

Aluminium from the Amazon: Strengths, Weaknesses, Opportunities and Threats

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Abstract



The Amazon region in South America historically comprises three aluminium-producing countries: Brazil, Venezuela, and Suriname, while Guyana is also home to several bauxite mines. In the Brazilian Amazon, we find two of the world's main aluminium producers: Alcoa and Norsk Hydro. These companies are among the avant-garde in terms of sustainability, as certified by the Aluminium Stewardship Initiative (ASI). They have earned their reputation as sustainable producers thanks to cutting-edge technologies applied in mining as well as in alumina and aluminium production. Examples include the management of bauxite tailings, measures for safer disposal of bauxite residue (colloquially called red mud), the greening of the energy mix used, decarbonization of the smelting process, and reforestation programmes at the impacted sites. The fate of Venezuela and Suriname is a different one: after successful operation for decades, the aluminium smelters in these countries have shut down their operations, due to diverse factors, leaving the facilities in ruin and forming a considerable threat to the environment and to social wellbeing. A comeback will be difficult if it will happen at all.

Bringing a social science perspective, Simon Lobach has studied the environmental performance of aluminium producers in the Amazon. Besides the actions of aluminium producers, he has also taken the fragility and global importance of this unique ecological biome into account. Based on a several-year research project on aluminium production in the Amazon, he presents his findings in the form of lessons for sustainability from the aluminium producers in the region, but also insights that the sector can obtain from a wide array of academic and societal actors in the region that were consulted in the context of this project regarding responsible operations in this highly diverse, rich, yet vulnerable biome.

Keywords: Aluminium in the Amazon, Sustainability, Environmental performance, Bauxite residue.

1. Introduction

The Amazon region in South America extends over nine different countries. It contains vast bauxite deposits, which have been exploited since 1915, when the Aluminum Company of America (Alcoa) acquired its first concessions in two territories in the northern Amazon that were then under colonial administration: British Guiana and Dutch Suriname. At that time, the First World War made it necessary to build fighter aircrafts, for which aluminium was required. Aluminium played an even larger role during the Second World War. During that conflict, Suriname was the largest bauxite exporter worldwide, helping the Allied Forces to victory. After the war, Suriname attempted to capitalize on this position by setting up its own aluminium smelter within the country. For this, it needed an alumina refinery, but also a reliable source of electricity, for which a hydroelectric dam was built. Alcoa created the necessary infrastructure in Suriname, so that the first Amazonian aluminium was produced here in the late 1960s. British Guiana has attempted to follow this example since that time, and has continued doing so after it became the independent country Guyana, but these efforts have had ups and downs with some indications of a potential revival today [1, 2].

The aluminium sector in the Amazon expanded especially when Brazil and Venezuela joined the game in the 1970s and 80s. In Brazil arose the aluminium smelters Albrás in Barcarena (formerly operated by Vale, now by Hydro) and Alumar in São Luís do Maranhão (operated by Alcoa). Venezuela built two smelters (Alcasa and Venalum) in Ciudad Guayana, both operated by the state company Corporación Venezolana de Guayana – CVG.

For this to happen, both Brazil and Venezuela also built hydroelectric dams to power the smelters. Even today, some of these dams are among the largest worldwide: the Guri Dam in Venezuela and the Tucuruí Dam in Brazil.

The two Brazilian smelters have a considerable output. Albrás produces around 460 000 tonnes per year [3]. Alumar was deactivated for several years because of high electricity prices, but reopened in 2022 and is aiming to fulfil its potential of 447 000 tonnes again very soon [4]. These two Brazilian smelters rely on bauxite from mines in Trombetas, operated by the Brazilian stock company Mineração Rio do Norte (MRN); Paragominas, operated by Hydro; and Juruti, operated by Alcoa. Two alumina refineries exist in the Brazilian Amazon, both built next to the smelters that they supply to. The alumina refinery in Barcarena (Alunorte) has for a long time been the largest in the world. Figure 1 shows the location of the facilities used for aluminium production in the Amazon.



Figure 1. The northeastern Amazon, with the different components of the aluminium supply chain. The orange symbols indicate bauxite mines, grey symbols alumina–aluminium production facilities, and the blue symbols major hydroelectric plants. The black lines indicate the main electricity transmission lines connecting the hydroelectric plants to the aluminium plants, while the red line shows the slurry pipeline transporting liquefied bauxite from Paragominas to the alumina plant in Barcarena. Source: Own elaboration using Google Maps.

5.2 Bauxite Residue Needs Permanent Monitoring

The monitoring of dangerous substances, like bauxite residue, often stops after an industry has left a country. This may not be on anyone's mind in Brazil today, but sooner or later alumina production will end, and it may become unclear who should be responsible for the management of these toxic basins after that, especially if the State lacks the capacity to take this responsibility. The cases of Suriname and Venezuela have taught us that such a moment may arrive sooner than anyone expects. In Venezuela, I interviewed a retired environmental engineer, formerly responsible for the security of bauxite residue basins in that country. He informed me that after the closure of the factories, monitoring was discontinued.

5.3 The Aluminium Industry Must Win the Hearts of Amazonian Populations

Finally, the very difficult historical relation between aluminium industry and traditional populations constitutes a major threat. This forms a risk for the industry in terms of reputation, as affected communities have become increasingly vocal and now bring their concerns to local and international audiences. But it is also a physical risk, as the Surinamese case shows, where the power lines linking the hydroelectric dam to the aluminium smelter were blown up by the so-called "Jungle Commando", which claimed to represent the ethnic groups that had lost their lands for bauxite concessions and the Brokopondo reservoir [25]. Repairing this relationship is an absolute necessity to end the tension around aluminium production in the Amazon.

6. Conclusion

Overall, the aluminium industry in the Amazon is moving towards increasingly sustainable practices. However, challenges remain, including the need for stronger community relations, mitigation of unintended environmental consequences, and responsible waste management. By seizing opportunities to enhance the region's well-being and livelihoods, the industry can contribute to sustainable development in the Amazon, and truly fulfill its promise of being a producer of "green" aluminium.

7. Acknowledgement

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