Initial Financial Analysis of MES policy option

Prepared by Eskom Finance

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A technical, financial and economic analysis was conducted to assess the impact of the MES policy requirements and find the most technically and economically feasible option to comply with the legislation, whilst keeping the lights on and not compromising security of supply.

Various policy position scenarios were explored ranging from no legal indulgence granted by DFFE requiring immediate policy compliance or shutdown of plant, to full indulgence allowing the Nox & PM retrofits done with plant remaining on load prior to the retrofits being implemented and Sox suspensions until the end of plant life. The outcomes of this analysis within the constrained power system context, indicate that for all the scenarios evaluated other than the full indulgence, compliance to the policy is not possible without catastrophic economic destruction resulting from massive levels of unserved energy and load shedding.

Power System Costs Scenarios (R' Billion: Present Value 2021-2050)

		Total Costs	Total Cost breakdown			Sensitivity
	Scenario		Power System cost: (Capex, fuel, fixed & variable O&M)	Externality cost (Carbon taxes, Nox, Sox & PM)	Externality cost Unserved energy (based on cost of loadshedding)	Externality cost Unserved energy (based on cost of unserved energy)
		R'Bn	R'Bn	R'Bn	R'Bn	R'Bn
2d	No FGD – shutdown plants 2025	5 610	3 653	275	1 682	14 968
1	FGD – shutdown plant 2025 until compliant	5 534	3 491	373	1 670	14 873
2b	Indulgence until 2035	4 561	3 526	421	615	5 475
2a	Indulgence to end of life (Nox and PM shutdown until compliant)	4 466	3 384	467	615	5 473
2c	Full indulgence to end of life (Nox and PM installed on load)	3 810	3 280	503	27	238

The SA power system is heavily constrained requiring a combination of both the existing fleet and a large build programme of renewables and gas generation capacity to be built and connected to the grid, to replace both the capacity reaching end of life and cater for new electricity demand growth. There are a number of constraints limiting the pace and quantum of both new generation and grid capacity including a secure gas fuel supply and logistical infrastructure in place. Even assuming the most ambitious and aggressive expansion plans, the build rate of new technologies are not able to timeously replace the capacity without severely compromising adequacy and security of supply. Any slippage on the expansion plans will translate into further unserved energy.

The various scenarios result in unprecedented levels of load shedding and unserved energy at the cost of catastrophic economic destruction to the country. The unserved energy levels reach levels that ramp up to in excess of 80TWHrs per annum from 2025 (40% of Eskom's annual volume of production), with accompanied load shedding between stages 2-13, compared with the current 2021 year, "worst year" cumulative total of 2 TWhrs. These scenarios could lead to a significant risk of a national blackout. The magnitude of the peak of the power insufficiencies may require widespread power rationing rather than load shedding, with up to two thirds of the country switched off at a time for a minimum of 12 hours. To the extent that the system cannot be operated in this manner, makes calculations of unserved energy and load shedding a moot point.

The financial cost of this inadequate supply can either be costed at the cost of load shedding or the cost of unserved energy, depending on the circumstances:-

- The cost of load shedding (R10/ kWh) is a more conservative rate reflecting a context of short-duration temporary, planned and scheduled interruption which assumes that customers can plan-ahead and mitigate the risk of load shedding e.g. buy a generator. The cost is much lower than the cost of unserved energy.
- The cost of unserved energy (R90/ kWh) by contrast is much higher since it is more unplanned and sporadic. Customers are not able to make an alternative plan to ensure business continuity. Large industrials, mines etc. amounting to approximately 50% of the load, cannot compensate for protracted periods of insufficient supply, and if no substitute is available the cost of unserved energy (9x higher) would apply.

Neither of these approaches are compatible with the scale of loss of 40% of national electricity production, which implies a context of catastrophic economic destruction. The unserved energy within the calculations have been conservatively costed at the lower cost of load shedding, however given the quantums in question and likelihood of customers not being able to substitute, the impact is likely to be exponentially higher.

Under the scenario of retrofitting FGD to all plant in operation post 2030: the unrealistic implementation timelines which imply power stations being out of production both for reason of being non-compliant until retrofitting of emission abatement equipment, as well as for more than six months per unit for the construction process, result in large amounts of unserved energy that cannot be avoided even with building large amounts of gas to resolve the supply shortage. In addition the average age of the fleet is 39 years old, with limited economic life remaining post retrofit of the FGD, on old plant that was not designed for FGD. To make FGD viable on older plant, life extensions on the existing fleet would be required. Although the cost of retrofitting the FGD is extremely high, and even more so given the relatively short remaining operational life, this cost is dwarfed by the catastrophic economic destruction that would ensue.

From an Eskom perspective, notwithstanding the fact that the balance sheet is constrained, any Govt policy-imposed requirements are by law recoverable through the tariff, whereby the consumer pays for the cost of compliance (failing which, the taxpayer through a taxpayer funded subsidy/ injection).

The options being considered revolve not around emissions compliance or not – they revolve around the timing of the achievement of various levels of emissions. However it is meaningless to consider and analyse environmental compliance timeline scenarios which are technically impossible to achieve even assuming unlimited funding. These scenarios inevitably imply catastrophic economic destruction due to loss of up to 40% of electricity production for a number of years, which government should not allow to proceed. Regarding the scenarios which are technically possible to achieve, an appropriate balance needs to be found between the dates and timelines of compliance to air quality legislation vs. cost and customer affordability and risk to security of supply.