

BUILDING A BLAST FURNACE FOR AFRICA'S POSTERITY

PROJECT CONCEPT NOTE ON SETTING UP OF AN
INTEGRATED STEEL MILL FOR 5 MTPA CRUDE STEEL, 4
MTPA CEMENT PLANT AND 1000MW POWER AT MAGBELE
TOWN, MARAMPA CHIEFDOM PORTLOKO DISTRICT,
SIERRA LEONE.



AFRICAN STEEL CORPORATION



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1. Summary of the action

1.1 Brief description of the proposed action.

This section presents a brief outline of the Pre-feasibility report for the proposed plan for setting up of an Integrated Steel Plant (ISP) at Magbele town, Marampa Chiefdom, Portloko District.

a) African Steel Corporation (ASC) intends to setup a Greenfield ISP along with Captive Power Plant (CPP) at Gbere, Portloko District, for the production of **5 MTPA** crude steel with **4 MTPA** cement plant and **1000 MW** power via Blast Furnace (BF)-Basic Oxygen Furnace (BOF)-Caster route, followed by hot & cold rolling for the production of flat & long products.

b) The proposed site for setting up of the Greenfield project is at Magbele area near the Rokel river, Portloko District, Sierra Leone.

c) The production plan of the proposed project is as follows:

▪ Hot Metal	5.50 MTPA
▪ Liquid Steel	5.49 MTPA
▪ Crude Steel	5.20 MTPA

Saleable products

▪ Hot Rolled Coils/Plates	2.40 MTPA
▪ Cold rolled products	1.89 MTPA

(Cold rolled annealed & galvanized coil, colour coated coil)

▪ Tinplate	1.44 MTPA
▪ Silicon Steel	1.42 MTPA
▪ Long Products (Bar, Wire Rod, Heavy & Medium sections)	1.80 MTPA
▪ Cement	4TP

d) The facilities at the production stage of **5 MTPA** crude steel are given below.

e) Major raw materials would be coking coal, iron ore concentrate/slurry/fines, lump ore, limestone, dolomite, clinker, gypsum and steam coal among others. While some of the raw materials would be imported, iron ore would be transported in Slurry Pipeline /or trains from Feregbeya and the Marampa sites & other districts to meet production targets.

f) The total water required would be approximately **10,000 m³/hr** all of which would be drawn from the Rokel river, for which a pipeline would be laid down from the river to the plant.



1.1 Brief description of the proposed action cont'd

- g) The estimated power requirements of various plant units including utilities and auxiliary facilities for the Plant would be about **1,500 MW** considering average demand. Sources of
- h) power would be captive generation from coal, by-product gases, wind/solar, hydro, and later nuclear energy.

There would be a requirement of around **93,000-100,000** casual and contract workers, during the phase of construction. Subsequently in the operation phase, approximately **78,000** personnel would be directly employed with another **250,000** and more of indirect employment.

- i) The total area for steel plant would be about **25,000 acres** and Rehabilitation & Resettlement (R&R) activities are not envisaged for the land to be allocated, which would be carried out as per the applicable regulations.
- j) The proposed production facilities would generate various pollutants in form of air emission, wastewater discharge, solid waste, etc, which would be managed by adopting state-of-art technologies, installation of control devices and treatment plants and by maximum recycling/reuse of the wastes, wherever applicable.
- k) It is envisaged that the project would be completed in a period of **4 to 7** years from the date of receipt of Environmental Clearance. It is considered that construction work at site for

various plant facilities of the project would commence as soon as government recognise and approve the project.

- l) The estimated capital cost for the integrated steel plant with cement and captive power plant is worked out at about **US\$ 6.5 billion dollars**.
- m) This Greenfield project would yield local direct and indirect employment opportunities in the project influence area; promote the development of ancillary industries or backward linkages; and contribute hugely to the local economy & state revenue. The project would bring forward an overall social development with emphasis in the areas of education, training, health and social & physical infrastructure.

Based on the pre-feasibility study, the technical and financial feasibility of the proposed project have been established. The capital cost as estimated is in accordance with the typical values for projects of similar magnitude.





1.2 Identification of the Project & Project Proponent

African Steel Corporation (ASC) is a Sierra Leonean owned iron ore mining and development corporation which plans to construct its first and probably the largest blast furnace on the continent of Africa.

The project would be rolled out in three phases: phase one would be the construction of an initial 5 MTPA blast furnace and a steel forging academy to train Africans in every steel works, sourcing resource persons from India, Australia, Brazil, etc.

Phase two which is expect to roll along with phase one is the sourcing and development of a 1500MW - 2500MW uninterrupted power in Sierra Leone for use on all the plants (blast furnace, cement plant & washing plant). This would be done in collaboration and partnership with the West African Power Pool project.

The final phase of the first season of the project would be the production and marketing of hot-rolled coil and thick steel plates used in the **automotive, appliance, container, earthmoving equipment, industrial machinery, railway and train tracks, armament, and the ships making industries**. Hot-rolled coil can be processed into cold-rolled coil which in turn is used to produce value-added products such as automotive steel.

Mission:

To reward our shareholders by using our skills to identify, develop and operate Africa's iron ore assets whilst enriching the communities affected by our operations now and in the future.

Vision:

To be the industry leader in delivering high-quality, value added steel products and innovative solutions in Africa and beyond that address our customers' most challenging needs for the future.





1.2 Identification of the Project & Project Proponent cont'd

Our Strategy: Is to maximize the chances of Africans to benefit from the natural resource endowment by maximize cash from our world-class iron ore reserve of over **30.8 Billion tons** in West Africa alone, and create superior value for our shareholders by meeting the needs of our customers.

STEEL FACTS

Nearly **100%** of the steel industry's co-products can be used.

- Slag** is used in cement, road construction, fertilisers, hydraulic engineering and sea forestation.
- Process gases** are used to produce heat and/or electricity.
- Emulsions and oils** are used as reducing agents.
- Iron oxides and zinc** are recovered from dust and sludges.
- Chemicals** are used as input material for the chemical industry.

worldsteel.org





2 Relevance of the project

2.1 Needs and constraints of the country

Sierra Leone has been the home to the largest deposit of iron African, and number three in the world, behind Australia and Brazil, but there has never been a smelter to add value to the iron ore. There has been a steady rise in the demand for steel in Africa. In **2019** and **2020** steel demand increased from **38.1mt to 39.2mt** in **2020**. This trend is expected to rise, given the emergence of several automobile assembling plants, the rise of smart cities, such as the “**Akon City**” or **Egypt’s New \$58billion capital city**. Sierra Leone’s **\$2billion Lungi Bridge** construction project and many more.

Africa is reputed to be the continent which was left behind during the industrial revolution of the 15th century, but is poised to catch up with the 4th industrial revolution particularly with the rise of multinationals such as ASC to drive the process. There is a steep rise in Africa’s infrastructure and construction sectors. Several initiatives mainly, affordable housing, new railway networks, development of domestic shipbuilding industry, opening up of defence sector for private participation, and the anticipated rise of automobile engine manufacturers, earthmoving equipment manufacturers, automobile and earthmoving equipment part moulders, electricity poles, transformer and new powerhouses, are expected to create significant demand for steel in the country and the continent at large. At the moment, China is the major supplier of crude steel to the continent, and virtually the best iron ore that is used to produce such steel, is mined in Sierra Leone. The demand for Steel in Africa is expected to rise in the coming days, months, and years. If any other country should take advantage of such opportunity, it should be Sierra Leone, who has the world’s third largest iron ore reserve.

Summary of major factors which carry the potential of raising the per capita steel consumption on the continent are listed below:

- I. Infrastructure improvement initiatives, such as ‘Smart Cities project’ by Akon, Egypt and many more, ‘Affordable Housing for All by 2030’, ‘African Steels Corporation’s approach to CSR’;
- II. Manufacturing growth driven by Made-in-Sierra Leone initiative;
- III. Encouraging the use of Made in Sierra Leone steel for various projects and levying of anti-dumping duties on certain steel products from Brazil, Australia, Russia, China, Korea, Japan and Indonesia;



2.1 Needs and constraints of the country cont'd

- IV. The Ministry of Trade and Industry is expected to increase the iron ore production favoring steel production in the country;
- V. Emergence of the continental market for steel under the AfCFTA.

Steel products find application in multifaceted sectors mainly dominated by areas of infrastructure & transport. Among the many drivers of demand, the following are having maximum influence in

triggering consumption of finished steel products like Bars & Rods, Structural and Plates:

Table 1-1

Product/Category	Application
Bars & Rods	Infrastructure - House Building Fasteners & Wires Bright Bars
Structural	Infrastructure - High rises Industrial Construction
Plates	Infrastructure - Bridges Railways - Wagons, Coaches, Tankers Industrial Construction, Defence Production Energy - Boilers, Pressure Vessels, Penstocks
HR Products	Tube making industry Railways - Wagon & Coach Automobiles and Industrial Machinery
CR Products	White goods - Refrigerators, Air-conditioners Automobiles, Silos & Containers Precision Tubes and Furniture
Galvanized, Coated, Tin Plate, Silicon Steel (NGO)	Automobiles, Consumer durables, Food Industries, Electrical Appliances & machine Construction, Packaging & Furniture



2.2 Significance of the project

As populations grow and nations around the world seek to improve their standards of living, it is inevitable that the demand for steel will increase.

Steel is critical simply because no other material has the same unique combination of strength, formability and versatility. New generations of steel continue to be developed that make it possible for manufacturers and builders to implement durable, lightweight designs. Going forward, materials that are ever stronger and meet higher environmental standards will be needed.

Without being aware of it, society now depends on steel.

Humankind's future success in meeting challenges such as climate change, poverty, population growth, water distribution and energy limited by a lower carbon world depends on applications of steel.

Steel plays a critical role in virtually every phase in our lives.

The rails, roads and vehicles that make up our transport systems use steel. Steel provides a strong framework and connections in the buildings where we work, learn and live. It protects and delivers our water and food supply. It is a basic component in technologies that generate and transmit energy.

Buildings and infrastructure

More than half of the steel produced worldwide goes into steel buildings and infrastructure.

The world's population is expected to increase by 2 billion persons in the next 30 years, from 7.7 billion currently to 9.7 billion in 2050, according to a new United Nations report launched in 2019.

This will be accompanied by rapid urbanisation. The need for buildings and infrastructure will continue to grow worldwide in years to come.

Steelmakers around the world are increasingly providing construction solutions that enable energy-efficient and low-carbon-neutral buildings. These solutions are highly material efficient and recyclable.



2.2 Significance of the project cont'd

Automotive

Advanced High-Strength Steels (AHSS) are now used for nearly every new vehicle design.

New grades of AHSS enable carmakers to reduce vehicle weight by 25-39% compared to conventional steel.

When applied to a typical five-passenger family car, the overall weight of the vehicle is reduced by 170 to 270 kg, which corresponds to a lifetime saving of 3 to 4.5 tonnes of greenhouse gases over the vehicle's total life cycle.

This saving in emissions represents more than the total amount of CO₂ emitted during the production of all the steel in the vehicle.

Transport

Mobility is essential to our modern way of life.

The efficient transport of goods has become key to our ever more globalised economy. Freight has almost doubled over the past 30 years.

Over 15% of steel produced worldwide is used to meet society's transport needs. It is also essential to the related infrastructure: roads, bridges, ports, stations and airports.

Steel in energy production and distribution

Energy is essential for the development of society and steel is critical for supplying the world with energy.

Whether based on fossil fuels, nuclear technology or renewables, steel is indispensable in the recovery, production, distribution and storage of energy. Steel also has an important role to play in improving the efficiency of these energy sources.

Food and water

Steel is needed for growing, storing and delivering our food.

It is also needed in water collection, storage, purification and distribution. Compared to other food preservation methods, steel cans save energy because refrigeration and freezing is not needed. Steel cans are 100% recyclable.



2.2 Significance of the project cont'd

Tools and machinery

If a product is not made of steel, the chances are that it will be made from a machine made of steel.

Steel is all around us; your car, your phone, your fridge - even the plastic and glass bottles you have inside your fridge - they are all made either of steel, or manufactured using steel tools. Plastic car parts, glasses and computer chassis are all manufactured in moulds made of steel. Steel is essential in our modern world¹.

Total consumption of steel in Africa was 39.2mt in FY2020. Driven by rising infrastructure development, growing demand for automotive products, growing quest for industrial development, etc. on the continent. This trend is expected to rise uncontrollably (except for the rise of global pandemic such as the COVID 19) as the need for own products by so many African states is growing by the second.

At the moment, there are more than six emerging indigenous car manufacturing companies on the continent whose primary raw material is steel. There is Kantanka and Turtle Motors in Ghana. There is Innoson and Nord motors in Nigeria and Mobius Motors in Kenya etc. foreign car manufacturers are also taking first mover advantages on the continent. Volkswagen is in Kenya, Rwanda and Ghana and many more.

World Steel Association (WSA) has projected a growth of Africa's steel consumption (in the absence of all things) of at 40.9 mt in 2022. Finally, the presence of ASC is expected to drive growth and development due to the lower cost of home manufactured crude steel.

2.3 Target beneficiaries

ASC's integrated steel mill is expected to bring a positive impact on the Sierra Leonean/or African economy by creating more jobs and business opportunities for every sector of the economy. According to local research data, our first 5 million tons steel mills will have an economic affect equivalent to creating about 171,000 jobs (93,000 related to the construction and 78,000 operations) for the entire African labour force; promoting permanent wealth creation.

¹ <https://www.worldsteel.org/steel-by-topic/steel-markets>.



2.3 Target beneficiaries cont'd

In addition, when our next 10 million tons per annum furnace would have been completed, it will generate sales equivalent to about \$1.5billion and jobs in excess of over 250,000. Amongst others, the key beneficiaries will be the youths.

2.4 Project objectives and expected results

Expected Results	
Objective 1: To build a 5 MTPA blast furnace; and a 4 MPTA cement plant in Sierra Leone within 3 to 7 years period.	1. Increased government revenue and moral.
	2. Youths on the continent will have improved skills in industrial machinery usage and steel forging capacity.
	3. There will be trained youths in furnace and other highly sophisticated industrial plant operation and management.
Objective 2: To add value to local raw materials in the country.	1. Appropriate backward linkages such as railway and railway track manufacturing and shipbuilding corporation will be located in strategic districts/chiefdoms across the country.
	2. All available metals and resources that could be smelted, processed or crushed can be done here before sold or exported.
	3. The importation of industrial goods in the country will be reduced.
	1. Youths within the country /continent will get suitable life skills for sustainable livelihood.



Objective 3: To engage local skills as the local content policy demands.

2. Youths within the country and beyond could get suitable, sustainable and attractive jobs.

3. The youth will be based in their communities to contribute to development.

STEEL FACTS

In Europe,
77%
of steelmaking slag is used to produce cement and materials for road construction. The rest of the recovered slag is used in other applications, such as fertilisers, metallic applications, hydraulic engineering, etc.

worldsteel.org



2.5 Project added value to national, regional and continental efforts

This project will enhance the government action regarding all developmental programmes and projects: the 4th industrial revolution, the human capital/capacity development, AUs Vision 2060, and many more.





3 Methodology and sustainability

3.1 Key implementing partners

Given the nature and sophistication of the project **Paul Wurth**, and **M.N. Dastur & Company (P) Limited Consulting Engineers** will serve as the main project implementing partners. We are going to issue a management contract for 5 to 10 years which will give sufficient time for our local engineers to acquire the appropriate skills and knowledge to take over the operation.

The lessons learnt is that if the local people are engaged in the implementation and management of their own project, and their cooperation, commitment and support is enhanced, their ownership of the project and thus the ownership and sustainability is assured.

3.2 Project sustainability plan

ASC will build a steel forging academy in Sierra Leone in partnership and collaboration with Association for Iron and Steel Technology (AIST), The International Steel Academy, World Steel Association and more to train Africans giving first priority to locals.

There shall be both management and advisory boards with particular focus on African experts to prevent sabotage. The advisory board shall compose of the incumbent president of Sierra Leone who shall be the chairman and other incumbent presidents of African countries who shall agree to take shares in the project and other key stakeholders on the continent and beyond.

3.3 Project multiplier effects

There will surely be a multiplier effect to a level of scaling up the industry of branching out into related processing activities. There will be a surge of crude steel users in the country and on the continent to take advantage of the whooping opportunity that blast furnaces brings to nations.





4 Project implementation and cost estimates

4.1 Implementation plan

The preliminary overall implementation schedule for 5 MTPA crude steel production with commissioning of various plant facilities of the project is shown in **table 1-2** below.

Table 1-2

NO	ACTIVITY
1	Engagement of key government stakeholders and potential local and international investors.
2	Engage the services of M.N. Dastur & Company (P) Limited Consulting Engineers to conduct project feasibility and terrain preparation.
3	Engagement of WAPP for energy MOU and signing and further exploration for more energy sources.
5	Sourcing of the blast furnace and cement plant to commence construction.
6	Setting up a project technical and finance committee and their terms of reference.
7	Actual operation of the industry.
8	Investment into the establishment of the major backward linkages, such as the railway and shipbuilding corporations and the armament factory.

However, much work is expected from the government of Sierra Leone as such projects has never been implemented in any part of the world without the full support, cooperation and collaboration of the government.

4.2 Capital cost estimate

The estimated capital cost for the integrated steel plant plus, cement, captive power plant, initial purchase of raw ore, and contingency is worked out at about **\$6.5 billion**.



5 Analysis of proposal

5.1 Financial benefits of the project

The financial benefits accrued from the project would not only profit shareholders but also strengthen the economy of the state due to earning from taxes and duties from the Plant. Installation of a state-of-art steel plant with captive power plant, jetty and other facilities would also add huge impetus to the growing economy of the state.

5.2 Social benefits

The proposed Greenfield project would

- I. yield local direct and indirect employment opportunities in the project influence area;
- II. promote the development of ancillary industries, medium small-scale trade & commercial establishments, local entrepreneurship and diversification in skill set;
- III. generate local income, boost the local purchasing power and promote an increase in land prices & rent;
- IV. contribute to the local economy and the state revenue.

The peripheral development activities that would be undertaken by the proposed project will focus on vulnerable communities in the project influence area. The project would bring forward an overall social development with emphasis in the areas of education, training, health and infrastructure.

The management board of ASC is proposing to donate its slag to the people and government of Sierra Leone for road construction across the country and also provide steel for the lungi bridge project due to the tax exemptions that will be granted to ASC.

In addition to that, the board is also proposing to build an ultramodern steel supported State House for the government that, will serve as the residence and office of both the president and the vice, at any chosen location, free of cost.



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