To Save or Not to Save SA's Ferrochrome Smelters and Eskom

Insisting on rationality, energy democracy and good governance

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Introduction and Executive Summary

The acute crisis regarding the possible closure of ferrochrome (and other) smelters in South Africa occurs at the intersection of our country's industrialisation and job-creation ambitions with environmental protection and sustainable development. An extremely intensive energy industry underpinning jobs, industrialisation, and significant export earnings has been driven by dirty, coal-based electricity that was cheap and has now become unaffordable (2–3 times too expensive to compete internationally). Medium- and long-term decarbonisation requires us to close our predominantly old coal plants when they reach the end of life (2030–2040) and replace them with renewable energy driven by our excellent endowments of solar and wind power. Our international competitiveness requires cheap electricity for ferrochrome smelters.

Today, only 4 of 48 ferrochrome smelters remain operational. While South Africa holds 72% of global chrome reserves, we produce only 19% of global ferrochrome – down from over 50% two decades ago. China, with no chrome reserves of its own, has overtaken South Africa by smelting imported ore. Between 30,000 and 68,000 direct and indirect South African jobs are at stake, along with more than R100 billion in annual export value.

The ferrochrome industry has signalled that it needs cheap power for the long term, at 62 c/kWh, while the cost paid by ratepayers in South Africa is R1.96/kWh. Global competitors are generally supporting their ferrochrome industries through artificially low electricity prices. If we agree on the imperative to save our ferrochrome industry, the decision must be made on how to do so. Do we subsidise the electricity price, do we keep our carbon tax or grant the ferrochrome industry relief through fiscal instruments? The revolutionary idea of driving the intensive energy industry with solar PV and BESS is on our doorstep and offers a progressive solution that, ideally, may be a few years away, allowing prices to bottom out somewhat.

Enter Eskom, our heavily indebted national utility, widely regarded as "too big to fail". Deeper investigation reveals that the ferrochrome question and the Eskom question are inextricably linked. If Eskom loses the ferrochrome industry now through either closure or migration to Solar PV and BESS, its faltering financials might go into freefall and precipitate an Eskom failure that seriously impacts the broader South African economy. While this is deemed true, nothing else matters. The decision made on ferrochrome needs to ensure that Eskom survives. This creates an incentive for Eskom to remain "too big to fail" rather than unbundle.

The grass that could get hurt as elephants fight is the carbon tax, meant to nudge our economy in the direction it needs to go in the long term: zero- or low-carbon. Recently, the media reported that the Minister of Electricity may propose that the carbon tax be paused (“scrapped”?) either for ferrochrome or altogether. NUMSA has voiced support for the former option.

If Eskom isn’t unbundled and on top of that the carbon tax goes, we could be having this exact conversation every five years or so, and the conclusion would always be the same: Eskom is too big to fail, we have to (again) extend the life of the Eskom coal plants and we cannot have a carbon tax because we would drive the smelters (Eskom?) out of business.

The good news is that the stars align for a transition to renewable energy around 2030, just as Eskom power stations start closing (9 GW in that year alone). This is roughly when solar PV and BESS are projected to get very close to meeting the 62c/kWh that smelters require for global competitiveness. With the carbon tax, the crossover point occurs much sooner – renewables become the optimal solution earlier. Our now-green ferrochrome would also be worth more in some markets.

We will describe and quantify the position of our chrome and ferrochrome industries in the world market, plotting how South Africa (with the bulk of global reserves) has steadily made less ferrochrome and exported ever more un-beneficiated chrome ore, primarily because of rapidly increasing electricity prices, while our global competitors have created favourable conditions for their ferrochrome smelters. Indeed, it was we who fed China with the ore they needed to surpass us as the global leader in ferrochrome production.

We then investigate the economics of ferrochrome production, noting the 4-5x value uplift from beneficiating chrome ore. Ferrochrome production is a global competition that rewards the lowest costs, with electricity as the major determinant. Subsequently, we quantify the loss to South Africa when un-beneficiated chrome ore (for which we had the capacity to smelt into ferrochrome) leaves the country un-beneficiated.

Untangling the Eskom challenge from the ferrochrome challenge, we then identify and quantify ways to address the smelter problem while temporarily ignoring the Eskom problem. These options range from restricting exports through legislation or fiscal structuring (‘’forced beneficiation’’), direct support from the fiscus, cross-subsidisation of electricity prices to match the uneven playing field of global competitors, exempting the ferrochrome industry from the carbon tax and/or subsidisation of the immediate construction of dedicated solar PV and battery storage plants. The last option proves surprisingly compelling, given that prices are still dropping.

With this framework established, the holistic problem (ferrochrome, including Eskom) is then considered. We detail our deep concern about the utility death spiral and Eskom's medium-term viability - absent of continued and very large government bailouts (shareholder equity injections running again into hundreds of billions of rands even after the imminent bailout of R230 billion). We stress the need to transform Eskom into an entity that is small enough to fail, so that rational, lowest-cost decisions for the economy can be made that also put us definitively on a path to net-zero carbon emissions. This would include maintaining the carbon tax, definitively unbundling Eskom, potentially creating a distinct balance sheet for Eskom Green and switching ferrochrome smelters (and potentially others) to solar PV and BESS, either embedded or dedicated and wheeled.

That leads to a discussion of the best road ahead. It is, broadly, a holding pattern for 4 – 6 years, with an aggressive transition to solar PV and BESS at that point (the decisions for which would need to be made from the end of 2028). There is a suite of policy decisions that could sustain a holding pattern, some of which would require decisive, well-considered action by the Treasury. It would be for Government to decide which holding pattern is most palatable.

Finally, we turn to governance and energy democracy. In the juxtaposition of ratepayer and taxpayer, the majority of readers of this article would fall into both categories. Most of us pay taxes and pay Eskom or our municipalities for electricity. Thus, whatever holding pattern is chosen to save Eskom, we will ultimately pay. The writers, each of you, and many other individuals and businesses. Given that we will be asked to pay, we should have a strong say in how this is done, and this is where common sense and good governance break down: Eskom is effectively asking us to bail it out, but without allowing us a say in how it would be done. The clear answer is to make Eskom smaller so that it is no longer too big to fail. This requires unbundling, the very solution Eskom is again trying to frustrate. The decision on the smelters needs to be made not in isolation, but in a manner that ensures a logical and feasible energy sector for the future.

1

Ferrochrome – A South African Beneficiation Industry at Breaking Point

It is good at the start to state the assumptions or axioms most will agree with: Job creation and job protection are important. South Africa wishes to industrialise more, not de-industrialise. Exports are good and balance of payments matter. Beneficiation of minerals before export adds value. The country needs the lowest cost electricity that is feasible. There needs to be equality and fairness in the electricity market and distortions need to be avoided. Fiscal policy can be used to promote the long-term interest of the country, even if it implies short term disruption.

These assumptions look innocuous until applied to the world of chrome and ferrochrome. Let us start with what they are. Chromite ore ($FeCr_2O_4$) is an iron-chromium oxide mineral found in the Bushveld Complex in great abundance, with South Africa estimated to have 70–80% of global reserves. It is essential in the manufacture of stainless steel and thus could be considered as a ‘’critical mineral’’ even before the term became so often used in the context of energy transition.

Mining is the extraction of this ore. This is a straightforward operation: dig, crush, screen, sell/smelt. Smelting is the manufacturing step. Chromite ore goes into a submerged arc furnace at ~2,800°C with carbon reductants (coke/anthracite). The carbon strips the oxygen from the chromite, producing ferrochrome - a manufactured alloy of ~50-70% chromium and ~30-50% iron. This is an electrometallurgical process that consumes enormous amounts of electricity. It is classified as manufacturing, not mining.

To sell or to smelt. Selling avoids any further capital investment, operational expense and also risk (think rising electricity prices), then yields perhaps USD 200–400 per tonne of ore depending on grade (the 2024 average export price was approximately USD 364/t). Smelting requires deep capital investment and a steady supply of affordable electricity that already made up at least 25% of input costs in the good old days of cheap electricity. This electricity

cost can be as high as 60% today in South Africa (lower elsewhere). And yet, for the brave-hearted who smelt the rewards are significant, with a value-add of about 4 - 5x. Ferrochrome sold at an average of approximately USD 1,691 per tonne in 2024 - roughly four to five times the price of the raw ore.

It is easy to see how South Africa once came to dominate world ferrochrome production. We have the bulk of global reserves. In the time when coal produced the cheapest electricity internationally, when South Africa had lots and lots of it and climate change and local air pollution did not matter, it was logical to conclude that our country has a competitive advantage in beneficiating chrome ore that would persist into the future.

Today, coal is often not the cheapest source of electricity and Eskom is in any event no longer able to produce coal-derived electricity at globally leading prices. Since the mid-2000s, the industry has faced tariff increases of up to 900% in ZAR and 300% in USD (in which ferrochrome is exported and sold) and the proportion of total production costs going to electricity has roughly doubled. Climate change and decarbonisation have become very important and South Africa has a steadily increasing carbon tax that presently adds approximately 3-5% to the production cost of ferrochrome (or 5-7% to the electricity they use, rising sharply as allowances are phased out in Phase 2 from 2026–2030). Renewables have boomed, with IRENA reporting that in 2024, 92% of new power was renewable and 91% of renewables projects delivered energy cheaper than fossil alternatives.

Moreover, Europe has instituted an import tax on the carbon intensity (climate impact) of products entering the EU. This is called CBAM or the Carbon Border Adjustment Mechanism and is meant to protect the European manufacturing base by avoiding heavy industry moving to countries with the lowest environmental standards. The logic is that if a country externalises or ‘’downloads’’ its costs on the global environment by using dirty energy, the CBAM will price this and equalise with countries or entities that produced in a less harmful way. The CBAM subtracts carbon taxes already paid in the country of origin, so South Africa gets a ‘’discount’’ equal to its carbon tax. Put differently, abolition of the carbon tax would have zero benefit for product exported to Europe. Approximately 15-20% of South Africa’s ferrochrome exports are destined for Europe and therefore subject to CBAM. The EU carbon price stands at approximately €85/tCO_2e, or roughly 15 times higher than South Africa’s effective rate of about €5.5/tCO_2e after allowances. This gap translates into a CBAM surcharge of approximately €200 per tonne of ferrochrome, representing roughly 12-13% of the product value. When indirect emissions from coal-based electricity are included in future CBAM phases, this could rise substantially.

Given all these headwinds, it is not surprising that only 4 of the 14 major (and also some 35 other, smaller) ferrochrome smelters are operational today. The survivors employ around 5,000 – 8,000 people, and indirectly 30,000- 50,000 jobs are at stake.

A comparison seventeen years apart shows the steady decline of smelting in favour of the export of ore.

TABLE 1 — SOUTH AFRICA'S FERROCHROME INDUSTRY: 2007 VS 2024

Base year	Total chrome mined (tonnes millions)	chrome ore beneficiated (going to smelters)	Global market share South Africa Ferrochrome	Electricity as % of production costs - SA	Export earnings ferrochrome (ZAR – billion)	Export earnings chrome ore (ZAR - billion)
2007	7 – 8	40 – 45%	50%	25 – 30%	30 – 40	5 – 10
2024	20 – 22	16 – 18%	19%	45 – 60%	100	85

This situation has deteriorated further since 2024.

We are increasingly feeding our smelting competitors with the ore they need to outcompete us because they have cheaper electricity and are generally more efficient. China imports the great bulk of its ore (about 80% of it) from South Africa to be the present, global leader in ferrochrome smelting. The ferrochrome it produces is roughly five times more valuable than the ore it buys.

There is an inherent conflict between South African smelters and exporters. The major ferrochrome players (Glencore-Merafe, Samancor) are vertically integrated - they mine their own ore and smelt it. They also buy additional ore on the market. There is no significant toll smelting model in SA - the smelter operators are principals, not service providers processing someone else's material.

Against this, the non-integrated chrome miners (Tharisa, Assore, and critically the PGM majors like Anglo Platinum and Implats who recover chrome as a by-product of platinum mining) mine chrome ore and export it - mostly to China. They benefit from unrestricted exports. The integrated smelters want cheap electricity while the non-integrated miners want free access to global buyers.

The momentum, through the confluence of the factors mentioned above, has been in favour of the exporters. Indeed, the smelters that remain were paying around ZAR 1,36/kWh (already a big discount on what the rest of us pay) for their electricity, while they say a long-term price of 62c/kWh is required to keep them globally competitive (let us say USD 4c/kWh). It is clear that SA smelters need much cheaper electricity. NERSA has approved an interim tariff of 87.74 c/kWh for the smelters for the next 12 months. This constitutes cross-subsidisation of the smelters by other electricity ratepayers. In the interim, the Minister of Electricity is rumoured to be working on a plan to provide the smelters with power at the required 62c/kWh. A statement appeared in the media late in February, providing the outlines of this plan[1]:

- The price will be 62c/kWh;

1. https://www.engineeringnews.co.za/article/details-of-eskoms-eleventh-hour-62ckwh-offer-to-ferrochrome-smelters-to-be-provided-in-nersa-submission-2026-02-27.

- Structure, duration, take or pay commitments, and risk and reward sharing to be discussed and agreed;
- To be submitted to NERSA for approval.

The sense one gets from terms like ‘’take or pay’’ and ‘’risk and reward sharing’’ is of the ferrochrome smelters and Eskom being chained together, to sink or swim together. This makes Eskom, which is presently ‘’too large to fail’’, effectively larger.

Furthermore, in this context, the question has now arisen whether the carbon tax should be suspended for ferrochrome (NUMSA is advocating this) or perhaps altogether (various reports in the media in weeks past). It should be noted we are talking about approximately ZAR 6-9 c/kWh today[2], potentially rising to ZAR 20-35 c/kWh by 2030[3], if the carbon tax trajectory is maintained and allowances are phased down as planned. This would only benefit the approximately 80% of SA exports not going to Europe and the CBAM. An exemption of only ferrochrome from the carbon tax would create a cross-subsidisation between taxpayers in addition to the cross-subsidisation between ratepayers.

In the background is South Africa’s USD 13.7 – 14.3 billion Just Energy Transition Partnership funding from a grouping including France, Germany, the UK, EU, Denmark and the Netherlands. It is meant to facilitate a transition away from coal and towards clean energy. Tinkering with the carbon tax and thus backsliding on energy transition is highly likely to cause tension with these funding partners.

Given this rather complex set of factors, the primary question is what policy options are available to South Africa and whether those presently pursued are indeed the most promising or best.

It can already be mentioned that South Africa has comparative, renewable energy endowments every bit as stupendous as the coal endowment that once supported the growth of ferrochrome production in the country and made it a global leader. Renewable energy has not been seen as a potential driver of smelters. But this may change, sooner than expected.

2. Carbon tax headline rate: R236/tCO_2eEskom grid emission factor: ~1.04 tCO_2/MWh Gross impact without allowances: R236 × 1.04 = ~R245/MWh = 24.5 cZAR/kWh But current allowances reduce the effective rate by roughly 65–75%, giving: 6–9 cZAR/kWh. In USD that's only about 0.4–0.6 cUSD/kWh (at ~R16/USD as at February 2026)
3. By 2030: Carbon tax rate rises to ~R462/tCO_2e. Allowances phase down significantly (to perhaps 30–50%) R462 × 1.04 × 0.50 to 0.70 = R240–336/MWh = 24–34 cZAR/kWh. In USD: roughly 1.3–1.8 cUSD/kWh (at ~R16/USD as at February 2026)

2

The Economics of Ferrochrome: Smelting Is Profitable, the Question Is Where

Ferrochrome is a lucrative business. In some ways it is like tourism. People have money and want to travel to where they can have the best experiences. The destinations compete to create the best packages of experience. The people go there, spend their money, the destinations become affluent and congested. Second and third best places get some people, fewer. Further down the ladder, reasonable offerings attract very few people, or nobody. The value is realised through the person leaving home with a bulging wallet and returning with a flat one.

In the case of chrome, it also leaves home from the mine with something like a bulging wallet. If it can be smelted and turned into ferrochrome, the chrome like the tourist can be relieved of its value.

Now, what makes an attractive destination for chrome ore? The cost of getting there, firstly. This can be nothing in South Africa or something significant in China. Then there is reductants/coke, there is labour/maintenance/logistics and then the big differentiator: Electricity, often making up 30–40% of the package. As said above, the latter is now significantly higher in South Africa. It is likely China is more efficient at the “residuals”, but it is in the combination of electricity price and transport costs that the winner is determined.

Let’s look at the electricity costs in South Africa and its major competitors:

TABLE 2 — GLOBAL FERROCHROME PRODUCERS: ELECTRICITY COSTS AND GOVERNMENT SUPPORT

Country	Electricity costs - USD cents/kWh	Domestic mining?	Share of global market %	Electricity subsidised?	CBAM position
China	5	Not significant	30%	Preferential industrial tariffs, especially in hydro-rich provinces	No domestic carbon price; not a major exporter to EU
South Africa	8 – 12 (standard); ~4 (at 62c target)	Yes – bulk of global reserves	19%	Yes, paying 35% less than others	Subject to CBAM; partial credit for domestic carbon tax. Coal-heavy grid = high embedded carbon
India	6 – 8	Yes	8 – 10%	State-level industrial tariff concessions; coal-based power relatively cheap	Subject to CBAM for EU exports; has coal cess but no comprehensive carbon tax
Kazakstan	4 – 5	Yes	8 – 9%	Low energy costs from domestic coal and gas; vertically integrated operations	Has domestic ETS with very low carbon prices; subject to CBAM
Indonesia	3 – 5	No; imports ore	5 – 7%	Yes - direct electricity subsidies for smelters	No domestic carbon pricing; minimal EU exports
Norway	3 – 5	No; imports ore	1 – 2%	No, industry built on long-term cheap hydro contracts	Within EEA – exempt from CBAM; already pays EU carbon price. “Green ferrochrome” positioning
Australia	8 – 12	No, fiscal support	<1%	Government assistance packages for strategic smelters	Has Safeguard Mechanism; no significant FeCr production or EU exports

While the avoidance of cross-subsidisation in the electricity sector is a worthy goal, it seems ferrochrome production knows no level playing field. The major global players are willing to skew things their way through electricity subsidisation or government support.

South Africa used to enjoy impregnable comparative advantage: The bulk of global resources, combined with very reliable and cheap electricity. This comparative advantage will re-establish itself in a few years when renewable energy is ready to drive heavy industry baseload in a competitive way. With South Africa’s resource endowments, Solar PV plus BESS is trending towards USD 5 cents/kWh and will likely get there in about 2030-2032 (solar PV alone is already below 5cUSD/kWh in most markets; the global average LCOE was 4.3cUSD/kWh in 2024 according to IRENA, and dispatchable solar with battery storage is currently

around 7.6 cUSD/kWh and falling rapidly). When that happens, South Africa will be able to produce green ferrochrome at prices competitive with ferrochrome of any colour whatsoever. Then, CBAM, carbon taxes and the like will greatly strengthen our comparative advantage and could potentially make us untouchable again.

What is needed is to find the best bridge for the next 5-8 years, safeguarding our industry and gradually building/de-mothballing greater production capacity again in anticipation of a favourable trading regime in the medium and long term.

3

The Real Cost of Doing Nothing: What SA Loses When Ore Leaves Un-beneficiated

It is tempting to view the ferrochrome crisis as a narrow industrial problem: a handful of smelters, a few thousand jobs, an argument about electricity tariffs. But the real cost of doing nothing extends far beyond the furnace gates. Every tonne of chrome ore that leaves South Africa un-beneficiated carries with it a substantial economic multiplier that is then realised in someone else’s economy.

Consider the arithmetic. South Africa mined approximately 21 million tonnes of chrome ore in 2024. Of this, roughly 6-7 million tonnes went into domestic furnaces to produce 3.3 million tonnes of ferrochrome. The remaining 14-15 million tonnes (more than two thirds of our production) was exported as raw ore, overwhelmingly to China. The raw ore fetched an average of about USD 364 per tonne. Had it been smelted domestically, it would have yielded roughly 7 million additional tonnes of ferrochrome worth approximately USD 12 billion at export prices (compared to the roughly USD 5 billion it earned as ore). The difference, in the order of USD 7 billion per year, is value-add that now accrues to Chinese smelters, Chinese workers, Chinese electricity companies and the Chinese fiscus.

Ferrochrome smelting is not just an energy-hungry furnace. It is a dense node of economic activity. For every tonne of ferrochrome produced, there are wages for furnace operators, technicians and maintenance crews. There are purchases of reductants, refractories, transport and logistics. There is electricity revenue to Eskom. There is corporate tax, income

tax from workers, VAT on domestic purchases and rates to local municipalities. Industry estimates suggest that of every USD 1,000 realised from a tonne of ferrochrome, roughly USD 700–800 circulates in the domestic economy before profits are remitted. When the ore leaves raw, we capture the mining margin and the shipping fee. The rest goes elsewhere.

This brings us to what can only be described as a strategic absurdity. South Africa holds approximately 72% of the world's known chrome reserves and produces 45% of global chrome ore. And yet we capture only 19% of global ferrochrome production - down from over 50% less than two decades ago. China, which holds essentially zero chrome reserves, now produces roughly 30% of the world's ferrochrome and is building more capacity. It does so almost entirely with South African ore. We are, in effect, the world's quarry: we dig the rock, we ship it, and somebody else makes most of the money.

The fiscal consequences are substantial. Each smelter that closes takes with it not only direct employment (typically 1,000-2,000 jobs per operation) but a wider web of indirect and induced employment estimated at three to five times that number. The workers who lose their jobs stop paying income tax and start drawing UIF and social grants. The municipalities in which they operated lose rates income and economic activity. The national fiscus loses corporate tax. The precise numbers are debated, but the direction is not: the net fiscal impact of allowing smelters to close and ore to leave un-beneficiated is almost certainly negative for the state, once the social cost of unemployment and forgone tax revenue is weighed against whatever saving is achieved by not providing cheaper electricity.

There is a further dimension that is often underestimated. Furnaces that go cold do not easily restart. A submerged arc furnace that has been shut down and mothballed requires substantial capital expenditure to recommission: relining, equipment refurbishment, rehiring and retraining of skilled operators who have long since found other work or emigrated. Some furnaces, once cold for long enough, become uneconomic to restart at all. The decision to let a smelter die is, in practice, often irreversible. And the ore body does not wait. While our furnaces stand idle, China and Indonesia are building new smelting capacity purpose-designed to process our ore. The market share we lose today will not easily be recovered tomorrow.

The short answer to what we lose when ore leaves un-beneficiated is this: almost everything except the hole in the ground. The mining jobs remain, and the port throughput, but the manufacturing value, the dense employment, the fiscal contribution, the Eskom revenue and the strategic position all migrate offshore. Doing nothing is not cost-free. It is, in fact, the most expensive option of all - it is just that the costs are diffuse, delayed and borne by people who do not all sit at the negotiating table.

4

Ways to approach and resolve the surface problem: Chrome beneficiation in South Africa

To return to our starting point, any support mechanism will be borne by electricity ratepayers, taxpayers. Here are the options:

- Restrict exports through legislation or fiscal structuring (‘‘forced beneficiation’’)

As said above, South Africa was mining about 21 million tonnes of chrome ore in 2024, smelting 6-7 million tonnes and exporting 14-15 million tonnes. The value uplift of smelting can be 5x. Blessed with such a high percentage of global chrome reserves, South Africa could take a cue from OPEC and try to manage its resource endowment to extract maximum value over the long term. This would imply export restrictions and/or forced beneficiation[4], constitute cartel-like behaviour and infringe on private sector and even individual rights in a manner that would be difficult to reconcile with our Constitution. It would likely also poke the (Panda) Bear, creating a possible trade conflict with China that would be ill-advised and impossible to win.

If we are looking for a more benign intervention that does not block exports, we enter the domain of minerals royalties, summarised in colloquial language as an export tax on un-beneficiated chrome ore[5].

The royalty legislation is concerned with minerals and does not even consider the beneficiation described here. It operates on the basis that in tax law, there is a distinction between mining and manufacturing. Ferrochrome production does not qualify as mining, thus the beneficiation process is beyond the scope of the royalty regime (but need not remain so)[6].

4. As an example, Zimbabwe during February 2026 banned the export of all raw minerals and lithium concentrates – see https://gazettengr.com/zimbabwe-bans-exportation-of-raw-minerals-lithium/.
5. The Treasury is the custodian of such efforts. South Africa levies a royalty on the disposal of minerals. At present, though, the mineral royalty dispensation is in its infancy. The system is arguably more of a stick than a carrot. Beneficiation is encouraged by levying a mineral royalty if a mineral is disposed of in a condition lower than the condition specified for that mineral in the royalty legislation. The extractor is penalised for not processing the ore itself or by way of an agent to the specified condition for that ore. Each mineral to which the royalty regime applies is listed, together with the condition at which it ought ideally to be sold after processing.
6. The royalty is levied in terms of a complex formula. The hypothetical gross sales and earnings before interest and tax are calculated when the notional condition is plugged into the equation. Precisely how this formula applies has not yet been bedded down by the courts. The matter is one of some controversy.

It is the principle that matters: A fiscal stick can be wielded if reasonable efforts are not made to create additional value on-shore.

If the principle is established in general terms but the existing framework is poorly applicable to ferrochrome production, are there already signs that change is afoot and help is on the way? The Davis Tax Review Committee reviewed South Africa's tax policy a decade ago, quite understandably became preoccupied with the complexity of the formula for calculating the royalty, rather than with whether the royalty regime was fit for purpose. The royalty regime had been newly introduced and therefore no data was available on which the Committee could definitively base any analysis as to whether the royalty regime was competitive. It is not. The Davis Committee decided to retain the current structure but recommended a rigorous economic analysis by the National Treasury. There has been no sign of this to date[7].

What is clear is that the National Treasury's rigorous economic analysis recommended by the Davis Tax Committee is long overdue. Government will have to decide whether the royalty regime is meant as a rent collection device, whether it will encourage beneficiation as seriously as government claims to be about it, and whether it sees its way clear to make provision for one of the most lucrative forms of beneficiation of South African ore, or whether some other special tax dispensation for ferrochrome smelters can be arrived at. If Treasury lacks the firepower to conduct such an analysis, it should appoint contractors to do so as soon as possible.

The advantage of using the royalty regime is that it is already based on the idea that different minerals should be treated differently. Ferrochrome production would not be a neat fit, but massaging the royalty regime has less of a bail-out character to it than procuring a special tax dispensation for ferrochrome smelters by other means.

While it is clear that incentivising chrome beneficiation in South Africa through royalties on un-beneficiated exports will likely take considerable time, given the non-ferrochrome interests that would have to be considered and consulted, it is still useful to quantify the positive, potential impact on chrome beneficiation. This is done in the next section, comparatively with tariff cross-subsidisation.

- Cross-subsidise electricity prices to match the uneven playing field of global competitors

7. Looking at mineral refining more generally, a statistical analysis conducted in the private sector suggests that the royalty regime's incentive is on its own terms insufficient to encourage miners to become refiners – see: The South African mining royalty regime: Considerations for modifying the system to balance its competing objectives by P.O. Akinseye and F.T. Cawood at https://www.saimm.co.za/Journal/v121n12p633.pdf. Ferrochrome smelters did not feature in that analysis. The difficulty of this type of analysis should not be underestimated, because confidentiality considerations preclude government from making data available on a disaggregated basis, leaving researchers with the burden of extracting data from the public domain.

This horse has probably bolted when NERSA allowed the 87.74 c/kWh interim tariff in January 2026 (approved by NERSA for 12 months). The Eskom Standard Tariff is ZAR 1, 96/kWh, displaying an enormous gap to the present ferrochrome tariff and even greater to the targeted 62c/kWh. The official line is that the difference would be paid not by the ratepayer but from the Eskom bail-out by Government (thus by the taxpayer). Our calculations show that the ZAR 10 billion from the bail-out ring-fenced for this would not even sustain the subsidy for (all) ferrochrome smelters for one year[8]. Then the Eskom debt would start to rise again until the inevitable, next Government bail-out.

This math matters when one considers the burden cross-subsidisation places on other ratepayers. As appears more fully from the next section, if the smelters pay 62 c/kWh while the average cost of supply is R1.96/kWh, in 2026, every other customer must absorb ~22 c/kWh in additional costs, equivalent to an 11% surcharge on the standard tariff. By 2030, as the gap widens and the non-smelter customer base shrinks, this surcharge rises to ~35 c/kWh. By 2040, it reaches R1.19/kWh - a 21% surcharge that is both economically and politically unsustainable, particularly when many of the remaining customers are municipalities that already cannot pay their current bills.

Cross subsidisation by other ratepayers can persist for a few years but not longer. A comparison with a royalty regime is instructive: Assume just for illustrative purposes that South Africa puts a 10% export royalty on the more than 15 million tonnes of Chrome exported annually, earning in 2024, ZAR 85 billion. The proceeds would be very considerable, in the billions of rands. If a commensurate tax benefit is developed for ferrochrome smelters to effectively support their production costs and make them competitive with the global competitors, Government would still be in a revenue-neutral position. Indeed, the level of the royalty could be solved for from time to time by what the need on the beneficiation side of the ferrochrome industry is.

Our approximate calculations show that about 11 billion kWh (11 TWh) were used to make 3.3 million tonnes of ferrochrome in 2024. Thus, an export royalty of 10% yielding say ZAR 4 billion after mining costs (illustrative estimate) would have meant that the electricity costs of ferrochrome smelting could have been supported by approximately 37 c/kWh, bridging some of the costs to provide the required tariff of 62 c/kWh.

- Exempt the ferrochrome industry from the carbon tax

Let us see how impactful such an intervention might be and what it might cost:

8. The gap between the standard tariff of R1.96/kWh and the 62 c/kWh target is R1.34/kWh; on the 12.8 TWh consumed by Glencore-Merafe and Samancor alone, the annual subsidy cost is approximately R17 billion — nearly double the R10 billion set aside. For the full ferroalloy fleet at 26 TWh, the gap is R35 billion per year.

At present the carbon tax accounts for 6–9 c/kWh of the approximately R1.09/kWh effective subsidy on smelter electricity. This could rise by 2030 to 25 - 30c/ kWh - not enough on its own to close the gap. Government would forsake approximately R0.7–1.0 billion in taxes per annum in 2026 and perhaps R4–6 billion in 2030. It would merely constitute another way to get taxpayers to carry ferrochrome smelters. Equity injections, royalty duties or tax credits would do the same job.

There are good reasons why abolishing the carbon tax is not a good idea. There is the very valuable Just Energy Transition Partnership that should not be jeopardised. Moreover, South Africa should be placed in a position to continue to be competitive in a changing world. Medium term, it is far more likely that the EU's CBAM taxes get copied in other jurisdictions than is the prospect that the entire globe declares climate change a ''hoax'' and goes into climate backsliding and denialism with the USA. The carbon tax is designed to solve a market failure and externalisation of costs onto the natural environment and thus the younger and unborn generations.

It is proposed that tinkering with it should be a last resort in efforts to save our ferrochrome smelters. We will return to the question a little later on.

- Subsidise the construction of dedicated solar PV and battery storage plants

The most progressive step possible now to save our ferrochrome industry is to immediately build solar PV and batteries to serve the industry with emissions-free and dependable power occasionally supplemented from the grid. Doing so, South Africa would become the world's premier manufacturer of green ferrochrome. It is true that the cost would be much lower in 2030 or so as solar PV and BESS pricing are steadily dropping. Still, the question is whether it would be cheaper to subsidise this option than to subsidise the electricity price of smelters or support them from the fiscus.

> **In isolation from the Eskom issue discussed in the next section, this is the best solution even though it would be considerably cheaper to implement in 2030 than now.**

A set of assumptions and calculations appear in Annexure A.

The conclusions from our analysis are as follows:

TABLE 3 — WHAT GOVERNMENT WOULD PAY AND GET FOR ITS MONEY

Outcome	Value
Cost to subsidise capital outlay for PV and BESS (2026 prices) – once off	ZAR – 77 billion
Avoided subsidy to smelters - annual	ZAR – 35 billion
Ferrochrome production restored	~5.0 Mt/year
Electricity price locked for 25 years	62 c/kWh (zero escalation)
Carbon tax liability	Zero (forever)
CBAM exposure	Eliminated — "green ferrochrome"
Eskom baseload dependency	Ended
Renewable energy deployed	8 GW solar + 2 GW / 24 GWh BESS
Annual export value protected	~R100B+
Jobs sustained	30,000–68,000 direct and indirect
Strategic positioning	Global leader in green ferrochrome
‘’Green ferrochrome premium’’	Worth more in some markets

The last thing Government might get for its money, however, is an Eskom in terminal and accelerating decline. This may well dictate that the progressive move to green ferrochrome needs to wait 4 – 6 years.

5

The Eskom Death Spiral and the deeper problem: Why Losing Smelters Accelerates the Utility’s Collapse

The above analysis has been done on the assumption that South Africa has a challenge in saving its ferrochrome smelting capacity and jobs and that efforts to solve the problem are ferrochrome problems distinct from Eskom.

In reality the demise of the smelters would dramatically worsen Eskom’s position to the extent of being an immediate, existential threat. We have, outside the present constellation of authors, written before about Eskom and its sustainability. See Op-Ed: Igniting Eskom Generation – turning the deadweight into economic fuel and Eskom's Leaders Promise Lower Prices. The Maths Says They're Wrong - https://www.linkedin.com/pulse/eskoms-leaders-promise-lower-prices-maths-says-theyre-frank-spencer-46wbf.

Many utilities globally are caught in the so-called ‘’death spiral’’. Eskom commences its struggle against this near-inevitability from an unfavourable position, being indebted to the tune of over ZAR 400 billion. A government bailout is aiming to dramatically decrease this (in an amount much larger than what is needed to subsidise solar PV and batteries for the smelters now).

A utility death spiral occurs when a power company with high fixed costs begins losing customers to alternative supply, whether rooftop solar, embedded generation, or private power purchase agreements. The utility must recover the same fixed costs (debt servicing, staff, grid maintenance) from fewer kilowatt-hours of sales. To close the gap, it raises tariffs. But higher tariffs make alternatives even more attractive, accelerating customer defection. Each departing customer increases the per-unit cost for those who remain, triggering another round of price increases and further defection. The spiral is self-reinforcing and, absent structural intervention, terminal.

Eskom's sales have already fallen 16% over the past decade[9] declining at roughly 3% per year. The most recent interim results (H1 FY2026) confirmed the trend[10]. Municipal debt to Eskom has ballooned to R105 billion as of September 2025 (tripling from R35 billion in just four years) despite a debt relief programme in which over 85% of participating municipalities are failing to meet their payment obligations.

Looking ahead, the pipeline of new generation capacity will accelerate these losses dramatically[11]. Counting together the sources of loss, Eskom's addressable sales could fall to 130–150 TWh per year, a 25–35% reduction from current levels on a business whose costs are largely fixed. Simultaneously, Eskom must decommission 9,900 MW of ageing coal capacity by 2030[12] and 58% of its current coal fleet by 2040[13]. The stations will stop generating revenue, but the fixed costs associated with them (staff retrenchment, site remediation, residual debt) do not disappear. The net income impact of the 2030 decommissioning tranche alone is estimated at ~R77 billion per year, roughly 20% of Eskom's current annual revenue.

Nobody has articulated a credible, workable plan for how Eskom navigates this contraction. The utility's current strategy amounts to tariff restructuring (shifting costs from energy charges to fixed capacity and connection charges), efficiency targets of R112 billion over five years, and hopes that the R320 billion transmission capex programme can be funded from operational cash flows. But the arithmetic is unforgiving: Eskom loses roughly R66 billion in revenue for every 48 TWh of sales that departs, while saving only about R9 billion in avoided coal costs, a net deterioration of R57 billion annually. Tariff increases large enough to close this gap would only accelerate defection further.

The smelter load sits at the centre of this crisis. Ferrochrome and ferroalloy smelters consume ~12.8–26 TWh per year (depending on whether one counts only the Glencore-Merafe and Samancor operations or the full ferroalloy fleet excluding aluminium). This represents roughly 2,000 MW of continuous flat demand: predictable, 24-hour baseload consumption that is among the most valuable load on Eskom's system. Losing this load, whether through smelter closure or migration to dedicated solar PV and battery systems, has identical consequences for Eskom's revenue line.

9. From 217.9 TWh in 2014 to 183.3 TWh in 2024.
10. Local sales dropped a further 3% to 86 TWh for the half-year. Revenue grew only because of a 12.74% tariff increase, the utility is running harder just to stand still. Non-technical losses (electricity theft, illegal connections, meter tampering) now account for 7.9 TWh per year, worth an estimated R17.5 billion in lost revenue.
11. Between REIPPPP Bid Windows 6, 7 and 8, Eskom's own renewable procurement, and the private bilateral PPA market, approximately 15–20 GW of new renewable capacity is expected to reach commercial operation by 2030. At a blended solar-wind capacity factor of ~30%, this displaces roughly 40–50 TWh of annual Eskom coal generation. Behind-the-meter solar (rooftop and commercial/industrial) is growing at 1.5–2 GW per year, with 4–5 GW already installed; by 2030 this adds another 15–25 TWh of displaced demand.
12. Hendrina, Camden, Grootvlei, Arnot, and Kriel.
13. We have assumed for calculation purposes another 6,000 MW in 2035 and the remainder in 2040.

At the current standard tariff of ~R1.96/kWh, the full ferroalloy smelter fleet would contribute roughly R51 billion in annual revenue to Eskom. Even at the proposed 62 c/kWh concessionary rate, the fleet would still contribute R16 billion, with the R35 billion shortfall funded through fiscal transfers or absorbed by the balance sheet. If the smelters depart entirely, Eskom loses all of it: the R16 billion in revenue at the concessionary rate, or the R51 billion at standard tariff, depending on the counterfactual.

More critically, the smelter load is one of the few things preventing Eskom's fixed-cost-per-kWh ratio from worsening catastrophically[14]. By 2030, Eskom could be attempting to recover R195 billion in fixed costs from as little as 110–120 TWh, implying a fixed cost per unit of R1.63–R1.77/kWh, an increase of 55–69% over current levels. As mentioned above, the cross-subsidy implications of supporting the ferrochrome smelters through ratepayers are stark and unsustainable, rising to R1.19/kWh (21%) by 2040 from each and every non-smelter ratepayer (and there is other intensive industry to consider).

If instead the smelters migrate to dedicated PV and BESS systems, Eskom faces an additional structural problem. The smelter load currently provides a stable revenue floor and a justification for maintaining generation capacity in Mpumalanga. Without it, the economic case for extending the life of ageing coal stations weakens further, the utilisation of the remaining fleet drops, and the per-unit cost of the coal fleet rises — all while Eskom must still maintain the transmission and distribution infrastructure to serve the same geographic footprint. The smelters may still require 5–15% of their energy from the grid as backup during prolonged cloudy periods and winter troughs, but this intermittent demand is far less valuable to Eskom than continuous baseload: Eskom must maintain the full capacity to serve the peak requirement while recovering revenue from only a fraction of the energy delivered[15].

Eskom's debt trajectory tells the same story. The R230 billion debt relief package was intended to reduce debt from R423 billion to ~R300 billion - a manageable level if the utility could subsequently fund its R320 billion five-year capex programme from operational cash flows and market borrowings. Losing the smelter revenue (or subsidising it at 62c) adds R17–35 billion per year to the funding gap. Over a decade, the cumulative smelter subsidy for ferrochrome alone (R261 billion) exceeds the entire capital cost of the solar+BESS system that could replace it. In the central scenario, Eskom's debt returns to R400–500 billion by 2035, requiring either further fiscal support (equity injections that would make the current R230 billion bail-out look modest), above-inflation tariff increases that break government's promise of single-digit increases, or both.

14. Eskom's fixed costs [debt servicing (~R80 billion/year), staff costs (~R40 billion for 40,000 employees), grid maintenance, and overheads] total ~R195 billion per year. Currently spread across ~185 TWh of sales, this equates to about R1.05/kWh. Remove the smelter load of 26 TWh and the denominator falls to 159 TWh, pushing the fixed cost per unit to R1.23/kWh, an immediate 17% increase in the unit cost of every remaining kilowatt-hour Eskom sells. If Eskom's sales are simultaneously declining at 3% per year from other sources of demand destruction, the compounding effect is severe.
15. This is precisely the dynamic that Eskom CEO Dan Marokane has acknowledged: "when the sun isn't shining, many rooftops draw from the grid. That grid capacity, we're maintaining it". Extended to an industrial scale that makes the problem orders of magnitude larger.

The conclusion is inescapable: there is no version of the smelter question that does not implicate Eskom’s survival, and there is no version of Eskom’s survival that is unaffected by the smelter decision. If the smelters close, Eskom loses its most valuable baseload customer and the death spiral accelerates. If the smelters stay on Eskom at 62 c/kWh, the cross-subsidy burden on other ratepayers and taxpayers grows until it becomes unsustainable. If the smelters migrate to PV and BESS, Eskom loses the revenue regardless - but South Africa gains a ferrochrome industry with a 20-year cost trajectory that is independent of Eskom’s fate. In all three scenarios, Eskom’s generation business contracts. The only variable is whether the smelters survive the transition. The smelter question and the Eskom question are, in fact, the same question.

> **The restated problem thus becomes: How best do we save the ferrochrome smelting industry in South Africa, given that Eskom also has to survive in some form for the time being?**

A few fundamental assumptions and axioms need to be spelt out and interrogated.

5.1 Why is Eskom too big to fail?

Eskom is still vertically integrated, responsible for the bulk of generation, all the transmission and a lot of the distribution in South Africa. While and for as long as Eskom is an integrated entity, a failure implies a failure in all these dimensions. The country goes without electricity, with catastrophic consequences.

5.2 What is Eskom’s decommissioning schedule?

This is presently the subject of litigation but even from the non-contested power station closures, the direction of travel is clear: Eskom loses a lot of capacity from 2030.

TABLE 4 — ESKOM COAL FLEET: UNCONTESTED DECOMMISSIONING SCHEDULE (BY 2030)

Power station	Installed capacity MW	% of total Eskom capacity	Decommissioning date
Hendrina	2000	~4.3%	2030
Camden	1600	~3.5%	2030
Grootvlei	1200	~2.6%	2030
Arnot	2100	~4.6%	2030
Kriel	3000	~6.5%	2030
Total uncontested	9900	~21.5%	

5.3 When or under what conditions would Eskom no longer be too big to fail?

If Eskom is truly unbundled, the ownership and operations of the country's generation assets supplying the national grid are sufficiently diversified. An Eskom failure would become manageable (at worst a minority of generation assets go offline until a new operator can step in. Transmission continues). All these developments are under way with IPP and self-generation rising dramatically in the last 15 years - while Eskom has not commenced a major new-build in many years. The Eskom coal fleet is getting to end of life, with a large chunk of assets having been slated for retirement by 2030. The National Transmission Company of South Africa has been launched, though the Minister of Electricity is seemingly resisting the crucial, last step of letting it own its own assets, currently still on Eskom's balance sheet. If we carry out the plan as envisioned, Eskom will be small enough to fail after 2030 or so.

5.4 What do we need to do to keep Eskom afloat while it becomes relatively smaller?

In short, we have to ensure that its historical debt stays manageable for the required period and that its cashflows are maintained. The former task is being achieved through a large government bail-out mentioned above. The latter is highly problematical and indeed may be intractable, as appears from the discussion above. That said, the problem builds up over a number of years and becomes acute towards 2030 – if Eskom does not lose the smelter load. The prospect of keeping Eskom afloat until 2030, without the smelters and without serious damage to our economy is however, in our opinion, unrealistic. But, if we stick more or less

to the decommissioning and unbundling schedule, Eskom's generation and transmission assets will be dramatically fewer after 2030 (Independent Power much larger) and an Eskom crisis would no longer necessarily be a South African crisis of "going without electricity economy wide".

5.5 How does the subsidisation of ferrochrome smelters buying electricity from Eskom compare to the subsidy required to supply ferrochrome plants from solar PV and BESS, over time, inclusive of the carbon tax?

The comparison hinges on three cost streams that apply to the Eskom path but not to the solar+BESS path: the tariff subsidy gap (the difference between Eskom's cost-reflective tariff and the 62 c/kWh concessionary rate), the carbon tax liability on coal-fired generation, and the implicit CBAM exposure on EU-bound exports. The solar+BESS path carries a large upfront capital cost (R157 billion in total, of which approximately R77 billion would fall to government as a capital subsidy, with the balance privately financed) but eliminates all three ongoing liabilities permanently.

For the Eskom path, we assume the concessionary rate of 62 c/kWh escalates at 6% per year (reflecting coal cost pass-through), while Eskom's average cost of supply escalates at 8% per year from the current MYPD6 level of ~196 c/kWh. The carbon tax is calculated using the effective rate after allowances, applied to Eskom's coal fleet emission intensity of ~1.05 tCO_2/MWh, with the effective rate rising as the tax-free allowances phase down under the Carbon Tax Act. All figures are for the ferrochrome fleet only (12.8 TWh per year).

TABLE 5 — ESKOM SUBSIDY VS SOLAR+BESS: COMPARATIVE COST TO THE FISCUS, 2026–2030

	2026	2027	2028	2029	2030
Eskom tariff subsidy gap (Rbn)	17.2	18.7	20.4	22.1	24.2
Carbon tax on coal electricity (Rbn)	1.4	1.7	2.0	2.4	2.9
Total annual Eskom path cost (Rbn)	18.6	20.4	22.4	24.5	27.1
Cumulative Eskom path cost (Rbn)	18.6	39.0	61.4	85.9	113.0

The solar+BESS base case requires R157 billion in total capital expenditure, deployed over a 3-4 year construction period. Of this, approximately R77 billion represents the government capital subsidy needed to bring the LCOE down to 62 c/kWh; the remaining R80 billion would be privately financed. Against the Eskom path, the cumulative subsidy cost reaches R113 billion by 2030, just five years in. The government's R77 billion capital outlay for solar+BESS is thus recovered in avoided Eskom subsidies within approximately four years. By early 2032 (approximately six years), the cumulative Eskom subsidy exceeds even the full R157 billion system cost. Every year thereafter, the Eskom path continues to accumulate R28–35 billion in annual costs (and growing), while the solar+BESS path carries only operations and maintenance costs of ~R2–3 billion per year.

Over a 10-year horizon (2026–2035), the cumulative cost of the Eskom path reaches ~R261 billion for ferrochrome alone - R104 billion more than the entire solar+BESS capital cost. Over the 25-year design life of a solar+BESS system, the Eskom path would cost well in excess of R1 trillion, compared to roughly R220 billion for solar+BESS (R157 billion capex plus R60–65 billion in lifetime operations and maintenance). The divergence is even starker if the carbon tax rate increases beyond current projections, or if Eskom tariff escalation exceeds the assumed 8% per year - both of which are more likely than not.

Two further costs apply exclusively to the Eskom path but are not captured in the table above. First, the CBAM surcharge on EU-bound ferrochrome exports, currently estimated at €200/tonne for coal-based production, which would cost the industry R5–8 billion per year and rising. Solar-powered ferrochrome eliminates this entirely. Second, the opportunity cost of prolonging coal plant life to serve smelter load - locking Eskom into maintaining ageing generation capacity that would otherwise be decommissioned, further entrenching the utility's structural decline. Neither cost appears in a line item, but both are real and both fall away under the solar+BESS path.

Without the carbon tax, the crossover point shifts later, to approximately year 8–9 rather than year 6. This is the scenario in which an exemption or suspension of the carbon tax for ferrochrome would delay the economic case for solar+BESS by 2–3 years, at the cost of higher cumulative emissions, continued CBAM exposure, and deeper Eskom dependency. It is, in our view, the wrong trade-off: paying more over a longer period to lock in a worse structural outcome.

6

The Policy Decision: Finding the Best Bridge across the Next 5 – 6 Years

Solar PV and BESS should clearly be the medium- and long-term solution to bring the burden of subsidising Eskom-supplied electricity to the ferrochrome smelters from old coal plants to an end. If not, at an eventually stupendous financial cost, we would be forced to extend the life of at least some old coal plants in order to keep the ferrochrome smelters going and Eskom would remain too big to fail for a longer period of time, just as it is actually becoming too big to save. Thus, exempting the ferrochrome industry from the carbon tax would be a very regressive step that would prolong high emissions and carbon dependency for longer than necessary. If the ferrochrome smelters sign take-or-pay agreements with Eskom for the long term, they would be contractually precluded from switching and the Eskom coal plants would likely see their lifetimes extended again and again. Eskom and the ferrochrome industry, chained together, would sink together.

For the next 4 – 6 years, Eskom’s support needs and the still-falling prices of solar PV and battery storage dictate that ferrochrome smelters should continue to receive power from the grid. The need to get the price point some 25c/kWh lower still in order to remain globally competitive can be achieved in three main ways. The (unlikely) first option is through continuous Government bail-outs, once the initial ZAR 10 billion ring-fenced for this purpose runs out (equity injections into Eskom from the fiscus). The second is deeper cross-subsidisation of the smelters by the electricity ratepayers of South Africa. The third would be

through the imposition of an export royalty on un-beneficiated chrome ore, or a refund similar to the one available in terms of the carbon tax regime. There could also be a combination of the above three interventions, especially if the Treasury should need time to finalise such a royalty regime.

Despite the feasibility of immediately moving to Solar PV and battery storage, protection of the Eskom balance sheet for the medium term makes this a non-viable option, given how much sales Eskom is already likely to lose.

Once South Africa has installed the green power required to produce green ferrochrome, our competitive position will be extremely strong. We have the bulk of global reserves, we will be unaffected by the CBAM or domestic carbon tax, and our superior solar resources will make the cost of our electricity competitive with most global competitors. If at that stage, international subsidisation of the electricity of our competitors is significant enough to require continued support of the smelters, a well designed and smallish royalty incentivising the beneficiation of chrome ore can create the fiscal buffer to allow support of ferrochrome smelters through a tax credit or similar support system. This would still leave the Treasury in a revenue-neutral position.

An institutional vehicle for this transition could be the new “Eskom Green” entity with a distinct balance sheet, ring-fenced from Eskom’s legacy coal liabilities. Such an entity would own and operate the solar PV and BESS assets dedicated to the ferrochrome fleet, contract directly with smelters at the target 62 c/kWh, and raise capital against bankable power purchase agreements rather than Eskom’s impaired credit. Structurally, this achieves two objectives simultaneously: it provides the smelters with a credible long-term power supply independent of Eskom’s generation business, and it creates a clean-energy asset base that can eventually be separated as part of broader unbundling. Eskom Green should sit as a standalone state-owned company, or perhaps as a public-private partnership; what matters is that the green ferrochrome programme is not entangled with the coal fleet’s managed decline.

7

Governance and the Unbundling Imperative: No Bail-Out Without Reform

The governance question is arguably the most important dimension of the smelter debate, and the one most likely to be overlooked in the urgency of finding a short-term solution. Every option discussed in this article, whether fiscal subsidy, tariff concession, carbon tax exemption, or capital investment in solar+BESS, involves the deployment of public money: ratepayer money, taxpayer money, or both. The amounts are not trivial. As we have shown, the Eskom subsidy path alone costs R18–27 billion per year, accumulating to R113 billion by 2030 and R261 billion over a decade. The solar+BESS path requires R157 billion in total capital, of which approximately R77 billion would fall to government, with the balance privately financed. In either case, the South African public is being asked to underwrite the future of an industry. It is entitled to conditions.

The first and most fundamental condition must be structural reform of Eskom. No intervention to support the smelters should be permitted to entrench Eskom’s current, vertically integrated structure or to serve as a justification for delaying unbundling. The logic is straightforward: Eskom is deemed “too big to fail” precisely because it simultaneously controls generation, transmission and a significant portion of distribution. A failure in any one of these functions threatens all three. If the smelter intervention locks in long-term power purchase agreements with Eskom’s generation business, it creates a contractual anchor that makes unbundling harder, extends the life of coal plants that should be retired, and perpetuates the conditions under which Eskom remains too big to fail. This is the worst possible outcome: spending hundreds of billions of rands of public money to preserve the very structure that created the crisis.

The price of public support (in whatever form it takes) must therefore include at minimum the following conditions:

- First, full transparency on Eskom's actual cost-to-serve for the smelter load. The 62 c/kWh concessionary rate was derived from Eskom's short-run marginal cost, but the true cost to the system (including capital recovery, grid maintenance, and the cross-subsidy burden on other customers) is roughly three times higher. Every rand of the gap must be accounted for, allocated, and reported publicly. NERSA's role in approving and monitoring any concessionary arrangement must be explicit, not circumvented through bilateral deals or ministerial directives.
- Second, cost-reflective tariff design that distinguishes clearly between marginal and average cost. The conflation of these two concepts has been at the heart of the pricing confusion throughout this debate. Eskom's marginal cost of coal generation (~50–62 c/kWh) bears no resemblance to the fully allocated cost of supply (~196 c/kWh). Pricing smelter electricity at marginal cost while recovering the balance from other customers is a policy choice, not an economic inevitability, and it must be made transparently and with democratic legitimacy — not presented as though 62 c/kWh is the "real" cost of power.
- Third, a binding commitment to restructure Eskom so that it is no longer too big to fail. This means completing the separation of the National Transmission Company of South Africa as an independent, asset-owning entity capable of raising capital on its own balance sheet. It means ensuring that the generation business is treated as what it is: a managed decline operation whose coal fleet will lose 58% of its capacity by 2040. And it means creating the market and regulatory conditions under which private generation, storage, and trading can compete on a level playing field, so that the country's electricity supply is never again dependent on the financial health of a single entity.
- Fourth, democratic accountability over how ratepayer and taxpayer money is deployed. The smelter subsidy (whether R10 billion from the fiscus, R261 billion over a decade from the tariff, or R77 billion in government capital subsidy for solar+BESS) would be public money. The public, through Parliament, NERSA, and civil society, must have a meaningful say in how it is spent, on what conditions, and with what accountability mechanisms. Eskom cannot be permitted to negotiate the terms of its own bailout behind closed doors while simultaneously resisting the structural reforms that would make future bailouts unnecessary.

The smelter crisis is real, and the economic case for supporting the ferrochrome industry is strong. But the decision on how to support it must be made as part of a coherent energy sector restructuring, not as an isolated crisis response that entrenches the status quo. South Africa has been here before: emergency interventions to keep Eskom afloat that became

permanent features of the economic landscape, each one making the next crisis larger and the structural reform harder. The R230 billion debt relief package was supposed to break this cycle. It will not do so if the smelter intervention simply adds another layer of open-ended subsidy to an unreformed utility.

The path forward is clear, if politically difficult: support the ferrochrome industry through the transitional period with the least-cost combination of fiscal, tariff, and royalty instruments - but make that support strictly conditional on Eskom unbundling, tariff transparency, and a credible timeline for migrating smelter load to renewable energy. The goal is not to choose between saving the smelters and reforming Eskom. It is to do both, because for now, neither is sustainable without the other.

Annexure A

Solar PV + BESS for South Africa's Ferrochrome Industry

A FIRST-ORDER CAPEX ESTIMATE FOR POWERING THE FULL RECOVERABLE SMELTING FLEET WITH 95% FIRM RENEWABLE ENERGY

> **South Africa's installed ferrochrome smelting nameplate capacity is ~5.6 million tonnes per year (per Glencore Alloys CEO Japie Fullard / Save SA Smelters, 2021). Current production stands at roughly 3.3 Mt (2024), with only 4 of 48 smelters operational.**

Specific electricity consumption (SEC) varies by technology:

Technology	SEC (MWh/t)	Examples
Conventional SAF	3.5–4.0	Most SA smelters
Premus (Glencore)	~2.5	Lion smelter (Steelpoort)
Blended fleet average	~3.3	Weighted mix

Cross-check: Lion smelter's four furnaces consume 4,800 MWh/day (200 MW continuous) to produce 720,000 t/year, implying 2.43 MWh/t — consistent with Premus efficiency. Glencore-Merafe holds NPAs for 800 MVA across all its smelters (2.3 Mt/year), equating to roughly 680 MW of real power demand at a typical power factor of ~0.85.

> **Not all 5.6 Mt can return. Some furnaces have been liquidated, demolished or degraded beyond economic repair. A realistic optimistic target: ~5.0 Mt/year, recovering most mothballed capacity while writing off the worst cases.**

Parameter	Value
Recoverable capacity	~5.0 Mt/year
Blended SEC	~3.3 MWh/t
Annual electricity demand	~16,500 GWh/year
Continuous power demand	~1,900 MW → ~2,000 MW (rounded planning figure)

Carried forward from the 100 MW reference design:

LOCATION: NORTHERN CAPE (UPINGTON/KATHU CORRIDOR)

SOLAR RESOURCE: GHI ~2,200 KWH/M²/YEAR; SINGLE-AXIS TRACKING CAPACITY FACTOR ~28%

RELIABILITY TARGET: 95% OF ANNUAL ENERGY FROM SOLAR+BESS (5% FROM GRID/BACKUP)

PV OVERBUILD RATIO: 4:1 (400 MW PV PER 100 MW FIRM LOAD)

BESS DURATION: 12 HOURS (SWEET SPOT FOR 95% FIRM SUPPLY IN NORTHERN CAPE)

BATTERY ROUND-TRIP EFFICIENCY: ~87% (LFP)

Component	Per 100 MW load	Scaled to 2,000 MW load
Solar PV (single-axis tracking)	400 MW	8,000 MW (8 GW)
BESS power rating	100 MW	2,000 MW (2 GW)
BESS energy capacity (12h)	1,200 MWh	24,000 MWh (24 GWh)

For context: South Africa's entire REIPPPP programme has procured roughly 6.3 GW of solar and wind to date across all bid windows. This programme would be larger than the entire renewable IPP programme — but not unrealistic by global standards. Saudi Arabia tendered 3.7 GW of solar in a single round in 2024, and China installs more than this in a month.

Unit costs reflect late 2025 / early 2026 pricing, with economy-of-scale benefits at programme level.

- SA utility-scale all-in EPC: ~$650/kW at scale (modules at $0.15–0.20/W; BOS + EPC + grid adds $0.40–0.50/W)

8,000 MW × $650/KW = ~$5.2 BILLION

Benchmark: Ember October 2025 all-in BESS capex of $125/kWh is for 4-hour systems. A 12-hour system benefits from spreading PCS/inverter costs over 3× more stored energy:

Component	4h system ($/kWh)	12h system ($/kWh)
LFP cells + racks	~55	~55
PCS / inverter	~18	~6
BOS / EPC / thermal	~32	~25
Interconnection	~18	~6
Total	~$125	~$90–100

For South Africa (logistics premium over Gulf/India): ~$100/kWh at scale.

24,000 MWH × $100/KWH = ~$2.4 BILLION

At this scale, significant transmission investment is required (new lines from Northern Cape to Limpopo/North West smelter corridors, or co-location with smelters using wheeling arrangements).

~$0.9 BILLION

Component	Capacity	Unit cost	Cost (USD)	Cost (ZAR)
Solar PV (tracking)	8,000 MW	$650/kW	$5.2B	R96B
BESS (LFP, 12h)	2,000 MW / 24 GWh	$100/kWh	$2.4B	R44B
Grid / transmission / land / dev	—	—	$0.9B	R17B
Total			~$8.5B	~R157B

PER KW OF FIRM DISPATCHABLE CAPACITY: ~$4,250/KW

IMPLIED LCOE AT SCALE: ~R1.10/KWH (~5.9 CUSD/KWH)

> **The ferrochrome industry has stated that a long-term electricity price of 62 c/kWh (~3.4 cUSD/kWh) is required for global competitiveness. If the unsubsidised solar+BESS LCOE is R1.10/kWh, what capital subsidy would government need to provide to close the gap?**

Component	R/kWh	Share
Capital charge (WACC 9%, 25 years, CRF 10.2%)	R0.98	89%
O&M (1.2% of capex)	R0.12	11%
Total LCOE	R1.10	100%

- O&M is irreducible at R0.12/kWh

ALLOWABLE CAPITAL CHARGE AT 62 C/KWH TARGET: R0.62 – R0.12 = R0.50/KWH

- Current capital charge: R0.98/kWh
- Reduction needed: R0.48/kWh

CAPITAL SUBSIDY AS PERCENTAGE OF CAPEX: R0.48 / R0.98 ≈ 49%

Metric	Value
Total system capex	R157 billion
Capital subsidy required (~49%)	~R77 billion
Residual capex (privately financed)	~R80 billion
Resulting LCOE	~R0.62/kWh

> **The subsidy need not be a pure grant. If structured as blended finance (concessional DFI loans + commercial capital), reducing the blended WACC from 9% to 5%, the LCOE falls to ~R0.80/kWh — meaning the grant component needed falls to roughly R30–35 billion rather than R77 billion.**

Financing scenario	Blended WACC	LCOE	Grant required
Fully commercial	9%	R1.10/kWh	R77B (~49% of capex)
Blended concessional	5%	R0.80/kWh	R30–35B (~20% of capex)
Deep concessional (JETP-type)	3%	R0.65/kWh	R5–10B (~5% of capex)

ESKOM'S DEBT: R400 BILLION+. THE SMELTER LOAD (~2,000 MW OF FLAT 24/7 DEMAND) IS ONE OF THE FEW THINGS PREVENTING THE DEBT-PER-CUSTOMER RATIO FROM WORSENING. LOSING IT ACCELERATES THE DEATH SPIRAL.

> **JETP commitment: R250–265 billion ($13.7–14.3B). A R77B solar+BESS programme for industrial decarbonisation is precisely the kind of project JETP was designed to fund. It ticks every box: coal transition, job preservation, clean energy deployment, and export competitiveness.**

> **Annual cost of the interim tariff gap: ~R10 billion/year (per Moneyweb reporting on the 87.74 c/kWh approval). That covers 12 months with no long-term solution. R77B buys a 25-year fix — equivalent to less than 8 years of the interim subsidy with zero residual value.**

> **Fiscal cost of doing nothing: If the smelters close, the lost GDP contribution is ~R41 billion/year, lost Eskom revenue ~R14 billion/year, and the state picks up unemployment costs for 30,000–68,000 affected workers. The subsidy pays for itself in under three years of avoided losses.**

Outcome	Value
Ferrochrome production restored	~5.0 Mt/year
Electricity price locked for 25 years	62 c/kWh (zero escalation)
Carbon tax liability	Zero (forever)
CBAM exposure	Eliminated — "green ferrochrome"
Eskom baseload dependency	Ended
Renewable energy deployed	8 GW solar + 2 GW / 24 GWh BESS
Annual export value protected	~R100B+
Jobs sustained	30,000–68,000 direct and indirect

Outcome	Value
Strategic positioning	Global leader in green ferrochrome

Solar-powered ferrochrome would carry near-zero Scope 2 emissions. In a world where CBAM prices EU-bound product at ~€200/tonne surcharge for coal-based production, and where stainless steel producers (Outokumpu, Aperam, Acerinox) are actively seeking low-carbon ferroalloy supply, South African "green ferrochrome" could command a premium rather than a penalty. The CBAM surcharge alone, avoided on ~15–20% of exports destined for Europe, would be worth roughly R5–8 billion per year to the industry.

Question	Answer
Recoverable smelting capacity	~5.0 Mt/year → ~2,000 MW continuous load
Solar PV required	8,000 MW (8 GW)
BESS required	2,000 MW / 24 GWh (12-hour duration)
Total capex	~R157 billion ($8.5B)
Capital subsidy for 62 c/kWh (grant)	~R77 billion (49% of capex)
Capital subsidy (blended concessional)	~R30–35 billion (20% of capex)
Payback vs cost of inaction	< 3 years

Note: This is a first-order engineering estimate based on publicly available cost benchmarks (Ember, IRENA, BNEF), Northern Cape solar resource data, and industry production statistics (Mining Weekly, Glencore-Merafe, Minerals Council SA, FAPA). A bankable feasibility study would require detailed hourly simulation, site-specific resource assessment, grid integration and transmission studies, smelter-by-smelter load profiling, and updated equipment quotes. The analysis assumes current technology and pricing; costs are expected to fall significantly by the time such a programme could be fully deployed (2028–2032 timeframe).