BUSINESS DAY OPINION

Global advances in renewable energy sector should halt SA's rush to nuclear

Let's avoid any major financial and technological disasters such as Medupi and Kusile happening again

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SA is once again on the cusp of another major electricity production decision. We had better get this one right. Mineral resources & energy minister Gwede Mantashe recently announced that the government is pressing ahead with a nuclear build programme for SA as early as 2024. This despite ample reported evidence that renewables, particularly solar, can be built both rapidly and cost effectively in incremental amounts up to the scale envisaged (2,500MW) to closely match any supply/demand curve.

It is therefore of some concern that those major companies in SA that have been interfacing with the renewables fraternity for their internal electricity production will respond to the one month deadline to raise reservations in a responsible manner with sound factual numbers. We certainly need to avoid any major financial and technological disasters such as Medupi and Kusile happening again.

The coming decade looks set to become a golden one for renewables globally and could well cement their position irreversibly as the way forward for a threefold purpose: global electricity needs, containing the global temperature rise, and avoiding the drastic climate change.
Given the magnitude of research & development expenditure in what is arguably the largest project in world terms, namely the decarbonisation of electricity, the continuing decline in costs of renewables will certainly help restore the global growth lost during the Covid-19 pandemic.

The good news is that the driver for electricity production through renewables is no longer climate change but economics. A recent announcement of the lowest competitive tariff globally for a large-scale solar PV (photovoltaic) project in Abu Dhabi certainly illustrates this. It particularly signals the resetting of economies after the Covid-19 lockdown, especially in terms of any incremental increase in the supply/demand curve going forward.

Most significantly, the rapid construction capability of small- to large-scale renewable technologies avoids the long lead times of the large-scale fossil fuel and nuclear projects, with their difficult financial funding constraints. In addition, it shows that matching the supply/demand curve is relatively straightforward.

With favourable economics as the driver, this raises the issue of stranded assets. Increased reporting on the abandonment of coal plants has become relevant. The stranded asset value of fossil fuel electricity production, explained in a recent Cambridge Econometrics paper in Nature Climate Change, is said to be in the range $1-trillion to $4-trillion. Big numbers.

German Chancellor Angela Merkel has announced a $45bn subsidy for the early closure of Germany's coal fleet. Into the bargain, of course, is that Germany has long said it will close their remaining nuclear reactors in 2022. This illustrates that the current momentum in place for the full economic potential of renewables will be reduced by the need for stranded asset subsidisation.

The Abu Dhabi project price of $1.35c/kWh is echoed by prices set from Europe to the US. The Al Dhafra Solar PV project has a nominal capacity of 2GW and is set to come on stream in mid-2022, which is rapid by any standard. The project needs about 20km² (large-scale area requirements do put pressure on projects proposed for installation in highly populated and intensively cultivated areas. It should always be remembered that this capacity reflects a maximum output capability when compared to coal and nuclear plants).

The previous lowest tariff of 1.64c/kWh was set in Portugal in July 2019. Brazil's figure of 1.75c/kWh suggested that these levels were soundly based and not skewed by arbitrary adjustment of any economic parameters. A further sub 2c/kWh was achieved in a similar time frame in the Los Angeles area. Of significance in the Los Angeles project, however, is the costing of storage to overcome intermittency, which gives an aggregate price of 3.96c/kWh. This raises the question of whether intermittency avoidance, either by gas peaker plants or storage, should be included in the cost for any comparative figure. To put this into perspective, the competitiveness of these bids, even old and fully depreciated coal power plants, have levelised cost of energy (LCOE) values of about 3.3c/kWh.

A recent report by Wood Mackenzie has dimensioned the challenge faced by gas peakers in handling the intermittency problem of renewables. The expectation is that gas peakers could well become stranded assets by 2030, with energy storage becoming the cheapest option. Such a pace of technology development bodes well for storage as the preferred option. Storage is expected to grow from 3GW in Europe to 26GW in 2030 and to 89GW by 2040. Expected rapidly declining storage costs will have a dramatic improvement in the continuing competitiveness of renewables. For example, the newly developed flowable zinc-air battery is considered to be more favourable cost-wise for large-scale projects compared with the ubiquitous lithium ion storage system.

This rapid construction period for large-scale projects has already been achieved by global minnows such as Vietnam and Myanmar, now considered to be the two fastest growing economies in Southeast Asia.

For SA, renewables would surely help overcome load-shedding and the planned closure of our ageing coal fleet. However, the political opposition to significant introduction of renewables capacity (by trade unions) could well be a limitation for this route.

If anyone still needs convincing of the maturity of renewables on a large scale, the achieved figure for Germany for February 2020 was 62% electricity production by renewables with a daily maximum of 74%. Only a few years ago the renewable naysayers were suggesting difficulties were likely with the intermittent nature of renewables for grid transmissions up to 30%. Moreover, the success in such a short period would suggest that 100% renewables technologically is not a pipe-dream.

The state of fusion research is a question well worth explaining given the many billions of dollars already spent and tens of billions still to be spent to get to a pilot plant to project stage. Reaching the temperature of about 50-million degrees centigrade to initiate the fusion reaction requires considerable capital. Any perceived driver must be substantial to continuethis research. There is a substantial penalty for temperature and pressure variables in capital costing since the world's most advanced research reactor, ITER, is said to weigh as much as three Eiffel Towers! About 35 countries are reported to be involved in the consortium.

Safe, clean and limitless supplies of energy had suggested fusion as the ultimate way forward. Compare this with fission nuclear reactors. In terms of timescale, the first pilot-scale fusion nuclear reactor for assessment of project costs is not likely in this decade and possibly not before 2040 (despite having been on the drawing board for the past 70 years). The favourable position both technologically (room temperature and pressure) and economically for renewables technology could put any faith in fusion in jeopardy as the ultimate way forward.

It is also of interest to reflect on the maturity of wind energy. The Vattenfall utility of Sweden is reported by the Institute for Energy Economics and Financial Analysis (IEEFA) to be building a 1.5GW offshore wind farm project, the largest in the world, in the Dutch North Sea region within two years. The technology for turbines has now progressed from being secured to the ocean floor in shallow waters to include floating turbines for deep waters. A recent World Bank report has assessed the total technical potential of offshore at 15.6TW, split 5.5TW for fixed-bottom wind turbines and 10.1TW for floating-wind turbines (1TW equals 1,000GW or 1-million MW). The total world electricity production figure for 2019 is some 3TW.

The maturity of renewables is further illustrated by a study reported recently in the IEEFA. Indian solar sector tariffs have stabilised at rates about 20% to 30% below the cost of existing thermal power and half the price of new coal-fired power. This reinforces the fact that economics is becoming the preferred driver for renewables in the global decarbonisation of electricity production.

It is worth mentioning, however, that there are a number of notable research targets that provide enough confidence that the dramatic decline in the costs of renewables over the past decade is likely to continue. Cost effective, simple, low-maintenance technology, safe and limitless energy — what more could any country want as a technology option?

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