

Nuclear power is neither necessary nor cost-effective

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South Africa can achieve electricity supply security without investing in further nuclear power, writes Anton Eberhard

SOUTH Africa can achieve electricity supply security without investing in further nuclear power. Alternative power sources are cheaper and they can also help us achieve our Copenhagen pledges to reduce carbon emissions. These are the outcomes of recent modelling by the University of Cape Town's Energy Research Centre that were presented at a high-level international energy meeting convened recently by the Stellenbosch Institute for Advanced Study. The modelling takes into account a number of new international developments.

Over the past few years, renewable energy prices have fallen dramatically. In part, this has been due to subsidies in countries such as Germany that have led to higher global production, including in China, and lower costs. In a sweet twist of fate, the investment costs of renewable energy technologies in emerging economies are being subsidised by consumers in Organisation for Economic Co-operation and Development countries.

South Africa's renewable energy independent power procurement programme has also seen prices fall. Between bid rounds one and two, wind prices fell 20% and solar 40%. South Africa has among the most favourable solar resources in the world and is well positioned to benefit from global technology developments. Profound changes are also occurring in the energy intensity of South Africa's economy. This is, in part, due to structural changes in its economy but also due to accelerated energy efficiency investments as electricity prices rise sharply from historical lows.

South Africa's power plan — the Integrated Resource Plan 2010 — is outdated. Many of its assumptions no longer apply and its recommended investment decisions are not optimal. It would result in surplus, stranded and expensive generation capacity.

Electricity demand growth has been much lower than forecast; it is still below 2007 levels. Less new generation capacity is now needed over the next 20 years. It is no longer urgent to make an investment decision on nuclear power, as implied in the old plan. New data on nuclear power, and on imported liquefied natural gas (LNG), delivered via purpose-built ships, show that gas is more cost-effective. There has been an explosion in international gas markets over the past few years. Gas power plants have lower investment costs than nuclear, can be built quicker and complement variable renewable resources. However, gas imports may adversely affect our balance of payments.

A new, updated power plan would look very different from the existing plan. Forecast electricity demand growth would be lower. No nuclear investments are envisaged. The new power choices gazetted by the minister of energy at the end of last year would not all be needed, at least not yet. In the future, there would be more imported LNG. Shale gas is not an option in the next five years until there are more data on the economically recoverable

resources and environmental effects in the Karoo. And piped gas, from the large new gas fields discovered off the coast of northern Mozambique, is probably not competitive with LNG sea imports.

The balance of capacity in the new power plan would comprise wind, solar, imported hydro and a modest amount of fluidised-bed coal plant. The appropriate combination of base-load, mid-merit and peaking plant can be provided with this generation mix at a lower electricity price than the existing plan (adjusting for new technology cost assumptions) while still meeting the carbon caps implied in South Africa's Copenhagen pledge.

Uncertainties about the future mean different investment strategies are needed. Risks can be minimised through investments in a diverse portfolio of modular, less-capital-intensive technologies, such as gas and renewables, that can be deployed rapidly and flexibly to meet changing demand patterns. Conversely, investments in lumpy, capital-intensive technologies, such as large coal or nuclear plants, run the risk of cost and time overruns and of under-or oversupply, depending on future demand variations.

Improving energy end-use efficiencies is the fastest and cheapest method of making existing generation capacity available for new loads. The potentials here are huge and typically not tapped without special attention of governments on appropriate regulations and incentive schemes.

A series of policy and institutional issues needs addressing. First, there is a need for a unified vision and policy for South Africa's electricity market. Few of the proposals in the energy policy white paper of 1998 have been implemented. A degree of competition for the market is being introduced through the contracting of independent power producers (IPPs). However, this is being done ad hoc. What is needed is a clear policy statement on the role of Eskom versus private IPPs in the future of South Africa's power sector. The competitive procurement of renewable energy IPPs has shown that prices can fall, but prices are still above international benchmarks. We need a more purposeful strategy for what we wish to achieve through the introduction of competing private power investors.

Second, the required institutional arrangements are not in place to procure and contract IPPs sustainably. The highly successful renewable IPP procurement programme — which raised R47bn in its first round and has resulted in 28 new renewable energy projects breaking ground — was managed largely by outside transaction advisers contracted by a National Treasury unit. The procurement of new IPPs with dedicated associated fuel sources (such as gas, coal or hydro) will be more complicated. What is needed is an independent market operator that, at the minimum, has responsibility for planning and procurement of new power. The Independent System and Market Operator Bill before Parliament, with necessary amendments, will begin to address these issues. The least risky option would be to combine power transmission assets with these functions.

Third, as already intimated, a new power plan is urgently required. The Department of Energy needs to urgently ask Eskom's planning professionals to revise and update the present plan. Fourth, there is no national gas strategy to guide the nature, location and sequencing of gas infrastructure. The National Planning Commission is willing to work with the Department of Energy and the Treasury to develop the inputs for such a strategy. This work is urgent given the more prominent role of gas in South Africa's new power plan.

Fifth, regulatory and metering impediments to installing own-generation systems, such as rooftop solar photovoltaic (PV) modules, with reverse grid feed-in, need to be speedily resolved. The dramatic fall in PV prices will lead to a quiet revolution in which individuals will make competitive energy choices without expensive subsidies.

Future investments in energy technology will dwarf those of other infrastructure sectors such as telecommunications, water and transport. It is vital that we get our decisions on capital expenditure right and that we execute these projects efficiently. The Energy Research Centre model outputs do not yet represent a new power plan. The outputs of models depend on input parameters and assumptions and, no doubt, there will be much debate and controversy around them. This is work in progress. But this is exactly what we need: a transparent process to interrogate and improve our confidence in our future power choices.

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