

**PROJECT REPORT**

**ON**

**15000 MTPA ALUMINIUM POWDER MANUFACTURING  
PROJECT IN JHARSUGUDA, ODISHA**

**Dec 2025**

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# 1. Executive Summary

## 1.1 INTRODUCTION

Runaya, a part of Vedanta is a fast-growing sustainable manufacturing company headquartered in Mumbai, India, founded in 2017. The company focuses on green aluminium recovery, diversified metal recovery, telecom-grade FRP & ARP rods, and ground support solutions for mining and infrastructure sectors. Runaya has emerged as a market leader in sustainable metal recovery, operating India's first and the world's second zero-waste aluminium processing facility. It processes over 50,000 MT of smelter waste annually, recovering valuable metals and compounds, and recovers 16,000 MT of certified green aluminium from dross each year. The company reported annual revenue of ₹700 crore in FY25. It has a workforce of 1200+ with a strong emphasis on gender diversity—60%. Runaya's ESG framework and innovation-driven culture position it as a future-positive enterprise, committed to circular economy principles and sustainable industrial transformation.

Eckart GmbH, Germany is a leading international manufacturer of metallic powders and pearlescent pigments for the paints and coatings industry, the graphic arts, plastics, aerated concrete, and cosmetics industries and has also supplied to NASA & ESA space programs. Eckart is part of Altana Group which has 48 production facilities and 65 service and research laboratories worldwide with more than 6,500 employees and a revenue of around €2.2 billion.

Runaya Eckart Aluminium Powders Pvt Ltd. is planning to put up a plant to produce 15000 TPA Gas Atomized Aluminium powder at Jharsuguda, Odisha (India) to cater to the high-end industrial applications in Aerospace, Paints & Coatings, Photovoltaic Cells, Light weight concrete, etc. for Indian and global market

## 1.2 APPLICATION, MARKET SCENARIO & DEMAND ASSESSEMENT STUDY (WORLD & INDIA)

### **APPLICATIONS**

Aluminium powder is a versatile material having a wide array of applications in many industry segments. The number is too large to be investigated in a uniform manner, especially by surveying the buyers at field level. The nature and extent of usage vary quite significantly from one industry to another. Accordingly, the major end-using industries have been identified for both forms of Aluminium - powder and paste and intensive discussions were held with some of the representative companies for each such end-use. The demand for concerned form of Aluminium was thus obtained by what is commonly known as Delphi or expert opinion method. For rest of the industries it was deducted as a group from the forecast of overall demand carried out in an independent manner. A summary of this approach is furnished in the following Table 1.

### World Scenario

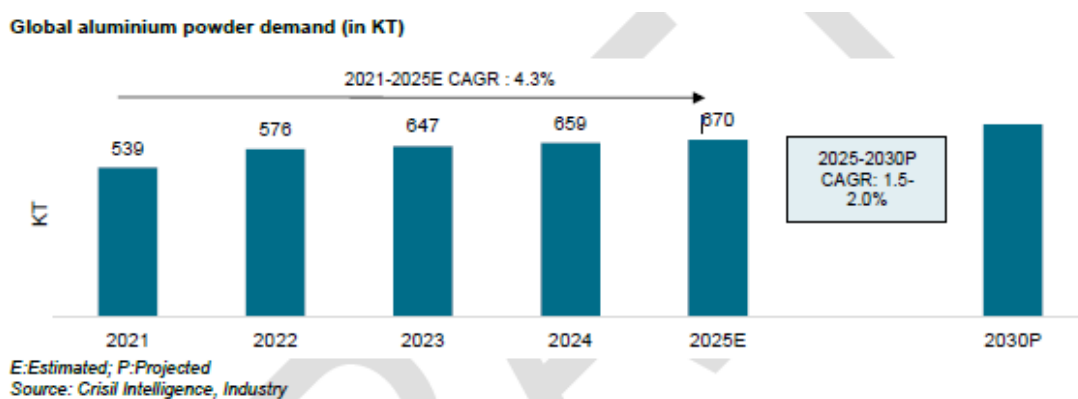
The global demand for Aluminium powder is projected to steadily increase, reaching 727-757 KT by 2030, driven by its versatility and unique properties. With a wide range of applications across industries such as aerospace, automotive, construction, defense, and energy, Aluminium powder has become a critical material in modern manufacturing technologies. The growing demand is largely driven by the automotive and aerospace sectors, which leverage Aluminium powder to develop lightweight, fuel-efficient, and low-emission vehicles and precision-engineered components.

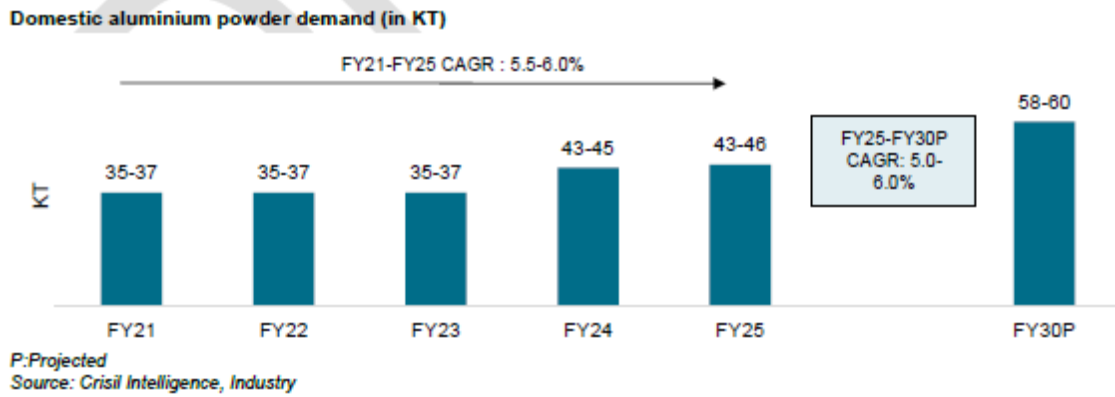
**TABLE 1 – MAJOR APPLICATIONS OF ALUMINIUM POWDER**

Type	Industry	Remarks
Air Atomised Aluminium Powder	Aerated Cement Concrete (ACC)	Assessed directly through field visits and intensive discussions
	Explosive & Propellant Defence	
	Pesticide	
	Industrial Paints	
	Others (Plastic Master-batch, Thermal Welding, Refractory, etc.)	Deduced indirectly from the overall demand
Gas Atomised Aluminium Paste	Automotive Paints	Assessed directly through field visits and intensive discussions
	Printing Ink	
	Solar Cell	
	Metal Coating	
	Others Plastic Coating	Deduced indirectly from the overall demand

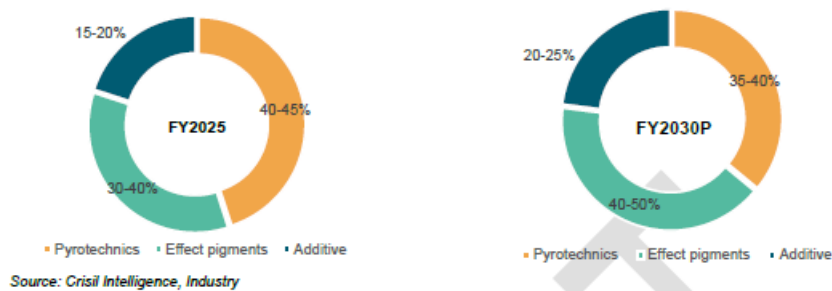
### India Scenario

India's aluminum powder demand is projected to grow steadily, reaching 58-60 KT by FY30P, with a current demand of 35-37 KT in FY21-23. The demand is expected to pick up in FY24-25, with an estimated range of 43-46 KT. In terms of applications, pyrotechnics currently account for 40-45% of India's aluminum powder demand, followed by effect pigments at 30-40% and additive manufacturing at 15-20%. However, by FY30P, effect pigments are expected to emerge as a dominant application, accounting for 40-50% of the demand, driven by the growing need for metallic effects in various industries such as coatings, plastics, and cosmetics. The increasing demand for effect pigments in India is to be driven by the country's growing automotive, construction, and consumer goods sectors, presenting opportunities for manufacturers to cater to this rising demand.





### India Aluminium Powder demand by application (in%)



### Opportunity

With the magnitude of domestic demand and trade flows across the global regions revealed above, it is apparent that opportunities do exist for any prospective entrepreneur to capture a share of the growing market. While there is competition in the powder segment with a number of domestic producers already present in the business are with 'ageing' technology.

Similarly, the international market having a trading volume exceeding 160,000 tons at present offers excellent opportunities to any new investor to excel in the global domain. With adequate marketing infrastructure, it would be possible to capture at least 10% of the domestic powder market and 2.5% of the international market on a sustained basis. Keeping the above assumptions in view, a possible scenario of market opportunities in quantitative measure is furnished below:

### 1.3 PLANT CAPACITY & PRODUCT-MIX

Based on the market scenario study detailed above, envisaged plant capacity and saleable product mix are summarized below:

Description	Quantity, TPA
Overall Plant capacity of gas atomized Aluminium powder	15,000 (Phase -1: 6 KTPA, Phase 2: 9 KTPA)

## 1.4 RAW MATERIALS & CONSUMABLES FOR CORE PROCESS OPERATION

Molten Aluminium, Compressed Nitrogen gas, Water and Electricity are the major raw materials and Consumables required in the production process.

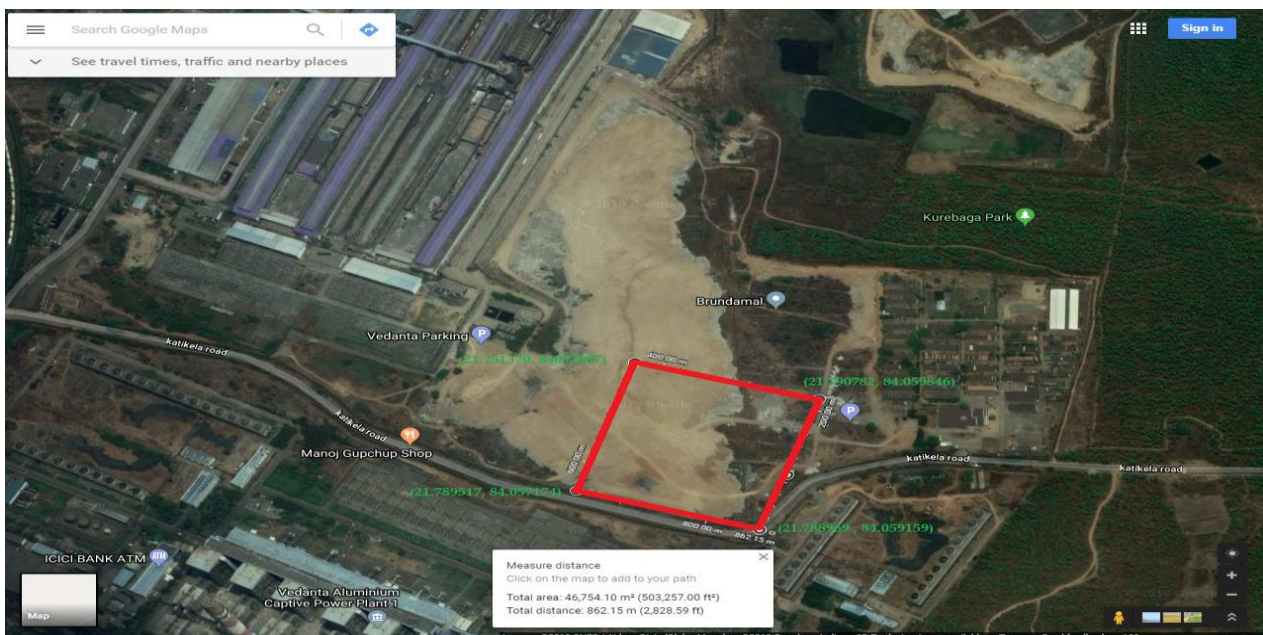
Sl. no.	Raw material	Quantity/ ton
1.	Molten Aluminium	1.07t/t
2.	Water	2.4m3/t
3.	Electricity	2.5 MWH/t

## 1.5 PRODUCTION PROCESS & EQUIPMENT

Gas atomization process is mainly used for producing high-end spherical Aluminium powder while air atomization produces irregularly shaped particles. The gas atomization process is a closely guarded technology. No such facilities are available in India. The technology for this project is being provided by Powben, Chinese OEM with expertise from Eckart GmbH will certainly enhance the technology for the gas atomization process as well as eventually ensure availability of their expertise during implementation as partners.

Gas atomization process is mainly used for producing high-end spherical Aluminium powder while air atomization process produces irregularly shaped particles. Special grade gas atomized powder is used in more demanding and specialized application areas of Aerospace.

## 1.6 PLANT LOCATION



The proposed Land of 11 acres has been sublet from M/s Vedanta Limited and free from all encumbrances. It is 500-600 m from smelter-1 Pot Line. The proposed site is connected to 30 m wide village road. Availability of power & water is very near to the site. The Captive power plant 1215 MW is just opposite the plot (30 m away). The plot falls in Domestic Tariff Area (DTA). The Plant layout of the proposed complex has been developed keeping in view the following points: Proximity to the molten Aluminium from Vedanta Aluminium Smelters at Jharsuguda. This will ensure Smooth flow of incoming and outgoing materials through a separate gate with minimum counter flow of in-process materials. Rational arrangement for production facilities, auxiliary units and ancillary buildings so capital

costs is minimized.

## 1.7 POWER

The total estimated power requirement for the plant is about 7 MW (Phase-1: 3.2 MW, Phase – 2: 3.8 MW). The source of power for the proposed plant is considered at 6.6 kV. Power shall be made available at the plot boundary through buried cables from Vedanta Limited.

## 1.8 ENVIRONMENTAL POLLUTION CONTROL MEASURES

The atomization process is a zero effluent and zero discharge process. The proposed operations would chiefly minimally water pollution (domestic sewage) and solid waste management problems to some extent. Constructing the raw material handling section as a fully enclosed facility to avoid entry of any outside dust particle, fume exhaust systems for the off gas, collection of the used nitrogen gas by fume exhaust systems after the bag filter house, using the blow down from the process cooling tower for gardening & landscaping, suitable measures for work zone pollution control and solid by-products management are envisaged.

## 1.9 MANPOWER REQUIREMENT

The manpower requirement shall be about 500 including both direct and indirect manpower at full scale operations of 15000 TPA.

## 1.10 PROJECT IMPLEMENTATION SCHEDULE

It is envisaged that commissioning of the phase -1 plant (6 KTPA) will be completed by October 2026 and second phase-2 (9KTPA) will be completed by end of 2029. The implementation schedule has been developed based on the estimated quantum of work, expected delivery and installation periods of plant and equipment and the need to commission the plant facilities within the targeted completion period.

### Timeline for Phase-1 (6 KTPA)

Activities	Timeline in Months
Land allotment	Mar'25
Basic Design Completion	Apr'25
Detailed Engineering Completion	Aug'25
All Regulatory Approvals	Feb'26
Construction Completion	Aug'26
Equipment Delivery	May'26
Installation and Commissioning	Oct'26

### Timeline for Phase-2 (9 KTPA)

Activities	Timeline in Months
Basic Design Completion	June'28
Detailed Engineering Completion	Sept'28
All Regulatory Approvals	Nov'28
Construction Completion	Oct'29
Equipment Delivery	Sep'29
Installation and Commissioning	Dec'29

## 1.11 INVESTMENT PROPOSED IN VARIOUS PHASES & MEANS OF FINANCES

Overall investment for the entire project is INR 300 Cr. The investment in Phase 1 is INR 105 Cr and Phase 2 is INR 195 Cr. Phase 1 is expected to begin commercial production by October'26.

The project is envisaged to be financed through a combination of debt and equity in the ratio of 70:30. The debt component of INR 84 Cr is expected to be mobilized from a consortium of domestic and international banks, leveraging green finance and sustainability-linked lending instruments where applicable. The equity portion of INR 36 Cr will be contributed by promoters.

## 1.12 INVESTMENT BREAKUP

Below is the investment breakup of Phase wise in INR Crores

Sl.	Particulars	Phase-1 (6 KTPA)	Phase-2 (9 KTPA)
1	Plant & Machinery	71	140
2	Land, Civil & Building	21	35
3	Others	13	20

## 1.13 FINANCIAL VIABILITY INDICATORS

The salient financial indicators of the project are summarized hereunder:

Sl.	Aspect	UoM	Value
1	Project IRR	%	~14-16
2	Payback Period (including construction period of 1 year)	No of Years	~9
3	Annual Revenue (post stabilization)	INR Cr.	~500
4	EBITDA (post stabilization)	%	~10-12
5	Capex	INR Cr.	300

## 2. PROCESS & TECHNOLOGY DESCRIPTION

### 2.1 GAS ATOMIZATION

High purity spherical Aluminium powder can be produced using gas atomization process. Nitrogen gas is used as an atomizing medium in the process. Main production equipment comprises of Medium Frequency Induction furnace, Induction heated tundish, Water cooled Atomizing Chamber, Cyclone, Bag filter house, hoppers, Blower, Gas Compressor, Nitrogen generator etc.

Hot Molten Aluminium will be carried in a special vehicle called Hencon Vehicle from the Vedanta smelters and will be unloaded into the holding furnaces, which alternately pours the molten Aluminium into a central induction-heated tundish for the atomization process. Gas atomization takes place within the large stainless-steel chamber situated below the induction tundish, which has earlier been purged with inert gas (N<sub>2</sub>) prior to atomization. Melt is fed to the atomization die from the tundish via an inductively heated guide tube. The water-cooled atomizing die is fed with high pressure inert gas.

The atomizing die consists of an annular chamber equipped with an annular jet. The profile of the gas jet is converging/diverging type to accelerate the gas to supersonic velocities. Liquid stream of molten metal is disintegrated (or disintegrates) into a large number of droplets of various sizes by means of a jet of compressed nitrogen gas. The melt stream is disrupted to form a stream of high velocity molten particles that descend through the atomizing chamber, rapidly losing heat and solidifying into spherical particles. Atomization is accomplished using an advanced "close-coupled" atomization die situated at the top of a water-cooled atomization chamber. A 500°C atomizing 'Gas Superheating' option is available for increased yields of fine powder. Gas atomization is carried out with nitrogen gas of 99.995 per cent purity at 40 to 80 bar pressure.

After atomization, the molten droplet upon cooling becomes Aluminium powder and enters into the water-cooled

Atomization chamber underneath the atomization die. The lower part of the atomizing chamber is conical which collects the metal powder directing it towards the water-cooled hopper situated beneath. The bulk of the powder is pneumatically collected in water-cooled hoppers situated at the base of the atomization chamber.

Spent nitrogen along with pneumatic transfer medium air and fine aluminium powder enter into cyclone separator. Carried over fines are separated from the atomization gas using a single cyclone separator and secondary hopper system. Spent nitrogen with air passes again to a filter bank (Bag filter house) after the cyclonic separation. These remove any residual fines and the cleaned gas then passes on to the regeneration system.

Zirconia sensor-based oxygen meter can sample the oxygen content of the system during purging via a solenoid valve-controlled connection. A centrifugal, medium pressure radial bladed blower is situated at the exhaust of the filter system to fine tune gas velocities throughout the system ensuring correct movement of powder.

Spherical Aluminium powder applications:

- Aerospace.
- ACC
- Paints & Pigments

## 2.2 CYCLONE AND CLASSIFICATION SYSTEM

Cyclonic separation is a method of removing particulates from the gas stream, without the use of filters, through vortex separation. Rotational effects and gravity are used to separate mixtures of solids and gases. It will be situated on the mild steel platform.

Fine powder along with nitrogen gas will be collected in cyclone from the atomizing chamber. A set of water-cooled duct work in stainless steel connects the atomization vessel outlet to the cyclone. This ducting will convey the gas and metal powder to the water-cooled stainless-steel cyclone. A high-speed rotating gas flow is established within a cylindrical or conical container called a cyclone. Gas flows in a helical pattern, beginning at the top (wide end) of the cyclone and ending at the bottom before exiting the cyclone in a straight stream through the center of the cyclone and out of the top. Larger (denser) particles in the rotating stream have too much inertia to follow the larger curve of the stream and strike the outside wall, then fall to the bottom of the cyclone where they can be removed.

Spherical Aluminium powder is fed through the primary air inlet of the classifier using dosing screw. Individual particles are subjected to aerodynamic drag forces by conveying nitrogen gas. As particles spiral toward the classifier rotor, classification occurs due to the forced vortex generated by the rotor because of the interaction between centripetal and air drag forces. Fine particles pass through the rotor and exit the duct at the top for collection in the Bag filter house. Coarse particles descend through the bottom discharge outlet of the classifier through a Double Flap valve. Double Flap valves are used to minimize nitrogen leakages. There will be butterfly valve and rotary valve also.

A secondary air inlet introduces a controllable amount of nitrogen gas that moves upward into the classification zone, increasing the residence time of agglomerated particles and dispersing them further for improved product yield. This gas flow helps to increase efficiency for smaller cut-points. Cut points can be controlled by adjusting the rotor speed and nitrogen gas flow rate.

In the classifying facility, dust filter, blower, injector nitrogen are included along with the classifier unit. coarse particles will be collected from the bottom of classifier and fine particles will be collected from the bottom of the dust filter. Coarse particles will be used in the dry and wet ball milling facilities as major raw material.

### 2.3 BAG FILTER HOUSE

A bag filter house is a gas pollution control device that removes particulates released from multi cyclone. Bag houses typically have a particulate collection efficiency of 90% or better, even when particle size is very small. A variable speed fan is situated downstream of the filter system to fine tune gas velocities throughout the system ensuring correct movement of powder. Here the bag filter will collect the remaining particles from the multi cyclone and separate the gas. Thereafter, the gas will be recirculated through heat exchanger and a blower in a closed loop. The remaining particles will be charged again in the ball mill. Complete Filter unit consists of filter bags, cages, collection of hoppers, fan, solenoid valves etc. Pneumatically operated Double Flap Valve and Rotary Valve will be there at the bottom of the bag filter.

### 2.4 HEAT EXCHANGER

There will be a radiator type heat exchanger with cooling water circulation on the tube side and nitrogen circulation on the fins side for cooling down the nitrogen.

### 2.5 RAW MATERIALS HANDLING

Molten Aluminium will be taken from Vedanta Smelter Jharsuguda in Hencon vehicles. This molten metal will be unloaded in the holding furnace at Al powder plant facility by blowing through positive pressure transfer pipe. Other Utilities like Liquid Nitrogen and Natural Gas will be brought to the site by Transfer trucks and will unload these to specific holding tanks at site.

### 2.6 FINAL PRODUCT HANDLING

Spherical Aluminium powder as produced is collected in water cooled hoppers below cyclone, atomizing chamber and bag filter house. Few spare hoppers will be kept and fitted with SS butterfly valves and fork sleeves at the bottom for ease of transfer. Aluminium powder from the hopper can be transferred into the MS empty barrels using the forklift. Butterfly valve can be opened to offload Aluminium powder from hopper to empty barrel.

Aluminium powder is usually stored in full top open MS barrels (210 litres capacity) fitted with lid and rings fitted with lever for closing the barrels airtight. Few hundred empty barrels are required for handling Aluminium powder. Barrels will be free from rust. Barrels require periodic painting with epoxy/red oxide coating inside. Aluminium powder in barrels must be stored in closed storage rooms. There will be no contact with moisture or water at any time.

Aluminium powder in each barrel may weigh between 225 kg to 250 kg max. Aluminium powder barrel is loaded on to the silo platform using forklift. Aluminium powder is usually scooped out manually and charged into the silo. Alternatively, a drum lifter cum tilter can be used to mechanically transfer Aluminium powder in barrel directly into the silo for ball mill/classifier.

Aluminium powder in barrels is transferred from the gas atomization plant to the classifier room or ball mills using trolley. Output from classifier is also collected in empty barrels. Color coding for each barrel will be introduced for Aluminium powder, classified Aluminium powder, for use in wet ball mill separately. Each drum will be given a drum number for proper identification and traceability. After being used in classifier/wet ball mill or empty barrels will be returned back to the place of origin.

### 2.7 PRECAUTIONS IN STORAGE OF ALUMINIUM POWDER

- Storage should be in rooms of non-combustible construction.
- Aluminum powder should be stored in the original shipping containers and kept tightly sealed. Keep all containers sealed except when opened for removal of material. Reseal containers immediately after each use to prevent contamination.

- Aluminum powder should not be stored in areas containing flammable liquids or other combustible materials, due to the differences in firefighting methods.
- Stack containers properly with ample aisle space. Keep stack height to a minimum.
- Keep aluminum powder containers far enough away from steam pipes, radiators and other high temperature sources to prevent heating of the contents.

## 2.8 FIRE FIGHTING SYSTEM

Aluminum Powder Since it is almost impossible to extinguish a large aluminum powder fire, the fire must be controlled in its incipient stage. Aluminum powder fires on reasonably flat surfaces may be controlled by blanketing the fire with a Class D dry extinguisher or by dry sand. This should be done with great care to avoid disturbing the powder and creating a dust cloud. Long handled shovels or scoops of non-sparking material should be provided for the application of dry extinguishing agents. Water must not be used to fight an aluminum powder fire since water reacts with hot aluminum powder to produce hydrogen. Also, the force of a water stream could suspend the aluminum powder to form a dust cloud.

## 3. INCENTIVES REQUESTS

The proposed project will be one first Gas Atomized Aluminium Powder facility in Odisha as well as India. This serves as an anchor for the broader manufacturing ecosystem, creating a catalytic effect that is expected to attract multiple ancillary companies to establish their facilities in the state.

This sector is highly technology-driven and requires substantial upfront capital investment. Our strategy is to position ourselves as early movers in this critical yet capital-intensive sector. However, to ensure financial viability of the project, we seek the following incentives and support. Our request to the state is to consider our application for tailor-made incentives under Industrial Development Policy or other relevant policy.

We understand that, as per the Odisha IPR policy, the capex subsidy is 30% on Plant & Manchinery. However, despite the project's strong strategic relevance, it remains capital-intensive with low returns i.e payback ~9 years. Even with 50% subsidy, the project shall remain less lucrative at 6-7 years payback range.

**We request your kind consideration of the maximum permissible incentives to ensure project viability and timely execution.**

### **How the project shall substantiate for the requested incentives**

#### **Cumulative Revenue (INR 5000+ Crores over 10 Years)**

The projected revenue suggests the plant will be a major contributor to the state and national economy, potentially through domestic sales and exports. It also reflects confidence in long-term operational viability and scalability.

#### **Investment**

Investment of INR 300 Crores for phase 1 and phase 2: This capital infusion covers infrastructure, technology, equipment, workforce development, and initial operational costs. A phased investment approach allows for risk mitigation, performance evaluation, and strategic scaling.

#### **GST**

The state can benefit ~500 Cr. in 10 years from tax revenues from the plant's operations – sales of Aluminium powder and related economic activities and expenditure by the employees within the state.

#### **Employment**

500 Direct & Indirect Jobs: These roles may span manufacturing, R&D, logistics, administration, and maintenance.

Indirect employment could include vendors, service providers, and local businesses benefiting from increased economic activity.

**Design and Innovation**

Nucleus for Design Innovation: The plant is envisioned as a hub for cutting-edge technology and product development. This could involve advanced atomization designs, regeneration techniques, and material science innovations, positioning the facility as a leader in industrial R&D. This would also contribute to local talent development in the critical industry of atomized powder.

**Diversity**

Inclusive Workforce (60% Women, 10% Differently Abled): This reflects a progressive HR policy focused on gender equity and social inclusion. It can enhance workplace culture, drive innovation through diverse perspectives, and set a benchmark for industry-wide practices.

**Sustainability**

100% Green Energy & Carbon Footprint Reduction: Operating on renewable energy (solar, wind, etc.) minimizes environmental impact. It also aligns with global ESG standards and India's climate commitments under COP agreement

