POWER GENERATION

Structure of the market needs to be revised to ensure least-cost energy

Rational arguments against nuclear do not always triumph, but an independent grid would unleash market forces, writes Anton Eberhard

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The battle for SA's nuclear and energy future is not over. While many South Africans welcomed the decision by the High Court in Cape Town setting aside international nuclear energy treaties and declaring the government's nuclear procurement programme unlawful and unconstitutional, President Jacob Zuma and his allies have not given up. Ultimately, the structure of SA's power market will need to change to ensure an optimal and least-cost energy mix.

Reforming the power sector will be the more important struggle.

Unfortunately, the court's nuclear decisions were essentially around procedural issues and it declined to rule on substantive matters, such as the rationality of procuring nuclear power when the government's own updated electricity plan says it is not needed.

The court ruled that the government was dilatory in tabling the earlier US and Korean nuclear agreements in Parliament and using the wrong constitutional provision in submitting the more recent Russian agreement, which should have been subject to parliamentary debate and approval. The court also found that the National Energy Regulator of SA (Nersa), whose

concurrence the energy minister requires before gazetting a determination to procure new electricity generation capacity, did not consult the public before agreeing with this crucial decision.

Zuma's government is likely to correct these procedural deficiencies through retabling the international agreements for parliamentary approval and restarting the procurement process. The energy minister could make a new determination in terms of the Electricity Regulation Act, based on a more favourable nuclear scenario in a new electricity plan.

Nersa could then go through the motions of consulting affected parties before offering its concurrence. But business groups, electricity consumers or civil society groups may mount new court challenges, this time on substantive grounds. Any administrative actions by the Department of Energy, Nersa or Eskom should meet the standard of being lawful, reasonable and procedurally fair.

Nersa has become a key institution amid the contestation of interests, power and ideas that are shaping our energy future. Though the Energy Regulator Act enjoins Nersa to act in a justifiable manner and independently of any undue influence or instruction, it will be difficult for the body to hold the line against a determined, kleptocratic elite. I know, from first-hand experience when I was an electricity regulator, of the subtle and not-so-subtle pressures that were brought to bear around regulatory decisions. In work across Africa, I have seen governments replace regulators to achieve more compliant outcomes.

The substantive grounds for blocking a nuclear procurement are formidable but may not be sufficient. Rational arguments, supported by computer models, don't always win the day. All the models that underpin SA's electricity plans show that nuclear power does not fit in a least-cost scenario. The models are backed by market prices revealed in actual long-term, fixed-price contracts. For example, Russia's Rosatom nuclear contract in Turkey is 12.35 USc/kWh, twice Eskom's average tariff.

SA's official electricity plan is prepared by Eskom modellers on behalf of the Department of Energy. The model shows clearly that our next least-cost investments in power stations should be a mix of solar plus wind plus gas power. This is not surprising: globally, and in SA, costs of solar photovoltaics have fallen more than 80% since 2008 and wind energy by 30%-40%. A recent solar auction in Chile achieved 2.9 USc/kWh; that is half Eskom's average tariff and a fraction of its new generation costs. Solar prices in the UAE are even lower at 2.1 USc/kWh. Who could have imagined this, even a few years ago?

It is undeniable that we are in the midst of a technological and market revolution in energy, yet many old professionals in the electricity industry fail to fully appreciate the implications. I still find it hard to accept how quickly renewable energy has broken through. When I started my professional career in 1980, oil price spikes sparked a new wave of innovation and investment in renewable energy.

I spent a year of my PhD doing field work in villages in the mountains of Lesotho on solar energy applications that would promote rural development. When I returned to the University of Cape Town, I started an energy research centre and post-graduate programme and sent my students out to rural areas to build and test new solar applications. We were full of hope, but as oil prices tanked the promise of superefficient and low-cost solar energy did not

materialise. Investment in renewable energy dried up and I became cynical about the prospects of solar and wind energy.

But in recent years everything has changed. Global climate change commitments and support mechanisms for renewable energy, especially in Europe, have created a new market for innovation and investment in solar and wind energy. Feed-in tariffs, initially at generous levels, encouraged mass production to meet new demand, resulting in significant cost and price reductions. In this environment it would be foolhardy to embark on large power investments in old technologies that would lock in uncompetitive prices for future generations.

The government's premier scientific establishment, the Council for Scientific and Industrial Research, has used exactly the same internationally accepted electricity planning model employed by the department and Eskom, with the same investment costs that Eskom's chief nuclear officer expects, but nuclear energy does not appear in a least-cost future mix. The University of Cape Town's Energy Research Centre runs a different model but it comes up with essentially the same result.

All the models also ensure that the least-cost mix meets specified security of supply standards. Variable but ultracheap energy resources can be complemented with flexible electricity generation and storage, including gas, bio-energy, pumped storage, hydro and demand-side management. More and more countries are demonstrating this is possible.

However, the structure of SA's power market constrains the rate at which new, more flexible, least-cost power options can be contracted. It is clear the government and Eskom favour big coal and big nuclear. Despite the Renewable Energy Independent Power Producer Procurement Programme attracting hundreds of billions of rand in investment, sparking local manufacture and ownership and transferring tens of millions to communities, our state-owned, vertically integrated utility blocks solar and wind energy contracts that are below its average cost of supply.

Globally, economies that are larger than ours, and even many emerging economies and developing countries, have restructured their electricity markets to accommodate more competition and private investment.

Independent grids have been established to contract state and private power generation on an equal footing and to allow system operators to respond more intelligently around balancing supply and demand, and to dispatch electricity at least cost. In principle, these power sector reforms are not difficult to implement. Eskom's power generation could become a separate subsidiary of Eskom Holdings and be spun off into a separate state-owned generation company, leaving an independent grid.

Through a simple amendment to the Electricity Regulation Act we could recognise direct agreements between generators, traders and large consumers. This is happening already and private companies are wheeling out electricity across the grid to industrial customers. But, through more explicit legal and regulatory recognition of these options, we could unleash a new market that stimulates innovation with lower prices while sustaining grid stability and reliability, as well as encouraging off-grid options.

However, these reforms have been resisted, even though they appeared in our energy policy as long ago as 1998. Constituencies that continue to promote big coal and big nuclear also generally support retaining a dominant, patronage-dispensing state utility. Now the consequences are there for all to see: brazen rent-seeking by a politically linked elite.

As I reflect on my career as an energy professional and policy adviser I marvel not only at the recent dramatic breakthrough of renewable energy and how nuclear power is now more often than not on the back foot, but I am also increasingly aware of how complex the political economy of the power sector is and how difficult reform has been. While the nuclear battle is by no means won and it is likely that we will need to maintain the legal thrust, the more fundamental and enduring challenge will be to restructure the sector so that we can move to a more sustainable power market that delivers least-cost, reliable power.

This struggle for institutional change will demand a penetrating understanding of political and economic interests, the way power is wielded through institutions and in policy and decision making, and the role of ideas and rhetoric in mobilising support for and against reforms. The nuclear battle has made clear that the struggle for a new energy future that will benefit all South Africans for generations to come is far from over. A luta continua!

• *Eberhard (@AntonEberhard) is a professor at the University of Cape Town's Graduate School of Business.*