Eskom – Crisis and Opportunity 17 March 2020

Amidst Covid-19, an oil price war and financial market chaos, the CSIR (Council for Scientific and Industrial Research) has updated its data on load shedding. By Friday 13 March 2020, South Africa had already experienced 88% of the load shedding that it endured in the whole of 2019. I will write it again: 11 weeks into 2020, South Africa has experienced 88% of all the load shedding it endured in the 52 weeks of 2019.

An Animal Called EAF (Energy Availability Factor)

The reason for Eskom's insufficient supply is the poor performance of its plant as measured by EAF – a measurement of how efficient Eskom's power stations are. This has declined from over 88% in 2000 to 67% in 2019. The CSIR expects it to decline further to 64%. (There was a brief period in January when it was sitting at 61%.)

The IRP (Integrated Resource Plan), which is the Holy Grail of energy planning, assumes an EAF of 75%. Eskom's own forward planning assumes an EAF of more than 70%. It is certain that none of these 70%+ figures will be reached, primarily for two reasons.

Firstly, more than 50% of the power stations are now 37 years old and have been poorly maintained. Old equipment poorly maintained cannot deliver high EAFs.

Secondly, there are serious design faults with both Medupi and Kusile, preventing these two plants from operating at capacity. Eskom CEO Andre De Ruyter has revealed that boilers at both Medupi and Kusile must be modified by adding 12,5 metres to their height to reduce exhaust steam temperatures. The boilers are currently 130 metres tall and the temperature of the exhaust steam is 128°C, which is too hot and damages the equipment. The units can therefore not be run at full capacity. Each of the 12 generating units at Medupi and Kusile will have to be switched off for 75 days to add the 12,5 metres – that is 900 days of being switched off!

Poor quality coal also affects the EAF.

Maintenance Mantra

To improve its EAF, Eskom has adopted a 'philosophy maintenance' policy. The programme involves regular maintenance and refurbishment of equipment as prescribed by the original equipment manufacturers.

Ironically, more maintenance means more load shedding. Plants must be switched off to be maintained. De Ruyter therefore warned that load shedding will be with us for at least 18 months. He also warned that the maintenance programme must be supported (i.e. load shedding endured) or the country can expect regular load shedding of 8 000 MW (stage 8) by mid-2021 due to a further declining EAF.

Some electricity commentators are more sceptical than De Ruyter and allege that load shedding will 'carry on for five years'. The CSIR says it can take two to three years to end load shedding, depending on what decisions are taken (my emphasis). Those decisions relate to investment and the way the country organises its electricity industry.

New Capacity and a New Way of Doing Things

The only permanent answer to load shedding is new investment in new capacity. That, in turn, requires a wholesale re-organisation of the electricity industry in South Africa.

In what is probably its most important political decision to date, the Ramaphosa government (in power for 25 months this past weekend) has chosen exactly those options – new investment and reorganisation. The relevant policies were published in October 2019 already and reiterated by the President in December – regrettably most people missed it.

The government's energy plan, the IRP, envisages that 30 000 MW of new capacity will be procured by 2030, and 11 000 MW of old Eskom capacity will be closed. Nearly half of the new capacity (48%) will come from wind, 20% from solar, 10% from gas, and the balance from hydro, storage and coal. After December's stage 6 load shedding it was decided that a further 2 000 MW of emergency power will be procured, pushing the total to 32 000 MW.

Also published in October was the Eskom roadmap, which confirmed the break-up of Eskom into three entities: generation, transmission and distribution. In February, Minister of Mineral Resources and Energy Gwede Mantashe, who is significantly also ANC chairman and an ex-unionist, declared, 'There is no fight over that now, we all agree that there will be generation, transmission and distribution, each with its own board...'. The deadline for establishing the boards is 31 March.

The consequences of these policy changes are huge.

Firstly, it means more investment. To date, 6 000 MW has been procured from independent power producers. That brought investment of R220 billion (42% of which came from foreigners). If 6 000 MW brought R220 billion investment, 32 000 MW can conceivably bring in R1 trillion in investment, even allowing for cheaper technologies. The 32 000 MW is based on an EAF of above 70%. If indeed the EAF goes down to 64%, as the CSIR expects, much more than 32 000 MW will have to be procured. So R1 trillion investment is certainly not unrealistic.

Secondly, it means the end of Eskom's monopoly, and the introduction of competition in the electricity generation market. Eskom power stations will have to compete with one another in supplying power to the national grid – as will independent power producers (IPPs) and every other producer. The system operator will buy from the cheapest producers. That will wring a lot of cost and inefficiencies out of the system.

Thirdly, municipalities will no longer be compelled to buy power from Eskom, but rather from whoever can deliver at a good price. It is the end of the single-buyer model and another pillar of monopoly down.

Fourthly, production of power for own use has been made easier. The IRP provides for the equivalent of a Medupi or Kusile to be produced by 'own producers'. There are concomitant issues to sort out – primarily administrative procedures and energy transportation or 'wheeling' – but the direction is clear.

Fifthly, it will put South Africa on the road to green energy, enabling the country to meet its international climate change commitments.

In short, the Ramaphosa government's decisions will turn the electricity industry in South Africa upside down, generate billions in investment, and bring about the end of Eskom as we know it.

There are, of course, very strong vested interests that stand to lose a lot from these changes. Their opposition is vociferous, and one sees evidence of resistance all over. But the political homework has been done and I seriously doubt they will be able to stop the changes.

Implementation

To facilitate the above, several steps must be completed.

Firstly, the minister of minerals and energy must issue section 34 determinations stipulating how many MWs will be procured from each of the technologies (wind, solar, own generation, etc). These ministerial determinations must then be submitted to the National Energy Regulator (NERSA) for concurrence. Concurrence means NERSA must evaluate the minister's decisions, pronounce whether they are rational and in line with the IRP, and invite public comment on them.

This is the point at which citizens can have their say on for example nuclear power, fossil fuels, or green energy. The concurrence procedure is a restraint on the minister's discretion and promotes public participation in energy matters. It promotes rationality and transparency and is a good arrangement. The downside is that the procedure takes time – in a time of load shedding where frustration levels are high.

The minister informed Parliament on 19 February that the section 34 determinations have been done and are with NERSA for concurrence.

Once NERSA has given concurrence, work on new 'Bid Windows' can start. The last Bid Window 4 contracts are currently being completed and connected to the grid, and emergency procurement is under consideration.

Interest

It speaks for itself that most, if not all, of this investment for 32 000+ MW of new capacity will come from investors other than Eskom. Will they come to the party? The answer seems convincingly 'yes'.

By 31 January, 481 proposals had been received for emergency power procurement. If we apply the normal 80/20

rule (80% chancers and fly-by-nights and 20% serious proposals) it still leaves us with more than 90 serious contenders.

Among the proposals received was a proposal to convert current diesel generators to gas. Apparently, this is not technically difficult, can be done quickly, and will result in much lower running costs. Proposals were also received to import gas from Mozambique to replace coal-fired power stations in Mpumalanga, but these are of course dependent on international agreements with Mozambique. More broadly, gas helps to fill the need for base load. It can complement energy from wind and solar and together with storage provide base load. Over the next decade gas is going to become a big industry in South Africa.

Own Generation

For own generation below 1 MW no ministerial or section 34 determinations are needed – only NERSA registration. The regulator has received 132 applications, of which 75 have been approved and the remaining 57 are being processed. On average, NERSA takes 38 days to register these applications. The MW numbers are small – only about 42 MW. As Eskom tariffs rise, NERSA becomes more adept at processing, and technologies become cheaper, more and more people will engage in own generation.

For own generation above 1 MW a ministerial determination is likewise not required, but a licence from NERSA is. To date, the regulator has received 18 applications for a total of 116 MW. Most of them are incomplete because they do not have power purchase agreements, which is a requirement. NERSA has 120 days to finalise completed licence applications.

The CSIR recommends that own generation at scale and selling surplus into the grid is the quickest way to alleviate power shortages. For that, one will have to deal with concomitant issues like 'wheeling'.

Wheeling

Several big companies have submitted applications for licences to generate large quantities of MWs for own use. An issue to sort out here is 'wheeling' – generating power at one place and then using the Eskom grid to take the power to a point of consumption some distance away.

In 2017/2018, Sibanye-Stillwater got the go-ahead to generate 50 MW. It was never built because Sibanye-Stillwater could not transport the power from the West Rand to Rustenburg. It had to use the Eskom grid and could not get permission to do that. Eskom's De Ruyter has pointed out that the grid has not been built for the entry of independent power producers and it will cost R18 billion to upgrade the Eskom grid for that purpose. He reasonably wants to know: who will pay?

The to-be-split-out-of-Eskom transmission company will have to take responsibility for this investment, upgrade the grid, and recover the cost from those using the grid.

Sense of Urgency – Also For Politics

As mentioned earlier, the minister has done the section 34 determinations; NERSA must now give concurrence. Normal processes are being followed, but these are abnormal times. Processes must be sped up within the law and ways found to bring Bid Window 5 forward. Concomitant issues like wheeling and selling surplus own generation into the grid must also be resolved.

Politically it would be unwise to go into the 2021 local government elections with load shedding – particularly if that load shedding is stage 8. Likewise, it will be bad to approach the 2022 ANC elective conference with a load shedding albatross.

A Reflection

The story of Eskom and electricity in South Africa is also the story of delayed structural adjustment.

Twenty-one years ago, in December 1998, the Mandela government adopted a White Paper on energy. Many of the proposals now initiated by the Ramaphosa government date from then. Had the country heeded its own forward-planning and moved along with energy reform, it would have been in a very different space now. Yes, looting and stealing and corruption and inappropriate skills all contributed to the current problems. But, so did the fact that structural reform wasn't pursued in 1998. The lesson of timeous reform applies to other critical industries today, such as transport, telecommunications and ports (to name only a few).

So What?

- Load shedding will remain with us until at least the second half of 2021 and could conceivably be around at the time of the local government elections in 2021.
- The way out is not just better maintenance, which is now being pursued seriously, but also new investment.
- The quicker new investment comes online, the quicker load shedding can be terminated.
- The policies for such investment have been put in place, political support for it has been built, and what is now needed is urgent implementation.
- One must be realistic. Changing a system that has developed over many decades is complex; many implementation issues must be dealt with; new investment does not go into production overnight. It will take time. But there is no denying that change is coming.
- Energy is South Africa's own big crisis. It is also South Africa's big opportunity. At least R1 trillion in investment can be harnessed, new industries and jobs created, and energy security ensured, all of which will place the country on a whole new path.