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ENERGY

# Innovative solar plus storage a boost for renewables domination

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Colin Wood

Electricity generation is one of the largest industries worldwide. Changes in technology development are important economic events globally. Relative to other countries, SA is still struggling in the decarbonisation of electricity production with alternative technologies.

However, the news is that a relatively new concept, solar plus storage (or minigrid, third generation), outlined by the World Development Bank in a report in June for low and middle- income countries will provide the local energy strategists with another conundrum to consider for an alternative market entry mechanism.

Currently, the headwinds being experienced by Eskom to take any alternative route are due to some perceived risk. Then again, the extended delay of the integrated resource plan (IRP) at Nedlac puts any renewable route under further pressure together with the need for financial discipline at Eskom.

However, by comparison in a high-income country, the possibility of dramatically lower prices using the solar-plus-batteries concept has already been outlined for the US (Forbes magazine July 1, 2019). At 1.997c/kWh for solar and 1.3c/kWh for power from batteries in a Los Angeles municipal project this is the lowest-priced power from solar in the US and possibly worldwide.

The 25-year contract is expected to be operational in 2023 and illustrates the potential of the concept. It is designed to be operational for 16 hours of the day. The visceral expert reaction is goodbye to gas, coal and nuclear.

We have to keep in mind that electricity production post-World War 2 received its first major alternative technology boost through the development of nuclear power. This feat of engineering reached maturity in the second half of the 20th century.

This has been particularly evidenced by the French nuclear model before the advent of renewables, whereby nuclear power as a base-load generator was entering a class all of its own with 75% of its electricity (at its peak) from nuclear. Since then, the urgency to decarbonise electricity worldwide for climate change has led to the shift to renewables (solar and wind).

The effect of safety measures on cost and the financial complexities experienced in adding large slugs of capital for nuclear have become evident. Such issues have led to the recent termination of a semibuilt nuclear project in Anglesey, Wales. This follows the cancellation of Oldbury, another Hitachi-based nuclear power station, together with Toshiba's Moorside which were designed to produce 15% of UK needs.

Prime Minister Theresa May's recent announcement of a target for zero greenhouse gas emissions in the UK for 2050 (the first major global economy to sign such a target into law) is therefore significant. The UK has already reduced its greenhouse gas emissions by 40%, while at the same time growing its economy. Such a remarkable change has seen the delinking of emissions from economic growth long been thought to be inextricably tied together.

A second major alternative technology thrust (initiated in the 1990s due to the climate change threat) is the development of renewable resources globally. This was further spurred by Stanford University Professor Mark Jacobson. His roadmap for 139 countries to change to 100% renewables by 2050 that also doubles the number of jobs, has added undoubted credence to renewables.

The rapid development of solar and wind technologies has been quite extraordinary, with dramatic cost reduction enabling market entry. Certainly, the further success of Germany's "Energiewende" renewables project is a testimony to German engineering. In its infancy, the naysayers pointed to the variability issue of solar and wind with particular reference to grid stability being the stumbling block.

However, the current achieved results of Energiewende against this perceived insurmountable backdrop have since proved invaluable. Over the first five months of 2019, Germany's renewable component stood at 47%. To illustrate the relative grid stability issue further, on Easter Monday 2019, the renewables component reached 77% with a momentary production of 100% at midday. On the nuclear front, therefore, Germany now plans to phase out its nuclear capability in 2022.

Many other countries are proceeding apace with the decarbonising of electricity. Scotland and Denmark have had periods of 100% renewable generation, mainly due to wind. Scotland achieved 74% renewables in 2018 and has set itself the target of 100% by 2020, while the Danish forecast is more conservative at 100% by 2050.

In terms of capacity, renewables technology has certainly reached maturity with some of the world's solar parks reaching 2,000MW and pushing on towards a goal of 5,000MW – the size of SA's infamous Medupi and Kusile coal-fired plants, which are struggling to be profitable. Needless to say, the contining cost overruns of these two plants plus their construction time delays have added to Eskom's financial distress.

An added advantage of renewables is the ability to add capacity in modular fashion whereby moderate incremental financial requirements with new additions can be added

with decreasing costs. This would keep in sync and closely follow the demand pattern, which is a difficulty with the mega-increments of nuclear.

The drive for dominance by renewable energy over nuclear as a global theme has been reinforced by the undoubted success of wind and solar. There is, however, a determined focus to reduce the capital cost bogey of nuclear by some leading universities, such as MIT in the US.

As an aside, perhaps this is not dissimilar to the technological market entry of the electric car in recent times against fierce competition from "Big Oil". The world's first hybrid was built and driven by Ferdinand Porsche in the early 1900s but it had to wait more than 100 years before acceptance of the all-electric car in the marketplace.

The World Development Bank report outlines the advance of renewables being accelerated by a modified approach. The report's focus is to outline an expected surge in a modified renewables technology (solar plus storage) using the minigrid concept. This anticipates a tenfold increase to 210,000 systems by 2030, powering 47-million people today to 490-million by 2030.

Specifically, for low to middle-income countries without a well-developed grid infrastructure, the solar-plus-storage concept to fuel a third-generation minigrid is seen to surge.

Meanwhile, SA's draft integrated resource plan (IRP), the blueprint for the country's electricity mix, has been "stuck" in discussions at Nedlac for months, most likely over the unions' requirement for a "just transition". Inevitable losses in "coal" jobs against new "renewable" job creation and the retraining of workers is the stumbling block. The figures say it all: SA's coal currently provides about 90% of electricity, with renewables contributing about 5%. The draft IRP's mix in 2030 stands at 46% coal and 25% renewables.

The minigrid concept, therefore, lends itself to an increasing independent power producer model which conflicts with the "just transition" model punted by the trade unions. Is it possible for Eskom to go the renewables route via the minigrid concept to cater for the trade unions' reservations? The financial issues at Eskom have probably reduced the utility's flexibility in considering this sort of strategic risk, but please, let's have no more Medupi disasters.

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