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New Perspectives on China's Aluminium Utilization and Development

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1 Introduction

Aluminum is a widely used fundamental material and is imperative for industrial and economic development. Due to the combination of various properties such as its high strength, light weight, good malleability, and high corrosion resistance (Chen Weiqiang et al., 2012). As a direct result of its outstanding economic performance in recent years, China is now the biggest aluminum user in the world and is becoming the main driver of the overall global aluminum usage (Griswold, 2007).

In the meantime, waste management and sustainable products policy, reduction of the primary resource use became the focus points of China. So the secondary aluminum will become an important means of aluminum resource supply security in China.

This study focuses not only on the supply and demand of aluminum, but also on the use of aluminum scrap.

2 Methodology

This study has been conducted using the curve-fitting method and comparative method to analyze the relevant data in China from 1956 to 2013, and in the United States from 1900 to 2013. Then operate on MATLAB by using least square method.

As we can see in fig.1, the primary aluminum development of the United States shows a trend of inverted "U" curve. However, the secondary aluminum production has been continuously increased. China as a rapidly industrializing country, its aluminum production shows a rapid growth, and it can be predicted that after reaching a peak in 2025, there will be a downward trend.

From 1985 to 2013, China imports a large number of aluminum scrap, we fit the curve of China import aluminum scrap volume during the past 29 years (Fig.2) by using MATLAB. The results are as follow:

$$y = -47.710x^4 + 2725.1x^3 - 44368x^2 + 5x + 5 \quad (1)$$

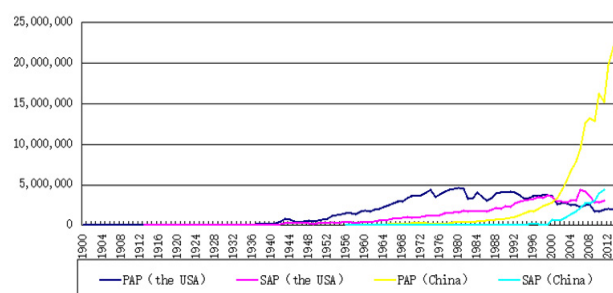


Fig.1 The U.S. and China primary aluminum production and secondary aluminum production

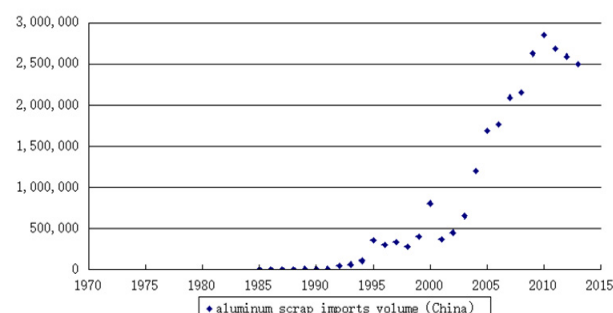


Fig.2 China aluminum scrap import volume (1985-2013)

The results from the curve fitting imply that China's aluminum scrap import volume will decreased, this suggests that China begins to reduce the external dependency of secondary aluminum with its self-sufficiency ability raise.

With the rapid development of China's economy, in-use aluminium stocks is growing fast, so China will be able to provide more secondary aluminum raw material, the raw material provided by China can be calculated using Eq.(2). The results are shown in Fig.3.

Raw material(China) = secondary aluminum production - aluminum scrap import volume * 80% (2)

3 Conclusion

Based on the above analysis, our conclusions are listed as follow: (i) China primary aluminum production and

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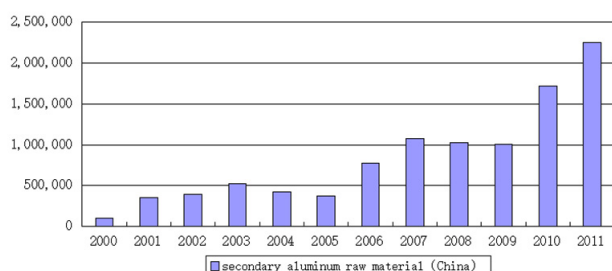


Fig.3 China aluminum scrap self-sufficient volume(2000-2011)

consumption trend will both appears inverted "U" curve and it's different from the U.S development law; (ii) In the future, China's secondary aluminium production will continue to increase and China begins to reduce the external dependency of secondary aluminum; (iii) China secondary aluminum production ratio will be more than primary aluminum ratio, because the availability of aluminum scrap will increase in the future and China's bauxite share of global reserves is less than 3% (Xu Guodong et al.,2012). It is important to research and develop innovative technologies for secondary aluminum industry; (iv) Considering the environmental factors, China should develop the secondary aluminum industry and reduce the

use of primary resource; (v) China's secondary aluminum production will be more than primary aluminum production in 2035.

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