

## MODERN TRENDS AND CHALLENGES OF DEVELOPMENT OF GLOBAL ALUMINUM INDUSTRY

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This article overviews complex study into modern trends and challenges of development of global aluminum industry. Dynamics, structure, and segmentation of global aluminum market are discussed in terms of systematic analysis. On this basis strategic map of the industry has been plotted and five forces of competition on global aluminum market have been determined which will influence directly on functioning and development of aluminum producing companies.

*Key words:* aluminum, industry, market, producer

### INTRODUCTION

Nearly all branches of global industry consume aluminum. Mechanic engineering, defense industry, aircraft engineering and shipbuilding, power production industry, fabrication of construction materials should be especially mentioned. Thus, aluminum is somewhat a “strategic metal” [1], possibilities to meet the needs for this metal by means of own capacities directly influence on national energetic, economic, military and transport safety.

Restricted access to commercially available bauxite resources and depletion of ores are the main obstacle for development of aluminum industry. It should be noted that global aluminum market, as many other markets of raw stocks, is cyclic and depends strongly on fluctuations of global economic situation. In the course of its development the market of non-ferrous metals, the segments of which are the markets of primary aluminum and aluminum items, depends significantly on the climate in financial sector, as well as on fluctuations of costs of energy. Herewith, contrary to ready aluminum products, import and export of raw aluminum are exposed to sharp variations of demand and prices, which creates elements of uncertainty and volatility for producers and consumers of this metal.

After tight for global aluminum market year: 2014 [2], in 2015 there is excessive aluminum production in

the World [3]. The main reason of the balance violation was decrease in demand for aluminum and increase in export from China, as a consequence the prices decreased to the minimum of 2009, some aluminum companies reached the limit of profitability.

It is obvious that global prices for raw stock and ready products of aluminum industry are rather unstable; sufficiently often this market suffers from redistribution of market positions among major market participants due to mergers. In addition, development of metallurgical companies requires for significant capital expenses with long term of payback period, which increases the importance of strategic analysis of trends and challenges of development of global aluminum industry.

### RESULTS

The most significant portion of aluminum consumption market is occupied by transport mechanic engineering, construction, electric engineering and fabrication of packing materials.

Accordingly, the key drivers of global aluminum industry are the factors of development of adjacent industries (see Table 1).

The aforementioned factors generate and promote global demand for aluminum aimed at production of hi-tech consumer goods and, thus, promote development and growth of global aluminum industry. Global production of primary aluminum in 2015 amounted to 57 MMT, by 9 % higher than in 2014 [5]. Comparative strategic analysis of aluminum consumptions by countries and regions is summarized in Table 2.

In the countries with high GDP level per capita the demand for the metal continues its growth, provided that metal intensive industries continue their development. From the point of view of geographical cross section the largest and most promising market segment of

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Table 1 **Key drivers of development of global aluminum industry [1, 3, 4]**

Adjacent industry	Factors of development
Transport and aircraft engineering	It is expected that steel will be replaced by aluminum in automobile industry, moreover, even now aluminum content in spacecrafts is about 90%, in aircrafts up to 80%
Construction	Construction boom in developing countries promotes demand for aluminum in the form of aluminum shaped sections and other aluminum construction items required in any climatic environment
Power production	Aluminum is widely applied in high-voltage power transmission lines, busbars of electric substations, TV and satellite antennas, only aluminum wires are applied for main overhead transmission lines
Packing	Aluminum as a packing material is environmentally safe and can be used as scrap for secondary processing
Others	The industry of mobile communication tools consumes high amounts of aluminum

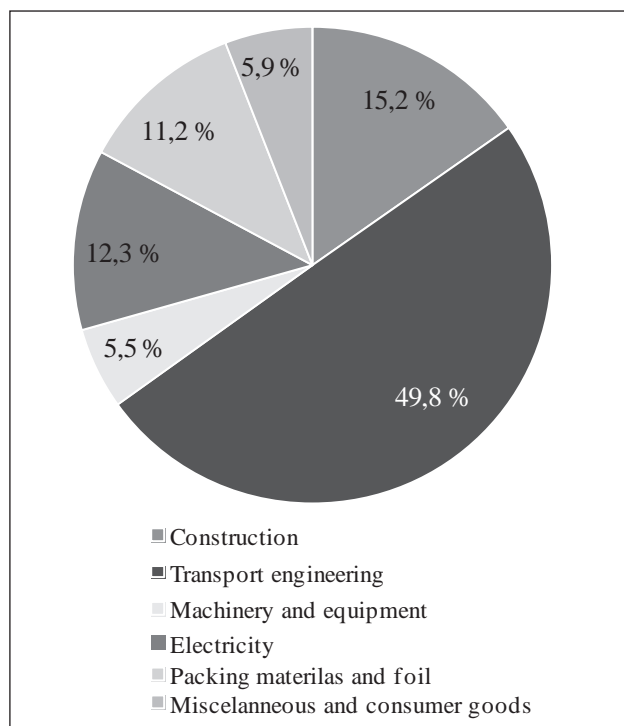


Figure 1 Global demand for aluminum semi-products in 2015 (without China), thousand tons and percentage [3]

aluminum products is China. Specific aluminum consumption by China is currently about 50 % [6].

Significant excess of facilities was formed in Chinese aluminum market, China tries to compensate it by export increase. Final result of aluminum export growth in China includes the mentioned above surplus of global aluminum market in 2015.

## DISCUSSION

An inherent result of excessive global aluminum production was sharp fall in prices. While commenting this fall, analysts mentioned that global aluminum market "...faced the greatest bearish fundamental shock in this generation and, probably, throughout history..." [3].

Market of aluminum industry is characterized by severe competition and high concentration. Cumulative specific weight of six largest producers is above 40% of global production of this non-ferrous metal (see Fig. 2), which is related with high input barriers for appearance of new participants in the market, specific peculiarities of production process and market environment [6, 7, 8].

Decrease in global price level was reflected in significant decrease in premiums of producers, which in its turn promoted the market participants to execute response actions, which are conventionally comprised of three key trends, characteristic for all companies of real sector of economy in transforming environment [9, 10]:

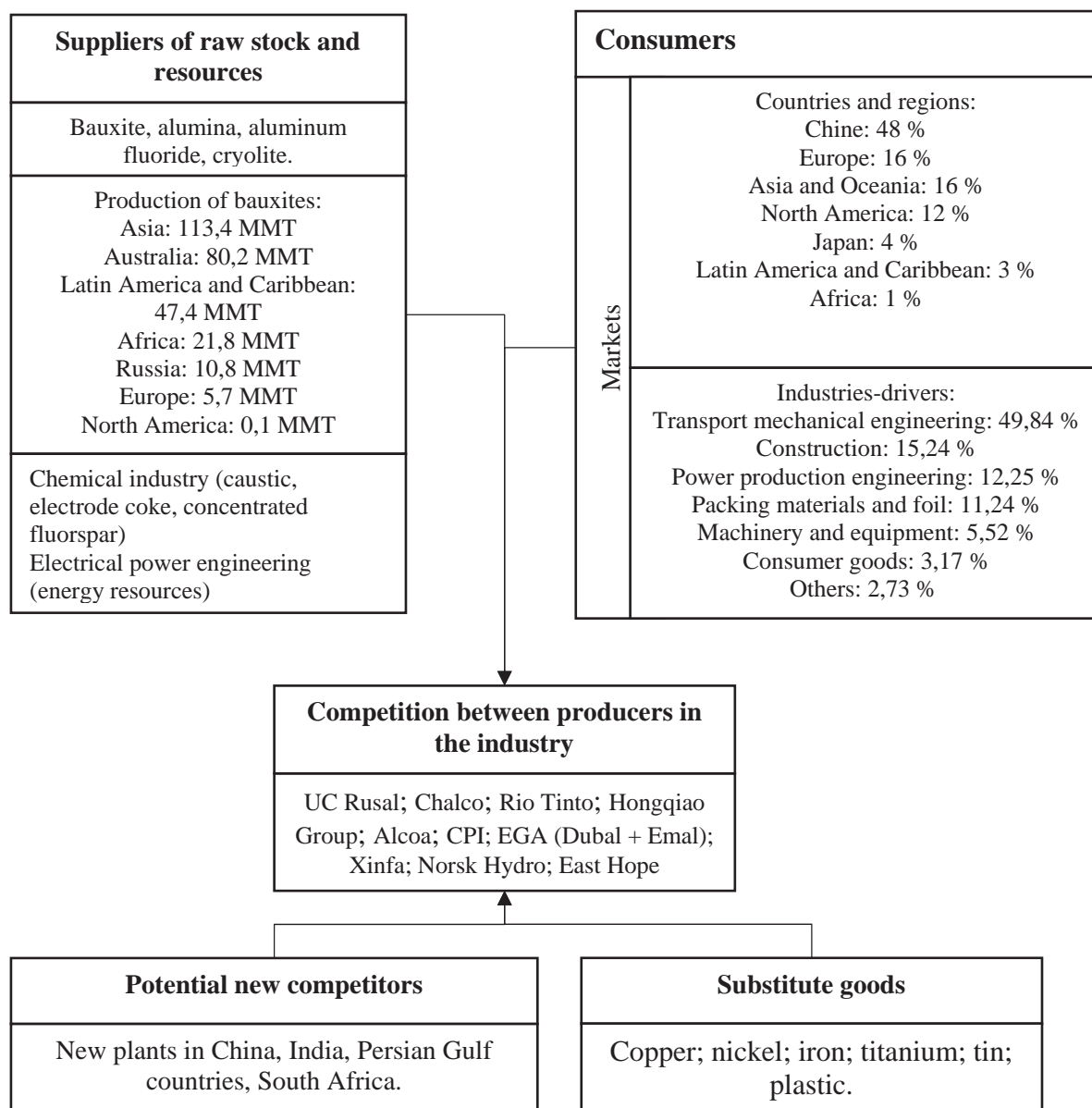
- 1) curtailment of production facilities;
- 2) reduction of expenses and optimization of business strategies;
- 3) lobbying of protection of internal market by means of import dues.

## CONCLUSIONS

In general the performed analysis of modern trends of development of global aluminum industry reveals that, on the basis of results of the year 2016, global aluminum market will be in short supply again. Herewith, global demand for aluminum steadily increases with increase in business of final aluminum consumers. However, the rate of this consumption growth unfortunately is behind the rate of output amounts and, as a

Table 2 **Comparative strategic analysis of aluminum consumption by countries and regions [3]**

Index	Agricultural producing countries	Countries with high rates of urbanization and industrialization	Countries with developed economy, developed service sector and hi-tech
Average per capita consumption, kg	India: 2,6 kg	Middle East: 6,7 kg China: 22,9 kg Brazil: 8,6 kg Russia: 8,4 kg	South Korea: 46,7 kg Germany: 29,9 kg USA: 18,1 kg Japan: 16 kg
Increase in per capita consumption (2015 to 2011), in %	India: + 75 %	Middle East: + 69 % China: + 56 % Brazil: + 60 % Russia: + 26 %	South Korea: + 57 % Germany: + 1 % USA: + 21 % Japan: + 6 %
GDP per capita, thousand US\$	Less than 10 thousand US\$	From 10 thousand US\$ to 30 thousand US\$	From 30 thousand US\$ to 60 thousand US\$



**Figure 2** Five forces of competition in global aluminum market

consequence, aluminum supply in global market. Thus, it follows that:

- firstly, urgent short term tasks of producers in this market can be as follows: reduction of stock excess, shut down of non-profitable companies or excessive facilities;
- secondly, appropriate optimization of business processes is required, reduction of inoperable credits by means of market tools, raising of venture financing for retrofitting of production funds, lobbying of internal markets of aluminum products;
- thirdly, the long term task of global aluminum companies should be establishment of qualitatively new proposal for meeting actual demand for primary aluminum and aluminum products.

Thus, the major participants in the global market of aluminum products should more intensively concentrate their efforts in strengthening of their vertical structure of aluminum consumption.

This article discussed key strategic aspects of dynamics and structure of global aluminum market, subsequent works on this topic will study innovation technological aspects of long term development of global aluminum industry.

## REFERENCES

- [1] H. U. Sverdrup, Ragnarsdottir K. V. and D. Koca, Aluminum for the future: Modelling the global production, market supply, demand, price and long term development of the global reserves. Resources, Conservation and Recycling 103 (2015), 139–154.
- [2] E. Popov & Ya. Tsinoeva, Aluminum became a rare metal. Kommersant, 143 (2014), 9.
- [3] T. Dmitrieva, Competition at falling aluminum market. Marine News of Russia. Available at: <http://morvesti.ru/tems/detail.php?ID=55044> (Accessed date: 20.06.2016)
- [4] H. Hao, Y. Geng and W. Hang, GHG emissions from primary aluminum production in China: Regional disparity and policy implications. Applied Energy 166 (2016), 264–272.

- [5] Review of global aluminum market. Aluminum Association. Available at: [http://www.aluminas.ru/wp-content/uploads/2016/05/Alyuminievaya-Assotsiatsiya\\_obzor-mirovogo-ryinka-alyuminiya-2016.pdf](http://www.aluminas.ru/wp-content/uploads/2016/05/Alyuminievaya-Assotsiatsiya_obzor-mirovogo-ryinka-alyuminiya-2016.pdf) (Accessed date: 20.06.2016).
- [6] Global aluminum production in 2015 increased by 9%. Minprom Information Agency. Available at: <http://minprom.ua/news/202216.html> (Accessed date: 20.06.2016).
- [7] Market review. Official site of RUSAL corporation. Available at: [http://www.rusal.ru/aluminium/key\\_markets/](http://www.rusal.ru/aluminium/key_markets/) (Accessed date: 20.06.2016).
- [8] The biggest global aluminum producers. All about aluminum. Available at: [http://aluminiumleader.ru/economics/world\\_market/](http://aluminiumleader.ru/economics/world_market/) (Accessed date: 20.06.2016).
- [9] M. N. Dudin, E. E. Frolova, N. V. Gryzunova and E. B. Shuvalova, The Triple Helix Model as a Mechanism for Partnership between the State, Business, and the Scientific-Educational Community in the Area of Organizing National Innovation Development. *Asian Social Science*, 1(2015), 1, 230-238.
- [10] M. N. Dudin & E. E. Frolova, The Balanced Scorecard as a basis for strategic company management in the context of the world economy transformation. *Asian Social Science*, 1(2015), 3, 282-288.

**Note:** The responsible for English language is the translator from Russian Presidential Academy, Moscow, Russia