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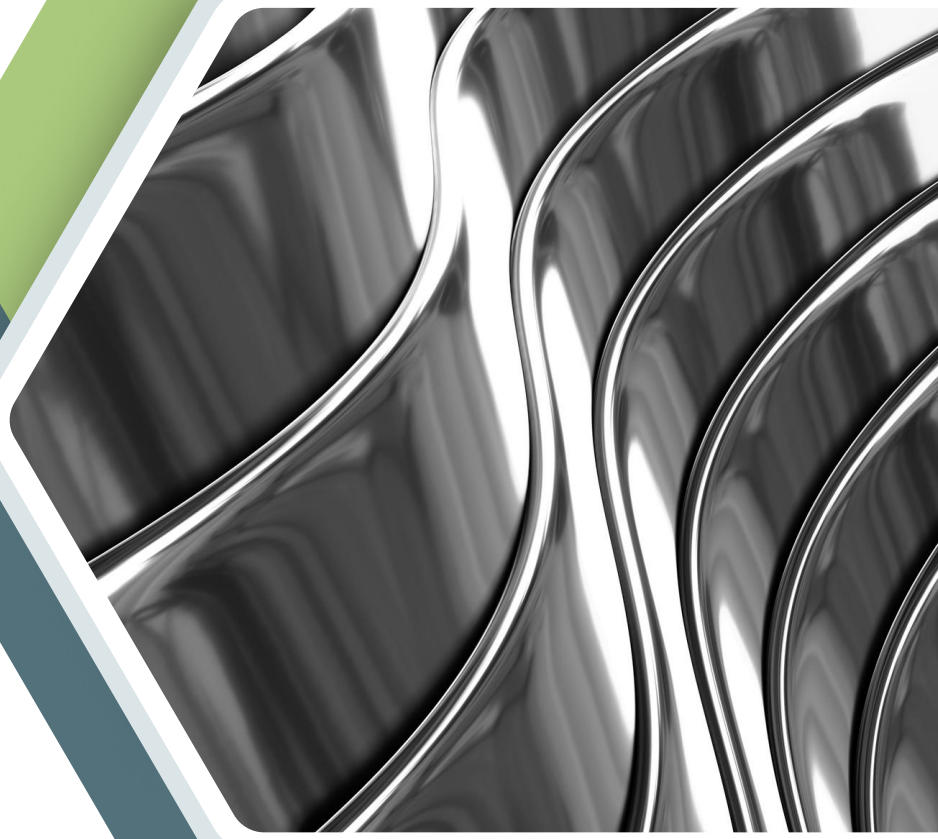

# TECHNOLOGICAL BREAKTHROUGH IN THE UTILIZATION OF CHINESE LOW GRADE BAUXITE ORE

# 中国低品位铝土矿利用的技术突破

ASIAN METAL
亚洲金属网

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# China's bauxite system is under pressure and must find a balanced solution

# 中国铝土矿供给系统面临压力，必需一个平衡的解决方案

# A growing global demand

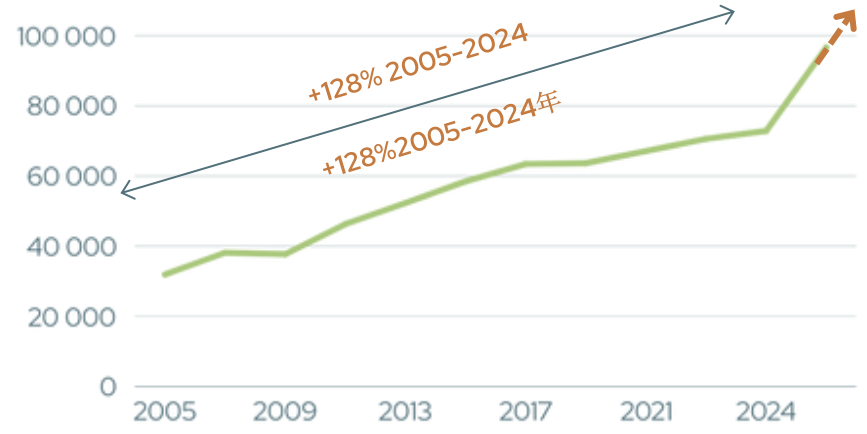
## 全球需求不断增长

**Historical high demand with projection of growth 基于预期增长的空前的大量需求**

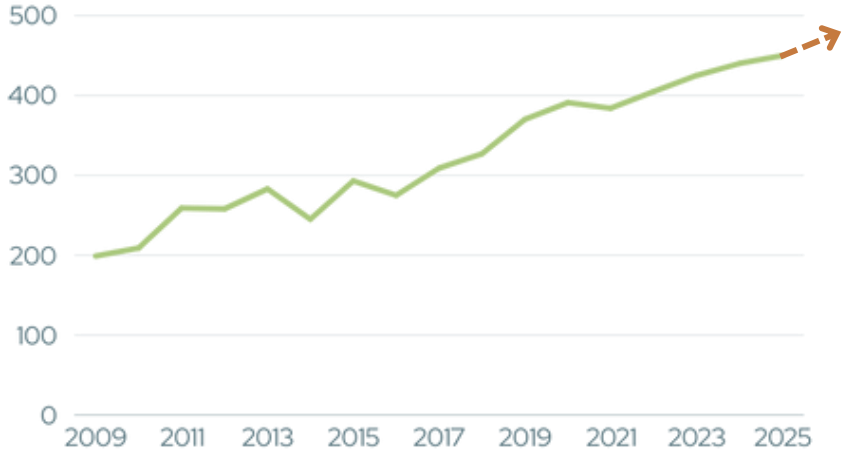
### A growing aluminium production...
铝产量增长

- 72 million tonnes in 2024
  2024年 7200 万吨
- Production multiplied by 2.3 since 2005
  自 2005 年以来，产量增长了 2.3 倍
- +128% in 20 years
  20 年内增长 128%

### World Aluminium Production (Mt)
世界铝产量




### World Bauxite Production (Mt)
世界铝土矿产量




### ...implying growing bauxite needs
意味着铝土矿需求的增长

- 440 million tons in 2024
  2024年 4.4 亿吨
- +50% since 2016
  自 2016 年以来 + 50%
- Essentially supplied from: Australia, China, Guinea （73% of total bauxite)
  主要供应来源：澳大利亚、中国和几内亚 (铝土矿总产量的 73%)

# A market facing challenges

## 市场所面临的挑战

### China's bauxite supply structure is under pressure 中国铝土矿供给结构面临压力

- China is largely the aluminum industry worldwide leader
  中国是铝行业的世界领导者
- China represents 60% of 2024 global production
  中国占 2024 年全球铝产量的 60%
- Production tripled in 10 years
  生产在 10 年内增长了 3 倍

**China's Aluminium Production (Mt)**
**中国铝产量**

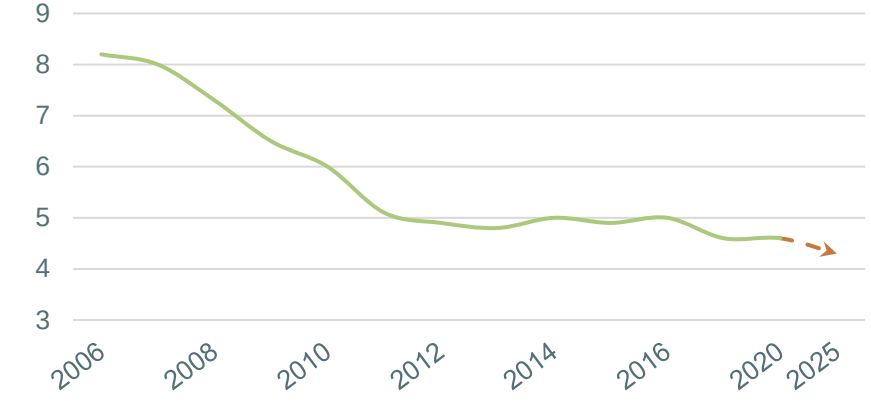

### Declining Chinese bauxite quality 国产铝土矿质量逐年下降

- Declining A/S ratio in China
  中国铝土矿 A/S 比下降
- Impurities: sulphur and organic carbon increasing in some deposits
  杂质：硫和有机碳含量增加

**This declining ore quality is one of the major problems the 2025–2027 national plan is designed to solve.**

这种矿石质量的下降正是 2025-2027 年铝行业发展计划要解决的问题。

**Chinese Bauxite Quality (A/S Ratio)**
**中国铝土矿质量 (A/S 比)**



# Leading to Import Dependence

## 导致进口依存度过高（国别）

**Massive importations lead to dependence...**

大规模进口导致进口依存度过高.....

Australia 澳大利亚

**24% of Chinese importations**

中国进口量的24%

**94%**

of total importation

占总进口的比例

Guinea 几内亚

**70% of Chinese importations**

中国进口量的70%

**China's 94% import reliance on 2 countries has created a strategic vulnerability**

**中国 94% 的进口依赖于2个产地国造成了战略脆弱性**

**Additional constraints to come...**

不断增加的约束条件.....

Guinea becomes more reticent to raw bauxite exportation

几内亚对单纯铝土矿出口变得更加保守

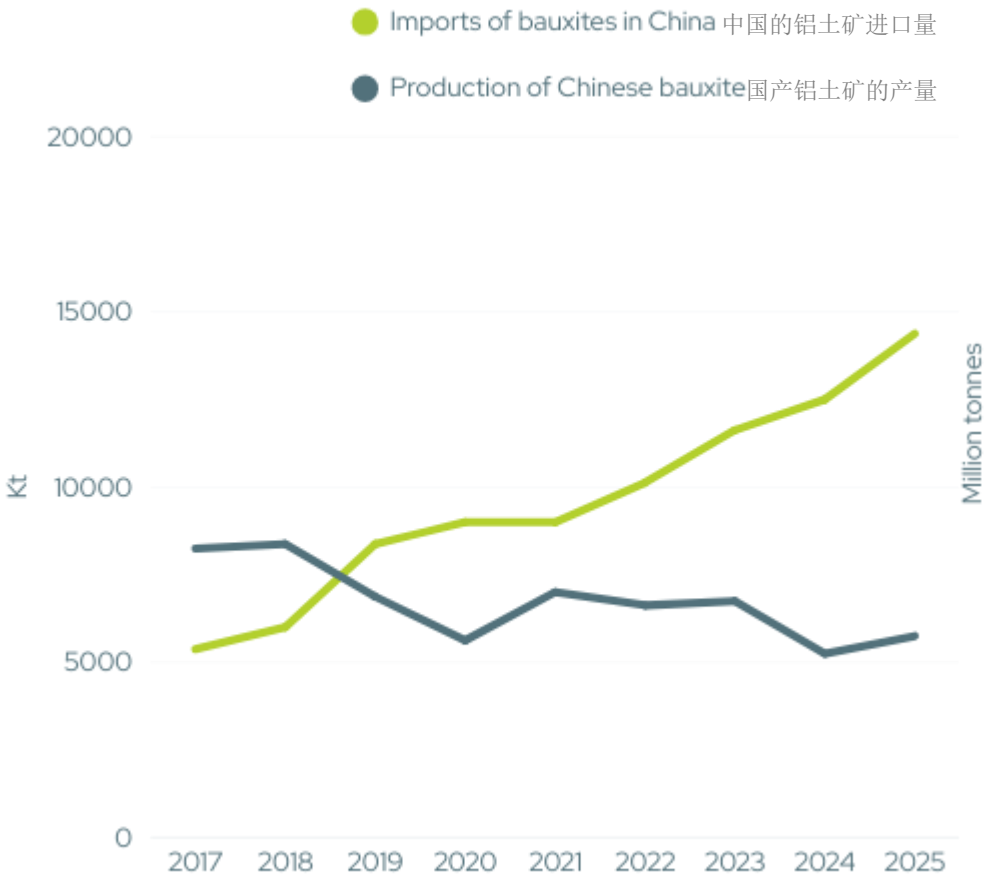
Guinea is following the path of Indonesia and now imposing to build alumina refinery unit locally as a counter part

几内亚已在效仿印度尼西亚的做法，强制要求在当地建设氧化铝厂为（开发当地铝土矿的）条件

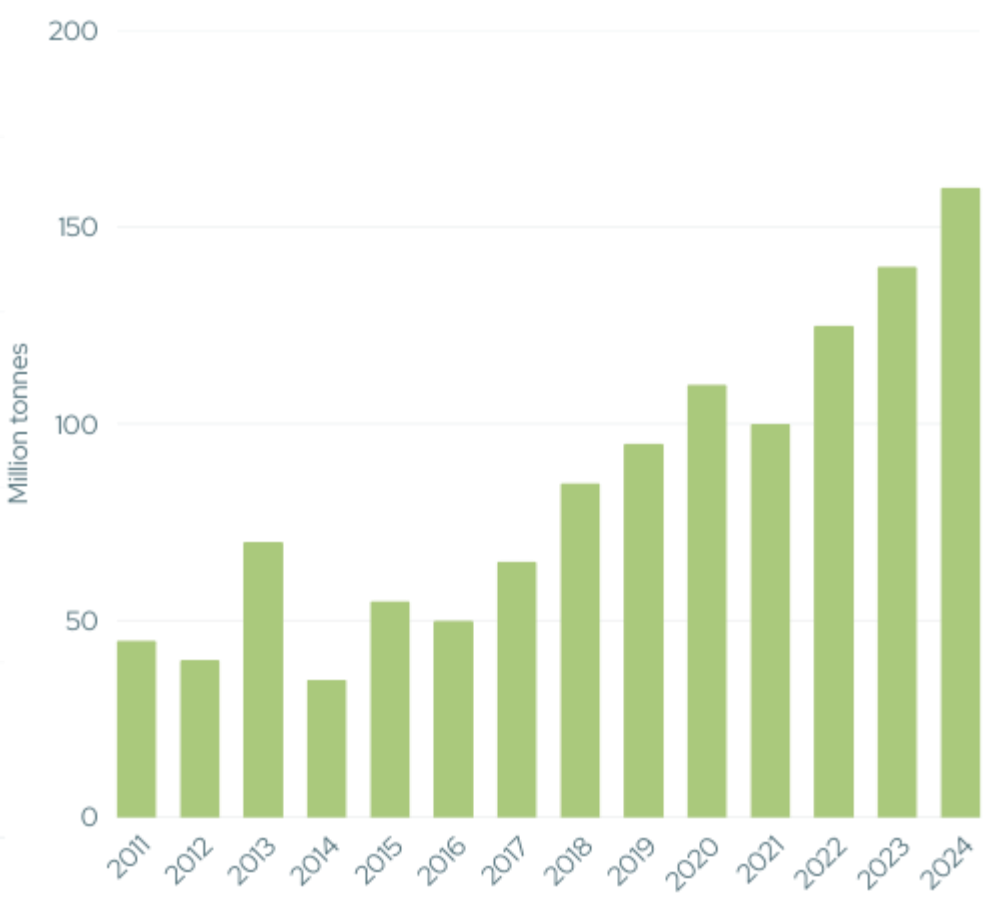
# Leading to Import Dependence

## 导致进口依存度过高

**Import x Production bauxite in China**
**进口 vs. 中国铝土矿生产**




**Importations of bauxite in China since 2011 (Mt)**
**2011 年以来的中国铝土矿年进口量（百万吨）**




**Massive importations lead to strategic actions to be undertaken 需要采取战略举措应对其风险**

# Weakened economic viability

## 经济性可持续能力减弱

**Dependence on raw material market fluctuations** 对原材料市场波动的脆弱性

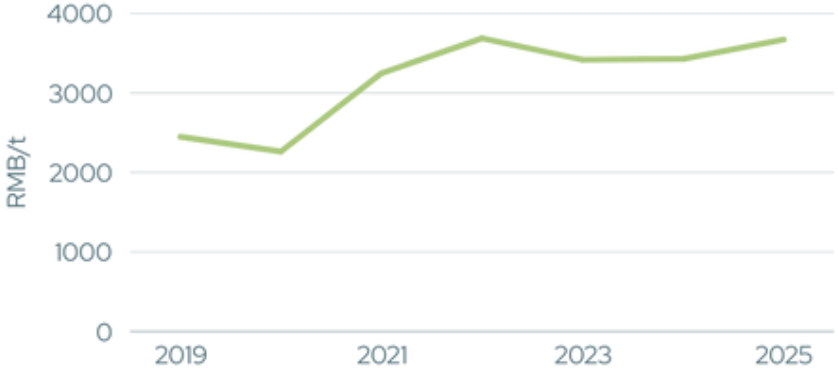
- Transportation costs increase
  运输成本增加
- Bauxite prices surged in 2024 : 119 USD Guinea
  2024 年铝土矿价格飙升：119 美元 几内亚矿
- Indicating strong market incentives for efficient processing
  行业对更高效的工艺有更强烈需求
- Caustic soda price today: $525 /t
  烧碱当前价格：525 美元 / 吨

Bauxite price : $90 /t (today)
铝土矿价格：90美元/吨(当前)

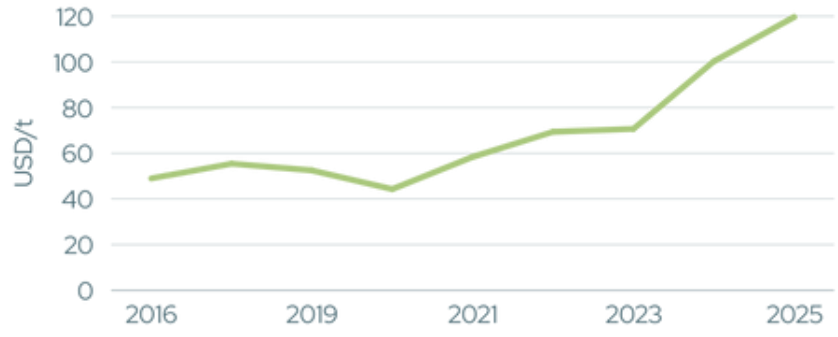
These are the industrial frictions the **Aluminium 2025–2027 plan** was designed to solve

这些是"铝业2025-2027"计划要解决的行业问题

**Caustic soda price**
烧碱价格 （单位：元）

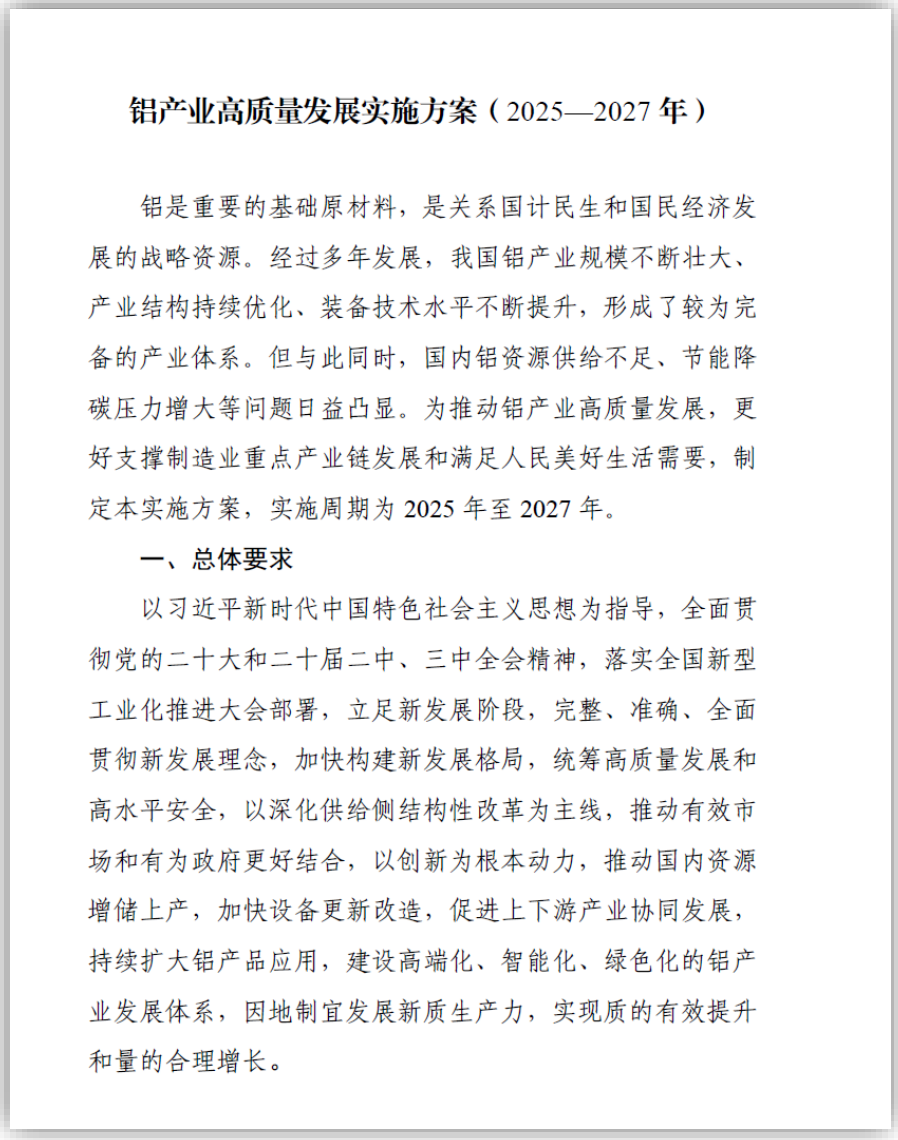



**Guinean bauxite price CIF China**
几内亚铝土矿到中国口岸的**CIF**价格



# 2025-2027 Plan enforces domestic bauxite transition

## 2025 -2027年铝业计划要求国内铝土矿转型



**铝产业高质量发展实施方案（2025—2027 年）**

铝是重要的基础原材料，是关系国计民生和国民经济发展的战略资源。经过多年发展，我国铝产业规模不断壮大、产业结构持续优化、装备技术水平不断提升，形成了较为完备的产业体系。但与此同时，国内铝资源供给不足、节能降碳压力增大等问题日益凸显。为推动铝产业高质量发展，更好支撑制造业重点产业链发展和满足人民美好生活需要，制定本实施方案，实施周期为 2025 年至 2027 年。

**一、总体要求**

以习近平新时代中国特色社会主义思想为指导，全面贯彻党的二十大和二十届二中、三中全会精神，落实全国新型工业化推进大会部署，立足新发展阶段，完整、准确、全面贯彻新发展理念，加快构建新发展格局，统筹高质量发展和高水平安全，以深化供给侧结构性改革为主线，推动有效市场和有为政府更好结合，以创新为根本动力，推动国内资源增储上产，加快设备更新改造，促进上下游产业协同发展，持续扩大铝产品应用，建设高端化、智能化、绿色化的铝产业发展体系，因地制宜发展新质生产力，实现质的有效提升和量的合理增长。

- China cannot rely too much on imported bauxites
  中国不能过度依赖进口矿
- IB2 is the most efficient technology for application and processing of low grade bauxites
  IB2是应用和处理低品位铝土矿的最高效的技术
- Red mud valorization is now a regulatory requirement, IB2 will reduce the generation of red mud
  赤泥是一个政策关注重点，IB2可以从源头减少赤泥的生成
- This is the state industrial policy and strategy
  这是国家的产业政策和战略

# Dilemma for Chinese alumina industry

# 中国氧化铝行业面临的两难处境

**Processing low-grade bauxite with traditional Bayer Process**
使用传统拜耳工艺处理低品位铝土矿

- Increases raw material consumption (bauxite and soda)
  增加原材料消耗 (铝土矿和碱)
- Increases water and energy consumption
  增加水耗和能耗
- Enlarges amounts of Bauxite residues
  增加赤泥生成量

**Refining alumina with imported bauxites**
用进口铝土矿生产氧化铝

- Leads to transporting bauxite over long distance 22 000km
  导致铝土矿长距离运输 22,000 公里
- High carbon footprint
  高碳足印
- Strategic vulnerability
  导致战略脆弱性

## Global and Chinese Policy Target全球与中国对铝行业的政策目标

**Worldwide**
全球

- Cop 28: ecological transition for aluminum industry
  联合国气候变化框架公约COP 28: 铝工业的生态转型
- Ambitious plan: Net Zero Emissions by 2050
  远大目标：到 2050 年实现净零排放

**China**
中国

- Five-Year Plan: 14th and 15th
  五年计划：第十四和十五
- China's green power target for aluminum (25.2% renewable share in 2024)
  中国铝业的绿色能源目标 (2024 年可再生能源份额为 25.2%)
- Strategic Sovereignty impact
  战略资源独立性

# IB2 is not just a technology—it's the tool helping China to apply its industrial policy

# IB2不只是一项技术，而是助力中国落实其产业政策的工具

# The solution: IB2 technology

## 解决方案：IB2技术

**A dedicated team of 10 professionals with over 400 years of experience in the bauxite and alumina industry has joined forces to develop an innovative solution for alumina refineries: IB2**

一支由**10**名在铝土矿和氧化铝行业拥有人均**40**多年经验的专业人士组成的团队，携手为氧化铝厂开发出创新的解决方案：**IB2**

### Disruptive
### 颠覆性

IB2 is a unique solution that transforms low-grade bauxite into high-grade bauxite by removing silica, sulfur and organic carbon

IB2技术提供独特的解决方案，通过脱硅、脱硫和有机物，将低品位铝土矿提升为高品位铝土矿

### Efficiency
### 效率

Thanks to IB2 technology alumina refineries will extract alumina with higher efficiency and less costs

得益于 IB2 技术，氧化铝厂将以更高的效率和更低的成本生产氧化铝

### Adaptable
### 适应性

IB2 technology can be adaptable to most of Chinese local bauxite

IB2 技术适用于大多数中国铝土矿

### Easy to implement
### 易于实施

IB2 is a technology easy to implement without modifying existing refineries

IB2是一项易于实施的技术，无需改变已有氧化铝厂

# IB2 delivers policy compliance and economic advantage in one solution

## IB2 可以提供同时具备政策合规性和经济优势的一揽子解决方案

**IB2 provides substantial solutions for Chinese refineries and delivers on the 2025–2027 aluminum development plan**
**IB2 为中国氧化铝厂提供重要的解决方案，实现 2025-2027 年铝工业发展目标**

## Financial 经济性

- Up to 40% OPEX savings for the refinery
  氧化铝厂的运营成本节约高达40%
- Turns unviable ore into valuable reserves
  将不可用的矿石变废为宝
- Revenues from Tobermorite sales (co-product) to construction material industry
  副产品雪硅钙石可销售给建材行业
- No longer be dependent on market fluctuations
  受市场波动的影响大幅减少

## Environmental 环境性

**IB2 delivers measurable gains across all ESG compliance metrics**
IB2 关于所有环境、社会和治理指标都取得了可测量的收益

- -40% CO2 emissions for the refinery
  氧化铝厂减少40%的二氧化碳排放
- -60% total residues
  尾矿和残渣生成量减少60%
- Improved carbon footprint through less transportation and carbonated Tobermorite
  通过减少运输和雪硅钙石的吸碳效应来改善碳足印
- ~-70% caustic soda
  碱耗减少70%
- ~-26% bauxite necessary
  矿耗减少26%
- ~-80% water necessary
  水耗减少80%

# IB2 delivers policy compliance and economic advantage in one solution

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## Strategic 战略

- Use of cheap low-grade bauxite ores with high silica content
  使用高硅含量的低品位铝土矿
- Use of high sulfur content bauxite, including bauxites under coal deposit
  使用高硫铝土矿，包括煤下铝
- Secured local bauxite supply
  保障本土铝土矿供应
- Increased available reserves from local mines
  增加本土矿山的可用储量
- No longer be dependent on importation
  不再依赖进口
- Participate to long-term Chinese sovereignty
  保障中国铝土矿资源的长期独立性
- Tobermorite as a co-product
  雪硅钙石作为副产品

# IB2 delivers policy compliance and economic advantage in one solution

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## Technology 技术

- We remove silica
  脱硅
- We remove 90% of sulfur
  脱除90%的硫
- We remove 100% of organic Carbon
  脱除100%的有机碳
- Easy to implement rapidly
  易于快速实施
- Can be adapted to many existing refinery with best results on the market
  适用于多家现有氧化铝厂，市场效果最佳
- Remove bottleneck, reduce equipment maintenance and thus increase production capacity
  解决瓶颈问题，减少设备维护，提高产能

# IB2 is already operating and preparing to scale in China

## IB2 已经开始运营并准备好在中国拓展

**Processing low-grade bauxite is a revolutionary approach**

加工低品位铝土矿是一项革命性的解决方案

### First unit to produce
第一个将要投产的生产线

- IB2 has already been already implemented to an existing refinery (Senze)
  IB2已在现有氧化铝厂(森泽)实施
- The first unit is already implemented at Senze and will be operational in July 2025. Over time, it will scale to several million tons of capacity per year.
  第一个IB2生产线已经在森泽实施，并预计在2025年7月投入运营。未来该项目将扩产至每年几百万吨的产能。

### Expansion to refineries across China and beyond
未来在中国及海外氧化铝厂的推广部署

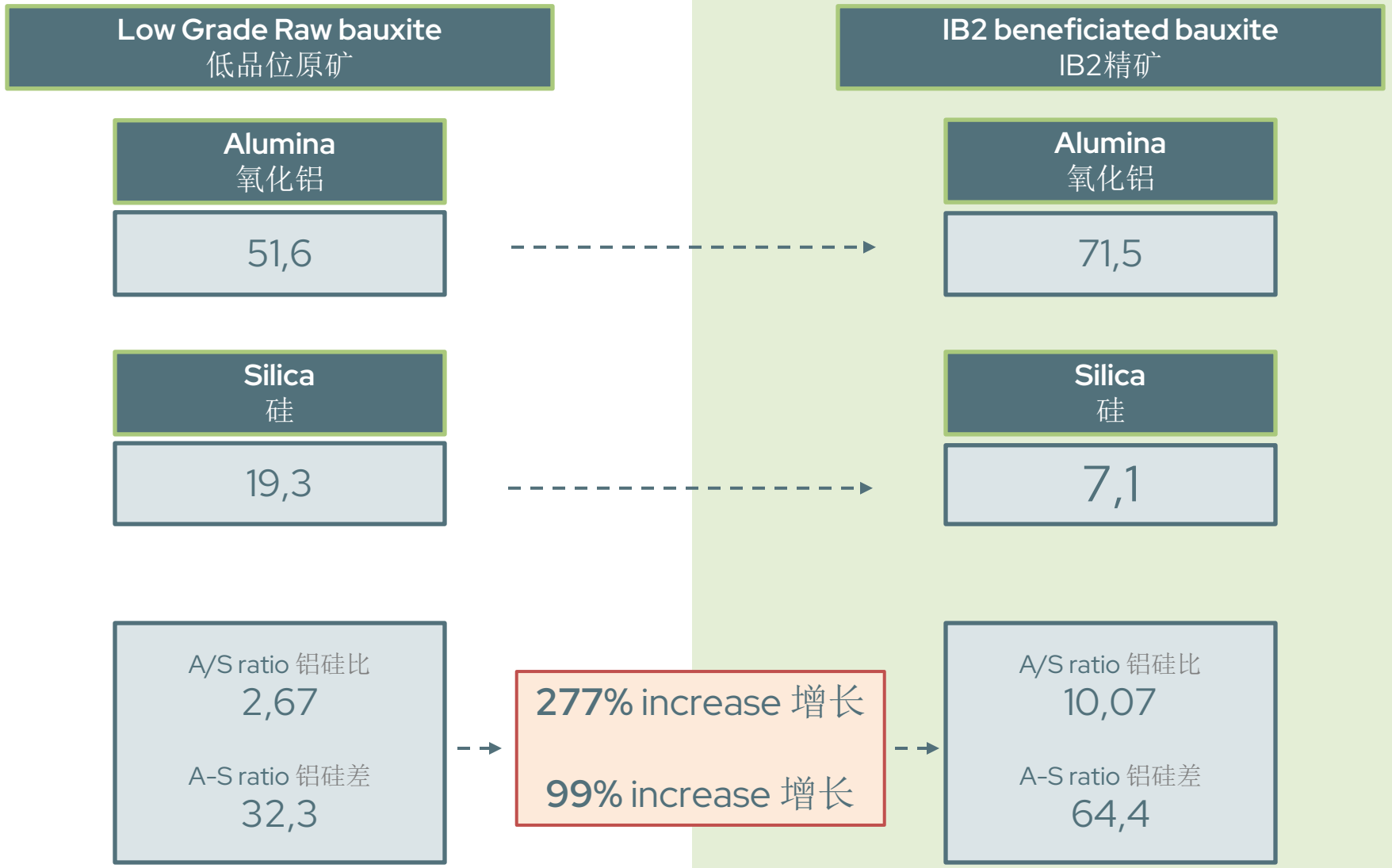
- Laboratory tests confirmed IB2 can be adapted to other refineries
  实验室测试证明IB2可使用于其他氧化铝厂
- IB2 is having discussions with other refineries in China and outside China, to be implemented as of end of 2025
  IB2正在与国内外其他氧化铝厂进行洽谈，计划于2025年年底实施

**IB2 is now accepting additional refinery sites for 2025 deployment**

IB2现正洽谈2025年可部署的氧化铝厂合作项目

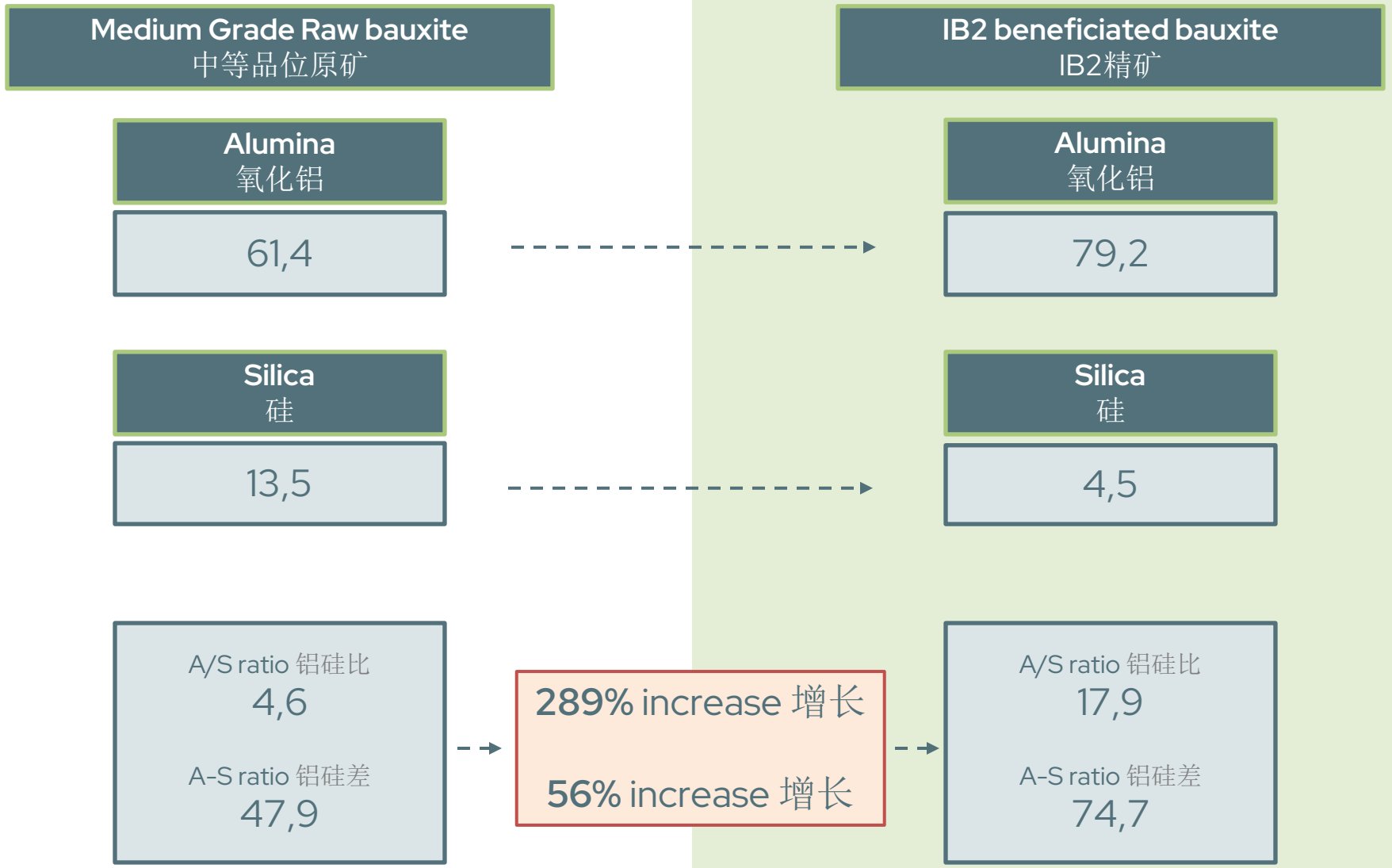
# Example of beneficiation on a sample of Chinese bauxite from Xiao Yi

## 举例：中国山西孝义铝土矿改进实例



# Example of beneficiation on a sample of Chinese bauxite from Jiaokou (Shanxi)

## 举例：中国山西交口铝土矿改进实例



# Photos 图片

# Photos 图片

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# Conclusion

Chinese bauxites supply is already **very dependent** on imports and this is becoming **dangerous**.

Almost all of the new capacity was built on the **seafront** to be supplied by imports.

Refineries must balance from imported ore and increase application of domestic low-grade bauxite to guarantee the supply of resources.

IB2 is already live, already embedded in China's system.

# 结论

中国的铝土矿供应已经非常依赖进口，这正变得越来越高风险。

几乎所有的新建产能都在沿海，以使用进口矿。

氧化铝行业需要平衡矿石进口，增加国产低品位矿的应用，保障资源供应。

IB2 已经融入中国的产业体系。

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# Thank you

# 谢谢

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