Environmental Aspects of UC RUSAL's Aluminum Smelters Sustainable Development

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Abstract

UC RUSAL is currently implementing an environmental strategy that includes increasing the number of pre-bake (PB) potlines and implementing global environmental standards at the existing smelters. The following has been achieved:

- Implementation of new Eco-Søderberg cells with environmental results that are comparable to PB cells;
- Construction of a pilot area for inert anode cells that are designed to replace VSS cells;
- Implementation of cutting-edge online and video systems for both emissions control and monitoring of cell condition;
- Testing of new types of binder with either a reduced or a close-to-zero content of benzo(a)pyrene;
- Construction of high-performance GTCs; and
- Development and implementation of technologies for sulfur recovery, SPL recycling, and solid waste treatment and recycling.

This paper provides an overview of the results of more than 10 years of effort to reduce the environmental footprint of RUSAL's smelters.

Keywords: Pollutant emissions, Eco-Søderberg technology, extractive pitch, gas treatment center (GTC) for aluminum production, spent potlining (SPL).

1 Introduction

Among the top priorities of its environmental and technical policy UC RUSAL proclaims the following: minimization of "carbon footprint" in the products; maximum switching over to the use of hydroelectric power; implementation of eco-friendly technologies; the most efficient treatment of air emissions; complete treatment and recycling of toxic wastes. Under its environmental strategy the Company performs the following:

- Development of new technologies for aluminum production with pre-baked anodes operating at of 500 to 700 kA with improved environmental properties;
- Implementation of eco-friendly upgrade solutions at existing Søderberg aluminum smelters;
- Development of new types of binder with a close-to-zero content of benzo(a)pyrene to produce anode paste;
- Testing of carbon-free electrolytic reduction technology with inert anodes;
- Implementation of highly efficient technologies for gas treatment;
- Implementation of technologies for recycling and treatment of potlining.

2 New Prebake Technologies for Greenfield Aluminum Smelters

The Company has already developed the entire series of high-amperage RA-300, RA-400 and RA-550 cells for its greenfield projects [1]. Khakass (Figure 1) and Boguchany (Figure 2) aluminum smelters are constructed using RA-300 technology, and RA-400 and RA-550 technologies are key technologies for Taishet aluminum smelter (Figure 3 and Figure 4) [2].
The technology proves to have high performance results and low pollutant emissions (Table 1).

Table 1. Process and environmental performance.

Parameter	RA-300	RA-400	RA-550
Amperage, kA	320	440	545
Current efficiency, %	94.5	95.0	95.5
Power consumption, kWh/kg Al	<13.7	<13.3	<12.9
F emissions, kg/t	0.26	0.25	0.20

When smelters are constructed with the implementation of new technologies one of the aims of the Company is to use 100 % power supplied by hydroelectric power plants. It will provide for minimization of "carbon footprint" during the primary aluminum production, as coal combustion is no longer required for generating power for the process.

Figure 1. Khakass Aluminum Smelter (RA-300 technology).

Figure 2. Boguchany Aluminum Smelter (RA-300 technology).

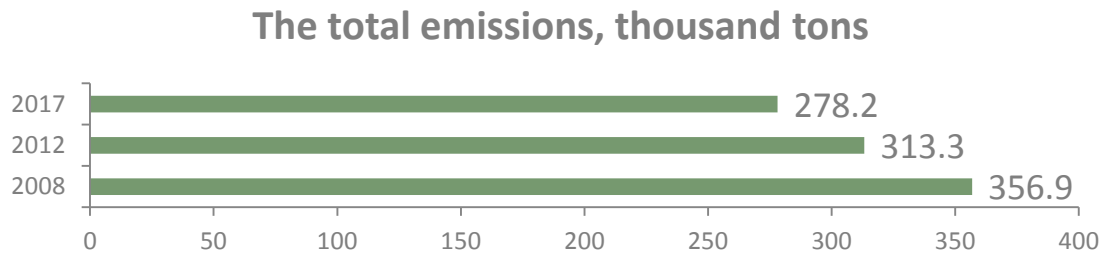

Figure 18. Reduction of gross emissions from Companies smelters.

The Company undertakes continuous measures to reduce its environmental impact as follows: further improvement of Søderberg technology; construction of new dry gas scrubbers that in conjunction with wet scrubbing technology ensures high efficiency of flue gas treatment; development of advanced extractive pitch and inert anode technologies to achieve even higher pollutant emission reduction values.

10 References

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