

Ecology as a fundamental trend of UC RUSAL technical evolution

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Abstract

Actual development of aluminum industry is very demonstrative – the aluminium demand and production volumes double every 15 years. From 2000 to 2014 the aluminum production rate increased from 25 to 53 tonnes per year (tpy). It is expected that by 2030 the aluminum production will surpass 90 to 100 tpy.

Due to the increased production, the world aluminium industry is challenged in the following:

- Global climate warming: greenhouse gas emissions;
- Deteriorated ore quality: depletion of ore resources, high sulfur in coke;
- Menacing growth of the generated wastes: red mud, spent lining;
- Increased volume of gas emissions;
- Improved public ecological awareness.

The global RUSAL ecological objectives are:

- Complete decontamination of atmospheric emissions,
- Zero discharge to the waterways, lakes and oceans,
- 100 % recycling of toxic wastes
- Application of ecologically friendly technology,
- Consistent soil rehabilitation,
- Minimization of the “carbon footprint” in the products,
- Balance of ecological, social and business interests.

Within the frame of this strategy implementation in alumina industry, work is in progress to utilise the red muds for scandium recovery, explore application of mud in steel and cement industries and as construction material. The state-of-the-art processes of red mud disposal are implemented, followed by disposal areas rehabilitation with treatment of caustic effluents. The more promising and ecologically friendly processing of high silica ore is under development, avoiding the red mud generation and able to process aluminous wastes (ash, clayey layers of coal deposits, etc.). The waste-free processing of nepheline ore is commercialized and continuously improved with production of alumina, soda / potash and cement. The complete utilization of the raw materials achieved by this technology also allows producing alumina with the lowest production cost within the company.

The improvement of the existing aluminum production built by RUSAL includes the ecological modernization of Soderberg technology, design and implementation of innovative pot assembly and recycling of spent materials, fabrication and application of alternative binders in order to completely avoid the benzo[a]pyrene, two stages gas cleaning and sulfate removal, 100 % processing of spent carbon lining. Development of prebake cell technology with amperage above 500 kA is in progress, together with inert anodes design for further conversion of Soderberg cells.

The new greenfield RUSAL smelters are designed exclusively on the ecologically friendly hydro energy sources.

Key words: Aluminium technology; environment; new technologies, modernization, hydropower.