

VANADIUM

INVESTMENT OPPORTUNITY SCORECARD

MINING & METALS

Opportunity Description: Opportunity to develop a 10 ktpa Vanadium refinery to supply the regional and global market

INVESTMENT OVERVIEW

INVESTMENT HIGHLIGHTS

- Expected investment size of USD 50-60Mn
- Plant capacity: 10 KTPA
- Vanadium is a silver-grey, ductile & malleable transition metal, added to crude steel as ferrovanadium to enhance the steel's properties.

FUTURE OPPORTUNITIES

- Project considerations: (Feedstock) Vanadium bearing fly ash and similar feedstock primarily sourced from power plants shall be used as raw material.

VALUE PROPOSITION

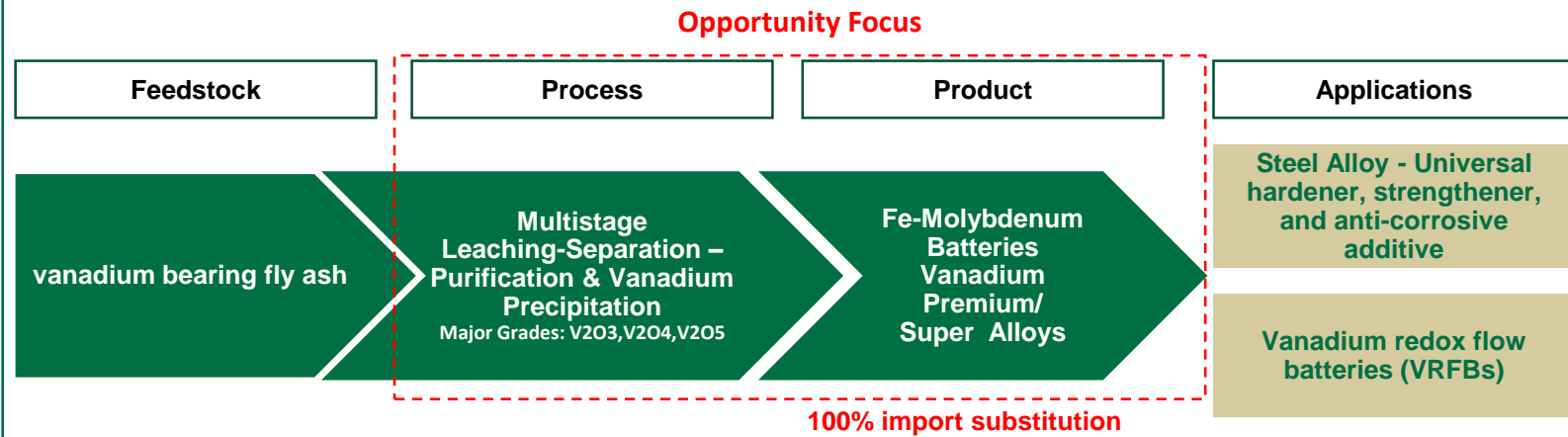
- In the KSA, raw material of vanadium bearing fly ash and similar feedstock can be primarily sourced from power plants
- The infrastructure of the KSA along with the locally availability raw material will ensure low cost of production
- The economically extractable vanadium occurs predominantly in vanadium-titano-magnetite (VTM) ore deposits associated with igneous intrusions.
- About 80% of global vanadium supply is produced as a co-product in steel mills. The country is a top steel producer and home to large prospective customers

MARKET OVERVIEW

GLOBAL TREND

- The global vanadium market is estimated at 120-150 ktpa in 2020 and is expected to witness a CAGR of 4-5% between 2020 and 2027.
- Vanadium prices have mainly been boosted by China's introduction of new rebar standards and a ban on vanadium slag imports. This combination of factors worsened the existing supply shortages in the market.
- Surging global crude steel production has raised the demand for Vanadium to enhance the strength, malleability and corrosion resistance of steel. It also used in other applications such as Ti-V alloys, catalysts, acids and paints.

VALUE CHAIN ANALYSIS



KEY DEMAND DRIVERS

- Vanadium demand in KSA is estimated at 10-12 ktpa, growing at 4-5% YoY.
- Steel industry currently accounts for 90% of the total vanadium demand in KSA, using it in alloying.
- VRFBs provide scalable, long life, and safe electricity storage and have a number of key advantages over other current battery technologies.

DEFINITIONS

#	SCORECARD SECTION	DEFINITIONS
1	Market size	Size of market in value/volume in KSA and/or Region (MENA/GCC) covering future projections based on available estimates from published /government sources
2	Business drivers	A select number of factors that will influence future demand for the related product/service
3	Investment highlights	An overview of key financial metrics summarizing the investment opportunity along with the expected return based on the suggested investment size
4	Value proposition	Summary of key differentiators that position KSA as a strategic choice over other regional/global peers
5	Market readiness	An overview of KSA market structure, market maturity and level of participation by local and global players
6	Competitor analysis	List of the local & international players manufacturing the underlying product in Saudi Arabia and their market share
7	Global trends	Latest business developments within the sector/product category
8	Scalability and localization	Ease of scaling the business across the value chain or into new adjacent products or geographies that would maximize the opportunity's investment returns and the ability and potential to locally manufacture the product and its components
9	Import dependency	An overview of the countries from which Saudi Arabia is importing the product and their value/volume and share in total imports
10	Value chain analysis	The process or activities that would potentially need to be carried out to deliver the underlying product or service
11	Key stakeholders	Government institutions, organizations, and/or authorities that participate or influence the market for the underlying product/service
12	Enablers	Factors that enable investment in the underlying opportunity
13	Cost of doing business in KSA	Key factors that position KSA as a competitive destination for investment in the region. Productivity adjusted wages do not include cost of \$1.23/hour towards annual recurring charges including work permit, resident identity (iqama) and health insurance

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