Reduction of Net Carbon Consumption - Different Avenues Tested

Sylvain Delenclos[1], Stephane Mermet-Guyenet[2], Johan Mizzi[3], Guillaume Branly[4] and Olivier Forato[5]
1. Senior Business Improvement
2. Engineering & Innovation Department Manager
3. Senior Reduction Expert
4. Reduction Process Engineer
5. Carbon & Reduction Technical Director
Aluminium Dunkerque, Dunkerque, France
Corresponding author: sylvain.delenclos@aluminiumdunkerque.fr
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Abstract

Decarbonization is a major issue for preserving our planet and the quality of life of its inhabitants. The development of industrial capacities and production methods in line with this challenge is essential. Aluminium Dunkerque is one of the world leaders in the production of low-carbon aluminum. The company has reduced its emissions by 17 % (scope 1 and 2) since 2013 and emits four times less greenhouse gases than the global sector average. Thanks to these assets, Aluminium Dunkerque intends to play a major role in the European production of low-carbon aluminum for the benefit of its customers and its communities. Therefore, in accordance with the objectives of COP21, we are accelerating our energy and environmental transition by giving ourselves an ambitious roadmap to 2050: the LowCAL project.

Although our strategy is geared towards the implementation of a CO_2 capture process, efforts remain sustained to reduce our emissions at their origins as much as possible. In this context, Aluminium Dunkerque was able to test two avenues for reducing net carbon consumption by: increasing the frequency of pot tending to maintain an airtight cover, and by coating the anodes in order to reduce their air burn (oxidation) and CO_2 burn (Boudouard reaction). The results are analyzed in a technical-economic context to be validated for generalization or a larger test.

Keywords: Aluminium electrolysis potroom, Net carbon consumption.

1. Introduction

Aluminium Dunkerque is a French plant located in northern France. The plant has 650 employees and uses AP40 technology on its 264 pots. Production totals over 280 kt/a at an operating current of 395 kA. Aluminium Dunkerque is part of the benchmark smelters in terms of low-carbon aluminium production, with a footprint of 4.4 t CO_2eq/t Al for scopes 1, 2 and 3. Scope 1 and 2 emissions have been reduced by 17 % since 2013 (Figure 1) thanks to continuous process improvements, introduction of low-energy pot linings and a less carbon-intensive energy supply. Nevertheless, the plant's overall scope 1 footprint is mainly due to the consumption of carbon anodes in the electrolysis process, which alone accounts for 85 % of smelter CO_2 emissions (Figure 2).

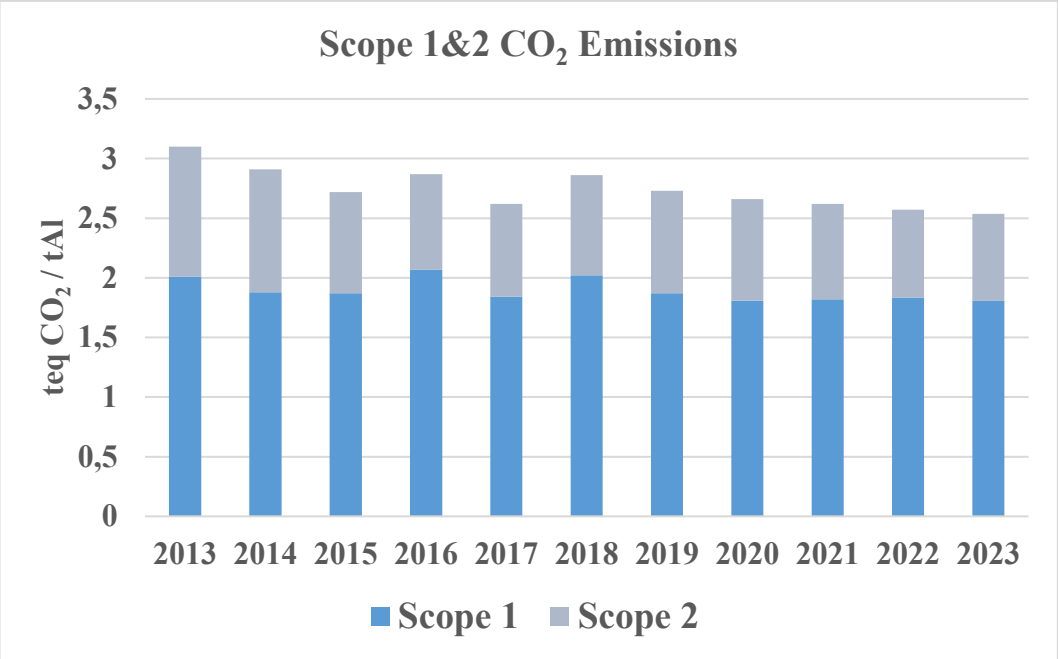

Figure 1. Scope 1 and 2 CO_2eq emissions in Aluminium Dunkerque.

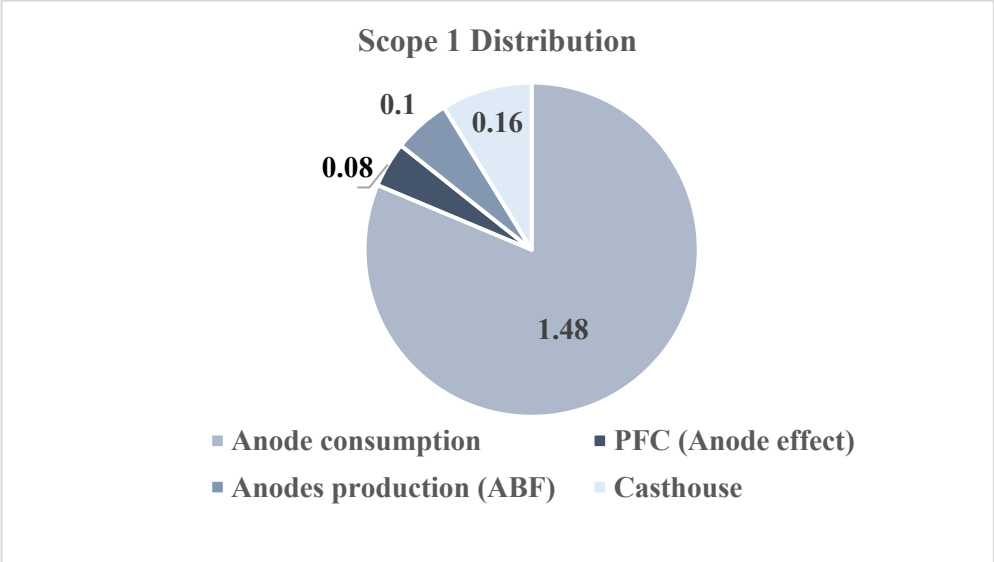

Figure 2. Scope 1 CO_2e emissions in the smelter.

Aluminium Dunkerque has implemented an ambitious strategy to decarbonise its facilities by 2050. This strategy, known as LowCAL@, is broken down into several milestones by 2030 aimed at increasing aluminium recycling capacity and implementing Carbon Capture and Storage (CCS) technology on the potline; benefiting from the future CO_2 hub to be developed in the region by bringing together manufacturers with significant carbon emissions.

In a second phase, the aim is to create a new electrolysis potline based on inert anode technology and then convert existing potline to this same technology by 2050.

Pending the introduction of these breakthrough technologies, Aluminium Dunkerque is continuing its efforts to reduce its carbon emissions by electrifying processes, reducing energy consumption, and cutting its net carbon consumption.

5. References

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