

When considering an application submitted under the EIA Regulations (GNR 982/2014), the relevant competent authority must take a number of factors into consideration, including the need for, and desirability of the activity.

The need and desirability of this Project is discussed below, including strategic plans, frameworks and policies applicable to the area and Project.

## 2.1 NEED AND DESIRABILITY

### 2.1.1 *Project Background: South Africa's Energy Crisis*

Electricity consumption has outpaced power system capacity building in South Africa (Independent Power Producer (IPP) Projects, n.d.). As a result the country has been experiencing severe electricity supply constraints since 2008.

To maintain system stability, load shedding in the form of scheduled rolling black outs are instituted when required, but with negative implications for the economy (IPP Projects, n.d.). This was also the commencement of steep price increases which placed a heavy cost burden on intensive electricity users at a time when commodity prices were dropping. China became a major exporter of steel and targeted traditional export markets.

The National Development Plan (NDP) is a long term (2030) development plan and aims to eliminate poverty and reduce inequality by growing an inclusive economy, building capabilities, enhancing the capacity of the state, and promoting leadership and partnerships throughout society (RSA, 2012). The NDP requires the development of 10,000 MW of additional electricity capacity to be established by 2025, against the 2013 baseline of 44,000 MW (IPP Projects, n.d.). This plan presents the overall national power generation plan.

An Integrated Resource Plan (IRP, 2010) has been developed in addition to the NDP. The IRP outlines the preferred energy mix to meet electricity needs over a 20 year planning horizon to 2030 (IPP Projects, n.d.). In terms of gas turbine power, the IRP highlights the need to commission 2,370 MW with Combined Cycle Gas Turbines (CCGT) technology and 3,910 MW with Peak-Open Cycle Gas Turbine (OCGT) technology by the end of 2030.

In May 2011, the Department of Energy (DoE) gazetted the Electricity Regulations on New Generation Capacity ("New Generation Regulations") under the Electricity Regulation Act, 2006 (Act No. 4 of 2006) ("the ERA"). Section 34 of the ERA and the New Generation Regulations enable the Minister of Energy (in consultation with the National Energy Regulator of

South Africa (NERSA)) to determine, *inter alia*, what new capacity is required (IPP Projects, n.d.).

These determinations specify that new generation capacity should be procured from, *inter alia*, hydro, coal and gas sources to support South Africa's baseload energy mix and that new generation from gas and cogeneration should be part of the medium-term risk mitigation project programme. The proposed ArcelorMittal Saldanha Steel (AMSS) Gas Fired Power Plant Project is thus aligned with the Government's vision for additional power generation in the country. The Project will:

- Initially reduce AMSS's power need off the national grid, by enabling it to be more self-sufficient;
- Further meet the demand for power of other users by providing excess power to the grid;
- Contribute towards the requirements of the IRP in terms of gas power production; and
- Reduce environmental impacts associated with the generation of baseload power through coal and large hydro-dam projects by providing an environmentally cleaner and less harmful alternative.

### 2.1.2 *Alternative Energy Sources*

AMSS requires power at a consistent and guaranteed forward price in order to continue operating beyond 2018. A comparative analysis of alternative methods of generating power was undertaken by AMSS. Based on the needs and desirability for the project, four key criteria were defined for the comparative analysis, as follows:

- Cost per MW hour;
- Baseload power requirement;
- Time to first power; and
- Difficulty of obtaining regulatory approval.

The following power generation options were considered:

1. Nuclear – This option is not open to private investment from a regulatory perspective. The cost of this option over a 50 year time horizon is competitive. However, the option was not considered viable because the regulatory framework is very onerous and this option has a very high initial capital expenditure (CAPEX) cost. Also, the time to first power is more than 10 years, which is too long considering the needs of AMSS within the short term.
2. Coal – This option was not considered viable based on the already high greenhouse gas (GHG) emissions from the plant without adding to the difficulties of achieving environment emission requirements (National

Environment Management: Air Quality Act, 2004) and the feasibility of locating a coal fired power station so far from a source of coal.

3. Renewable power (solar PV, concentrated solar or wind energy) – This alternative was investigated in detail. Renewable power generation facilities cannot provide baseload power (without backup storage, but reliable and cost effective battery solutions are not available at present) so the cost of this option becomes too high for an individual off-taker. This would not reduce the reliance on Eskom in the time periods of no generation in order to provide baseload power. In order to achieve total independence, back up storage is required which increases the costs significantly and makes this option too expensive to implement.

With regard to the provision of solar power, when comparing like for like capacity with all the competing technologies, solar has consistently shown to be undesirable; this mainly due to a high capital cost per kW to plant factor ratio. Where solar PV has penetrated the market significantly, high electricity tariffs reflect the cost of energy and thus can only be effectively utilised in wealthier economies where the consumer pays a premium or else the government subsidises the higher electricity cost. Other constraints to solar energy options are:

- Changes in output with weather elements.
- Not stable during disturbances.
- Inability to change output on demand and with demand.
- Requires large amounts of land.

It should however be noted that the Project will include solar PV panels on the roof of the buildings. The integration of solar panels will be undertaken after the commissioning of the main plant. It is estimated that up to 500 kW of solar panels can be installed on building roofs, generating up to 800 MWh of solar power per year which will help dissipate the plant's parasitic loads <sup>(1)</sup>.

Winds are irregular, both by season and vary widely diurnally. They also as per solar projects require large tracts of land for the generation of adequate power to make projects viable.

4. Liquid hydrocarbon fuel derivatives and biofuel options – This alternative involves the use of fuels other than gas to fire a power plant. This is not a viable alternative in this case as the cost of generation is unfeasible even when considered in combination with renewables.
5. Waste heat recovery on existing production processes at AMSS – Steam options and lower temperature regimes were considered, but these

---

(1) Parasitic load refers to the load generated by activities at the power plant which consume electricity, such as the office buildings, workshops, water treatment plants, etc.

technologies have low efficiencies and become uneconomical due to long payback periods. This option was therefore not considered viable.

#### *Energy mix for this Project*

With regard to the partial use of renewables for energy generation for this project, the following should be noted:

- Alternative renewable energy sources will not present economic benefits, rather environmental benefits. This proposed development has been assessed to have very few significant associated impacts and therefore the consideration of alternatives to minimise the environmental impacts while significantly increasing the cost of electricity does not appear justified from an overall cost benefit analysis perspective;
- If gas import volumes are reduced to make use of renewable sources, the gas cost advantage is diminished due to reduced economies of scale;
- The land currently proposed for the project is not sufficient to benefit from the economies of scale that an appropriately sized renewable energy project would provide. A further discussion on location alternatives is provided in *Section 4.1.2*;
- Power supply to AMSS would be unpredictable;
- There would be an unquantifiable annual load factor for the gas turbine consumption and therefore no contractual commitment for the import of natural gas would be possible, thus increasing the cost of gas-generated power for the project.

### **2.1.3**

#### ***Compatibility with Local Development Planning***

The proposed site for the development of the power plant is in close proximity to both the Port of Saldanha and Vredenburg, within an area referred to by the West Coast District Municipality Spatial Development Framework (SDF, 2014) as the 'growth engine' of the municipality. The SDF also states that the Port of Saldanha is the key economic catalyst within the district and its utilisation and potential should be optimised, through promotion of initiatives such as the Industrial Development Zone (IDZ), better use of the back of port areas and promotion of oil and gas industries.

The Saldanha Bay Local Municipality's SDF (2011) indicates that the proposed power plant site falls within what is referred to in the SDF as a 'planned industrial corridor' (see *Figure 2.1*). The location of the proposed facility therefore is in accordance with the current district and local municipal plans for development.





The current Eskom electricity situation, which affects both the availability as well as the cost of electricity, has resulted in a particularly challenging situation for the manufacturing industry in the Saldanha area. The timing of the energy crisis within South Africa, in combination with the structural changes in the global commodity markets, has the potential to severely constrain the manufacturing industry and, specifically, the companies focused on the export market (where cost pressures cannot be given through to the customer).

AMSS has tried to negate the effect of rising electricity cost through actively engaging in energy efficiency programs run by the Department of Trade and Industry (DTI), United Nations Industrial Development Organization (UNIDO), National Cleaner Production Centre of South Africa (NCPC) and DoE. The plant made significant improvements and has been used as a case study to illustrate what is possible in an industrial environment with energy efficiency <sup>(1)</sup>. However, there is little opportunity for further improvement without significant capital investment in technology.

Electricity prices in South Africa started to rise steeply from 2007 and have increased by 328% up to 2015 / 16. The price escalation going forward is expected to be higher than the Consumer Price Index (CPI) for the next five years. This price path is unaffordable to AMSA (ArcelorMittal South Africa) and in particular AMSS (ArcelorMittal Saldanha Steel). AMSS is competing mainly on the export market and upward electricity cost pressure with high price competitiveness in the international market has necessitated AMSS to actively control its cost drivers.

AMSS investigated an electricity generation option which would be cheaper than the regulated prices and which could introduce natural gas into the production process to unlock efficiency improvement not possible before due to the lack of available affordable fuel gas. Saldanha Steel widened its approach to include all possible electricity users and gas users to drive growth in the Saldanha Industrial Development Zone and surrounding areas. This enabled achieving an economy of scale to warrant investment into gas supply, landing, storage and regasification infrastructure at a pricing framework lower than open market forces. It also justified the construction and operation of a large enough power station of more than 1200 MW to provide security of supply in an area where Eskom experience high line losses of up to 25%.

The intention was to address shortages in supply to existing and potential new users in the area who are being restricted by the lack of secure supply for larger new connections at competitive Megaflex energy prices. The upgrading of Eskom supply infrastructure is planned until at least 2025, according to Eskom LT supply infrastructure planning document.

---

(1) ArcelorMittal implemented 15 energy projects which saw the plant reduce their LPR consumption by 40%. They were awarded an Eskom *eta* Award in 2013.

Eskom is currently operating an OCGT plant at close to 60 percent capacity with enormous associated cost of diesel (as a primary fuel). The proposed CCGT power plant in Saldanha will have efficiencies of over 62 percent and it will use natural gas as the fuel source. This will significantly reduce the cost of electricity. Furthermore, a study undertaken by Deloitte shows that the viability of importing LNG requires at least a 800 MW CCGT plant to be installed in the Western Cape in order to create a gas market and to lower the energy costs. The only source of base load power in the Western Cape comes from Koeberg, which is supplying 1940 MW to the grid. An additional 2050 MW is imported from Mpumalanga from coal fired power plants. Line losses have been reported at 20 percent, meaning that over 400 MW of electricity is lost during transport between Mpumalanga and the Western Cape.

The need to generate sustainable and affordable energy, given that the rapid rise in electricity prices is threatening the viability of many industries in South Africa. The lack of additional electricity capacity from Eskom is preventing new capital investment in all regions of South Africa. There is a need to generate energy that is clean and stable, while at the same time cost effective, so as not to impact the people of South Africa and to stimulate industrial and economic growth to create jobs. However, rising input costs particularly electricity tariffs and the falling Rand are placing enormous constraints on industrial and economic growth, where margins are spread thin with the decline in international economies.

There is a clear opportunity for increased power for the Saldana Bay region both from current businesses and also Eskom. The Power plant will go a long way to stabilize the Western Cape grid and afford Eskom an opportunity to address the current supply shortage. The location of the power plant will reduce electricity supply losses due to long transmission lines. Additional base load will enable connection of new Industries in the planned IDZ (Industrial Development Zone – currently being considered for transformation to a full SEZ). New load connections are currently unavailable, holding up direct investment opportunities into the IDZ.

The ArcelorMittal Saldanha Steel facility is the one steel plant that is currently profitable due to increased efficiencies and some global economic recovery. In fact, it is rated as one of ArcelorMittal's most productive plants world-wide. The current cost drivers of iron ore and electricity for the steel industry in South Africa pose too great a risk to the operation of Saldanha Steel and should alternative electricity and fuel sources not be found with more stable and predictable forward pricing mechanisms to bring cost under control the closure of the facility is a distinct possibility.

AMSS has partnered with an IPP, International Power Consortium South Africa (IPCSA), to supply electricity at a particular price affordable to AMSS and with a definite fixed forward price curve in order to sustain its operation long term.