

# From Regional Mismatch to Coordinated Optimization: Interpreting the Development of China's Anode Industry in 2024

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## Abstract



In 2024, China's prebaked anode industry reached a total production capacity of 30.366 million tonnes and an output of 23.102 million tonnes, with a capacity utilization rate of approximately 76 %. High-efficiency capacity accounts for more than 40 %, signalling a shift from expansion to efficiency-driven development. Regionally, Shandong has a high concentration of capacity and strong export capability, whereas Yunnan and Inner Mongolia face tight supply due to the clustering of aluminum smelters, forming a clear regional mismatch. At the enterprise level, a "strong-get-stronger" pattern emerges as leading companies leverage scale and market advantages to maintain dominance, while inefficient and idle capacities continue to exit. Meanwhile, anode exports surged to a record 2.166 million tonnes in 2024, increasing reliance on international markets and driving globalization of the industry. Looking ahead, the industry will continue to evolve toward high-quality development through enhanced efficiency, structural optimization, and coordinated growth.

**Keywords:** Prebaked anode, Capacity distribution, Regional supply-demand mismatch, Export growth, Efficiency transition.

## 1. Background and Current Status

Prebaked anode is a key raw material in primary aluminum production, with about 450 kg of anode consumed per tonne of aluminum [1]. As China's electrolytic aluminum capacity gradually shifts westward, the anode industry has been marked by continued capacity expansion alongside regional supply-demand mismatches. Eastern provinces such as Shandong and Henan have highly concentrated anode capacity, leading to oversupply in some areas; whereas resource-rich regions like Yunnan and Inner Mongolia have relatively lagging supporting capacity and require significant inter-provincial transfers. In addition, international markets are increasingly reliant on high-quality anodes, and China's anode exports have sustained growth, becoming an important channel to absorb excess domestic capacity.

This paper focuses on the supply-demand landscape, efficiency structure, and export dynamics of China's anode industry in 2024. Based on field research, industry statistics, and analysis of enterprise samples, it systematically reviews the current state of the industry, summarizes the evolution of efficiency patterns, and forecasts future development trends, providing a reference for policy-making and corporate strategy.

## 2. Industry Development Trends under Supply-Demand Linkage

The prebaked anode value chain mainly comprises three segments: raw material supply, anode manufacturing, and aluminum electrolysis consumption. In recent years, the growth of China's

electrolytic aluminum capacity has gradually slowed, limiting the potential increase in anode demand, and overall industry demand has stabilized. However, domestic anode capacity continues to expand, with excess capacity arising in certain regions and pronounced regional supply-demand mismatches. Meanwhile, growing demand in the international aluminum market has driven foreign smelters to increase imports of Chinese anodes, and the export market has gradually become an important outlet to absorb surplus domestic capacity.

Consequently, a new supply-demand dynamic has emerged in the prebaked anode industry, characterized by “*steady domestic demand, easing regional mismatch, and continuously growing international demand.*” This interplay is guiding the industry from a phase of scale expansion toward structural optimization, as shown in Figure 1.



**Figure 1. Distribution of prebaked anode production capacity by province in mainland China, in 2024 (million tonnes)**

### 3. Regional Capacity Distribution and Enterprise Efficiency Differences

#### 3.1 Significance and Application of the Capacity Utilization Rate Indicator

Capacity utilization is an important metric for evaluating efficiency in the prebaked anode industry, as it comprehensively reflects a company’s production level, economic performance, and market supply-demand status. A high-capacity utilization rate indicates that equipment is being used efficiently, spreading fixed costs over more output and thus lowering unit production costs; whereas a low utilization rate implies idle capacity and difficulties in profitability.

ongoing expansion of export markets has not only helped absorb surplus capacity but also propelled Chinese anode companies onto the global stage, opening a new chapter of capacity internationalization. Meanwhile, leading enterprises are further solidifying their market position through coordinated strategies and scale advantages, driving a steady rise in industry consolidation.

Looking ahead, the anode industry will continue to progress in the direction of “efficiency orientation, structural optimization, and coordinated development”, achieving a transition from scale expansion to quality enhancement and entering a more stable, efficient, and internationalized stage of development.

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