

Pioneering Sustainable Aluminium: Aluminium Dunkerque's Decarbonization and Partnership Strategy

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Abstract

Aluminium Dunkerque (AD) benefits from the low carbon footprint of the French electricity grid and the continual improvement of its smelting technology, which places AD in the top quartile worldwide for carbon emissions (scope 1 & 2). Building on this enviable position, AD revealed in 2023 its decarbonization strategy, which aims to halve its emissions by 2030 and to reach carbon neutrality by 2050. To achieve this, Aluminium Dunkerque has formed partnerships with other entities to prepare and implement this ambitious plan.

As early as 2017, along with other industrial companies from the Dunkirk port hub, it helped found the "Industry, Carbone and Territory" committee (now DKarbonation), which was established to engage with local, regional, and national public authorities in a platform for exchange and innovation with a view to decarbonizing this industrial territory. This initiative has since been recognized as France's first Low-Carbon Industrial Zone.

Subsequently, with the support of long-standing partners, members of Aluminium France, AD has initiated the acceleration phase of its decarbonization roadmap, the design of a solution for pre-concentrating and capturing CO₂ in pot flue gases, specifically tailored to the aluminium smelting technology.

Finally, AD is also forging partnerships with international companies active in the transport and long-term storage of CO₂, with a view to preparing the scaling-up of this CCS solution and being able to share the costs associated with the transport and the storage of the captured carbon at various sites below the North Sea.

Aluminium Dunkerque is convinced that success in these innovative and capital-intensive fields can only be achieved by building ad hoc, solid, and ambitious partnerships.

Keywords: Aluminium Dunkerque, French aluminium, Partnership, Innovation, Decarbonation, CO₂ emissions, Carbon Capture and Storage (CCS).

1. Introduction

Aluminium Dunkerque (AD) is one of the largest producers of primary aluminium in Europe. The plant is located in the port of Dunkirk, France, and benefits from a strategic position due to its direct access to the sea and a well-developed energy infrastructure. AD stands as a prominent player in the global aluminium industry. It is renowned for its significant contributions to both industrial production and environmental sustainability. The aluminium sector, known for its high energy consumption and substantial carbon emissions, faces increasing pressure to innovate and, eventually, adopt greener practices.

In this context, AD's operations are influenced by the low-carbon footprint of the French electricity grid and advancements in smelting technology. French electricity grid is one of the

lowest carbon grids in Europe. The country derives a significant portion of its electricity from nuclear power, which reduces the carbon emissions associated with its electricity consumption. This favorable context has allowed AD to benefit from a relatively low carbon footprint compared to other global aluminium producers, placing the company in the top quartile worldwide for carbon emissions. The company has succeeded in cutting its emissions (scope 1 & 2) by 18 % since 2013 and greenhouse effect gas emissions are four times lower than the global sector average (scopes 1, 2 & 3) [1].

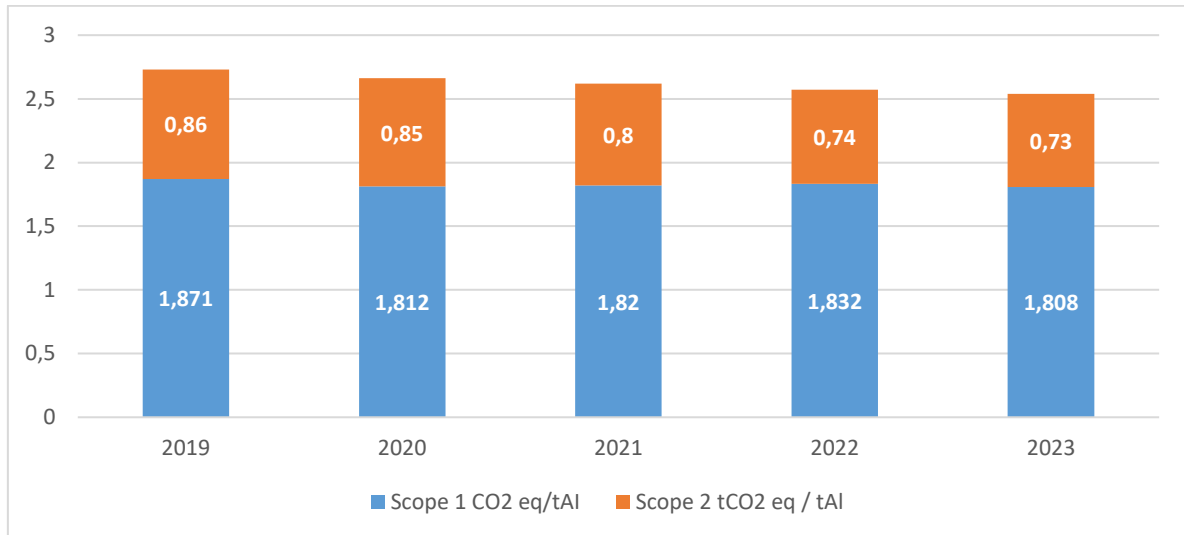


Figure 1. CO2 Scope 1 & 2.

1.1 Strategic Challenge

AD has always been dedicated to improvement, initially focusing on energy and electricity, particularly through electrolysis. However, with the new decarbonization goals, there is now a pressing need to tackle additional challenges such as gas emissions.

This broader approach demonstrates a significant shift from AD's historical focus to a more comprehensive strategy. This strategy is illustrated by the Lowcal ambition, which aims to address direct emissions related to gases. In recent years, this commitment has expanded to embrace operational excellence and energy efficiency throughout the entire site, with ISO 50001 certification now applied across the facility.

While some of these issues can be tackled with existing expertise, others necessitate external partnerships. This approach ensures that improvement efforts are enhanced by integrating both internal skills and external collaborations.

In particularly disruptive areas, where new technologies are essential yet not part of our core business, the need for external partnerships becomes even more crucial. While these innovations are vital for maintaining competitiveness and relevance in a constantly evolving market, they are not at the center of our primary expertise. Consequently, collaborating with other stakeholders allows AD to complement and enhance its internal skill set, bridging the gap between our core competencies and these emerging technologies. By working with external experts, AD not only leverages its own strengths but also integrates new insights and capabilities, which are crucial for advancing cutting-edge initiatives. This strategic approach ensures that AD remains at the forefront of technological advancements while effectively navigating areas beyond our traditional focus.

the ADEME ZIBAC call for projects [8]. This endorsement underscores the region's critical role in advancing decarbonization. This backing is crucial for accelerating the deployment of CO₂ technologies and infrastructure.

In this context, AD's strategic positioning enhances its role in the development and implementation of CO₂ capture solutions. Working in tandem with GRTgaz and other regional stakeholders, AD will contribute to a CO₂ transport network connecting industrial CO₂ sources to storage and utilization sites. By leveraging its advantageous location and expertise, AD is well-positioned to drive advancements in CO₂ capture and contribute significantly to the sector's decarbonization goals.

5. Conclusion

Aluminium Dunkerque has long been a champion of continuous improvement, initially honing its focus on energy management and electrolytic processes. As the landscape of industrial decarbonization evolves, AD's commitment has expanded to encompass broader challenges, including the reduction of greenhouse gases emissions.

AD's strategy reflects a deepened commitment to operational excellence and sustainability. The implementation of ISO 50001 certification across the entire facility underscores the company's dedication to improving energy management and efficiency site wide. These internal advancements demonstrate AD's ability to adapt and enhance its practices in line with emerging decarbonization goals.

However, addressing the complexities of gas emissions and other disruptive areas of decarbonization requires a common effort from all the stakeholders. By collaborating with industry experts and leveraging external innovations, and with the essential support of governments and legislators, AD can supplement its internal strengths and drive forward cutting-edge initiatives.

The role of the aluminium industry is critical in this context. As a key player in the global industrial sector, the aluminium industry must lead by example in adopting innovative technologies and practices to drive substantial emissions reductions. The sector's unique position, given its significant energy consumption and carbon footprint, means that its contributions to decarbonization can have a profound impact on broader environmental goals.

In conclusion, Aluminium Dunkerque's evolution from a focus on energy efficiency to a comprehensive decarbonization strategy illustrates a proactive response to the pressing challenges of today's industrial landscape. By combining its internal expertise with strategic external partnerships, AD is well-positioned to take an important part in the charge in industrial decarbonization, driving progress towards a more sustainable future.

6. References

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3. Note: The years 2018 and 2022 saw many electrolysis cells being shut down, either accidentally or deliberately, which explains the results deviating more from the average.
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