Hydro

Trust, transparency and transition

Taking on the challenges in the primary aluminium value chain

Contents

1. Going face to face with the dilemmas of our industry

The buildings we live in. The technology that connects us. The cars, planes, and trains that take us near and far. Aluminium is in almost everything around us. It plays a key role in lightweighting transportation, and in the manufacturing of critical components for solar and wind energy generation. We need it for batteries, buildings and construction, high voltage cables, and other power grid infrastructure.

The light, versatile, durable and infinitely recyclable metal is a perfect match for the circular economy. It has properties that make it an important enabler for the green transition. Demand is growing in line with the urgent need to stop global warming and mitigate climate change.

Aluminium has already changed the world. But now we must change aluminium. Why?

Today, about one quarter of global greenhouse gas emissions come from material production, and with the effects of climate change and nature loss already upon us, we face an urgent need to change the ways we produce basic materials. Aluminium is no exception. The production processes contribute to significant greenhouse gas emissions. In addition, harvesting natural resources always comes with a footprint. The aluminium value chain impacts sensitive lands, ecosystems and vulnerable communities.

So what can be done?

To bring about change and accelerate the green transition, we must turn our attention to the embedded footprint of the materials we need and use in our daily lives. With a better understanding of the processes and methods involved in creating materials, we will also be better positioned to make choices that are better for us and the world around us.

That's why industries need to speak openly about their challenges, while continually improving and minimizing their impacts. Transparency in the value chains are important prerequisites to build the trust we need to create demand for more sustainably sourced materials.

We choose to go face to face with the dilemmas of modern primary aluminium production. By promoting transparency throughout our value chain, we aim to build trust among customers and consumers alike, create a pull for more sustainably produced aluminium, and ultimately change the way we make a material the world needs.

How it´s made

Aluminium production processes

	BAUXITE	ALUMINA	ENERGY	PRIMARY	CASTING
MAIN INPUTS	• Bauxite resources • Water • Land clearance • Bauxite pipeline	• Bauxite • Caustic soda • Lime • Water • Coal • Oil	• Land use • Water reservoirs	• Alumina • Aluminium fluoride • Electricity • Coke • Pitch • Water	• Primary aluminium • Process scrap • Post-consumer scrap • Natural gas • NGL
MAIN OUTCOMES	• Bauxite • Rehabilitated land • *Tailings* • *Biodiversity impact*	• Alumina • *Bauxite residue* • *GHG emissions* • *SO_2 emissions* • *NO_x emissions*	• Hydropower • Flood control • *Regulated watersheds* • *Biodiversity impact*	• Primary aluminium • *GHG emissions* • *SO_2 emissions* • *Spent potlining*	• Standard, sheet and extrusion ingots, primary foundry alloys and wire rod • *NO_x emissions* • *Dross*

Aluminium is the third most common element in the earth's crust by weight and the most abundant metal, but because of its strong affinity for oxygen, it is found in oxides, never in its native form. Releasing it from the soil is complicated.

Production starts with bauxite, a clay like soil type, mined from a few meters below the ground. Between four and five tonnes of bauxite ore are needed to make one tonne of aluminium. About 90 percent of the world's bauxite reserves are concentrated in tropical and subtropical regions in the belt around the equator, typically in areas with high biodiversity value.

Next, aluminium oxide, better known as alumina, gets separated from the bauxite by using a hot solution of caustic soda and lime. Once filtered, the resulting white alumina powder is shipped to aluminium smelters for further processing.

Primary aluminium is made by passing a strong electric current through a molten mixture of cryolite, alumina and aluminium fluoride, maintained at around 960-980°C. From a positive electrode (anode), which is basically a large block of carbon suspended in the bath, the electric current goes to a negative electrode (cathode) formed by the lining of the pot where the bath is contained. The current then moves to the next pot. There can be hundreds in the larger primary aluminium plants.

This splits the alumina into oxygen and aluminium. The oxygen reacts with the carbon in the anode and forms CO_2. The liquid aluminium can then be tapped from the pot.

In the next stage, the liquid aluminium is brought to a casthouse furnace where it is mixed with other ingredients to achieve the required alloy. It is then cast into either foundry alloys, extrusion ingot, sheet ingot or wire rod, depending on the use. At this point, the cast products can be shipped to customers to be transformed into the end products we know and use in our daily lives.

Change of carbon anodes in the electrolysis at Høyanger, Norway.

2. The challenges of primary aluminium production

Hydro Sunndal primary aluminium plant.

The main challenges of the global aluminium industry lie within the basic production processes that form the foundation for all modern aluminium production. The extraction of bauxite is land use intensive, and impacts both nature and communities. The refining of alumina is an energy intensive process which produces significant amounts of residue, while the smelting process is even more energy consuming and involves process emissions that are particularly hard to abate.

Of the 957 TWh of energy consumed globally for primary aluminium production in 2023, around 60 percent were generated using fossil fuels, mainly coal[1] . This widespread use of fossil fuels for power generation is the main reason why the aluminium industry today accounts for two percent of global greenhouse gas emissions.

At the same time, demand for aluminium has grown rapidly during the last decades. Production increased from 24.7 million tonnes in 2000 to 70.7 million tonnes in 2023, with China accounting for 59 percent[2] .

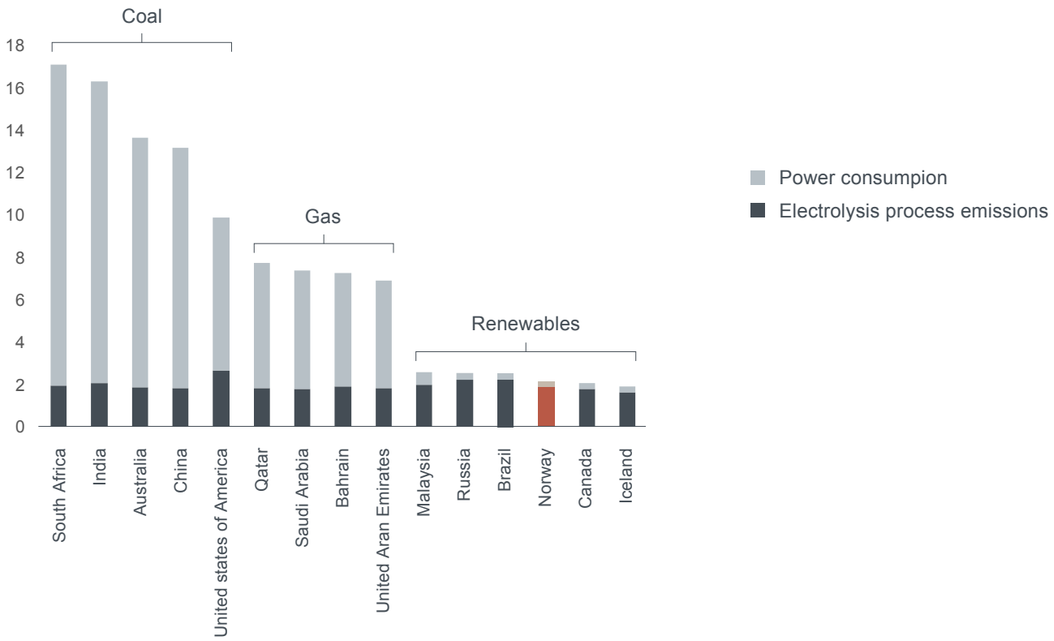
Reducing the impacts of a rapidly expanding industry requires a wide approach to decarbonization, and to the responsible management of the environmental and social aspects of operations.

Bauxite residue disposal area at Hydro Alunorte, Brazil.

1 https://international-aluminium.org/statistics/
2 https://international-aluminium.org/statistics/

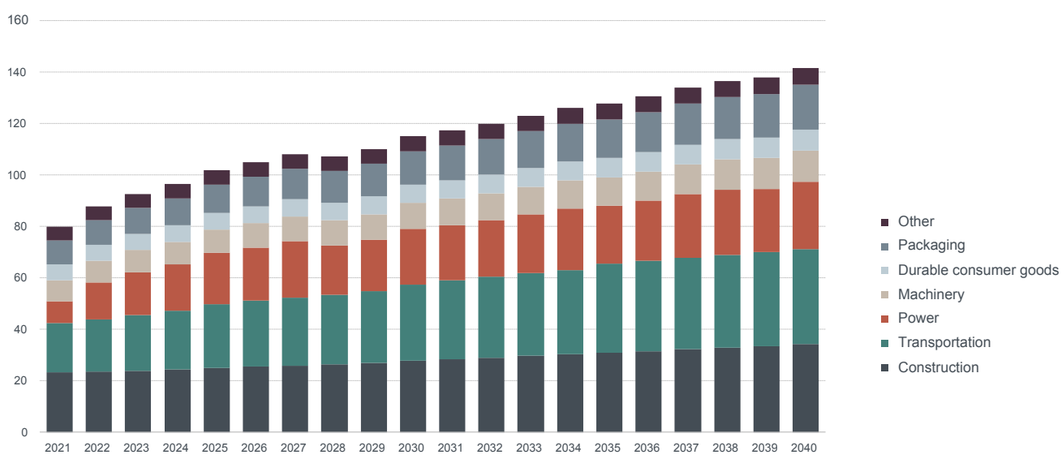
CO_2e emissions from primary aluminium production

Tonnes CO_2e/tonne aluminium, 2023



Sectoral aluminium demand 2021–2040

Million metric tons



Source: International Aluminium Institute

2.1 Bauxite and alumina

Strip mining at Hydro Paragominas, Brazil.

Bauxite mining and alumina refining are closely linked production steps that carry challenges tied to land use, nature conservation, water and tailings management, energy consumption, greenhouse gas emissions, and the social implications of operating in vulnerable regions. If not managed properly, there can be significant negative impacts on nature, local communities, as well as the safety and wellbeing of workers. However, there are solutions.

Land use

Bauxite is usually strip mined. This form of surface mining, a few meters below the ground, leaves a mark on the earth's crust because vegetation, topsoil and overburden must be removed to get to the underlying bauxite ore. Large areas need to be cleared to get access to the deposits, which can lead to conversion of habitats, loss of biodiversity and disruption of ecosystems. Rehabilitating mined areas back to a natural state can take decades and requires technical expertise.

Tailings management

The 150 million tonnes of alumina that are produced annually across the world, result in an equal amount of bauxite residue from the refining process. Its disposal is challenging due to its large volume and the fact that it often contains residual caustic soda that is highly alkaline. Proper management and storage of bauxite residue is therefore critically important to avoid contamination of soils and water.

Alumina silo at Hydro Alunorte, Brazil.

Energy consumption

While the energy input in bauxite mining is moderate, the refining of alumina is a highly energy intensive process due to the heat required for both steam generation and calcination. The aluminium industry has been lacking incentives to phase out fossil fuels like coal and heavy oil, which tend to provide cost benefits compared with less carbon intensive alternatives. As a result, the industry largely relies on these fossil fuels to power thermal boilers and calciners, thereby contributing to considerable CO_2e emissions.

Social impact

Due to the scale of a bauxite mine, there is an inherent social risk if not managed responsibly. The types of risk and the solutions needed to address them will vary greatly from country to country and community to community, depending on their socio-economic status and development. In any case it remains essential for extractive companies to understand the social context where they operate, respect human rights and engage directly with society to build resilient communities.

Reforestation work, planting new trees. Paragominas bauxite mine.

So, what can be done?

In 2022, the COP 15 of the Convention for Biological Diversity agreed to a new global biodiversity framework agreement that established global targets designed to halt and reverse nature loss by 2030, and put nature on a trajectory to full recovery from 2050. This global "Nature Positive" goal aims to reverse the rate of nature loss and depletion we see today. It requires increased conservation efforts, and more sustainable production and consumption.

Land-use for mining operations is likely the largest contributor to nature loss in the aluminium value chain. No Net Loss commitments, partnerships with academia and NGOs, and investment in research and technology are essential strategies adopted by mining companies to mitigate these impacts.

About 90 percent of the world's bauxite reserves are concentrated in tropical and subtropical regions in the belt around the equator, typically in areas with high biodiversity value. Mining operations require restoration of the affected areas. Depending on the jurisdiction, this could imply return to natural state or to agricultural production. Rehabilitation and reforestation of mined areas belong to the industry's key responsibilities, achievable only through a strong commitment to rehabilitation programs.

The challenges of bauxite and alumina operations are unique to each region, but proper management of bauxite residue remains one of the upstream aluminium industry's main challenges and top priorities. As a result, companies are working to improve methods of managing and reusing bauxite residue. This includes neutralization of the alkaline properties, treating the residue to enrich it into the soil for planting and utilizing the residue as a resource for the recovery of rare minerals.

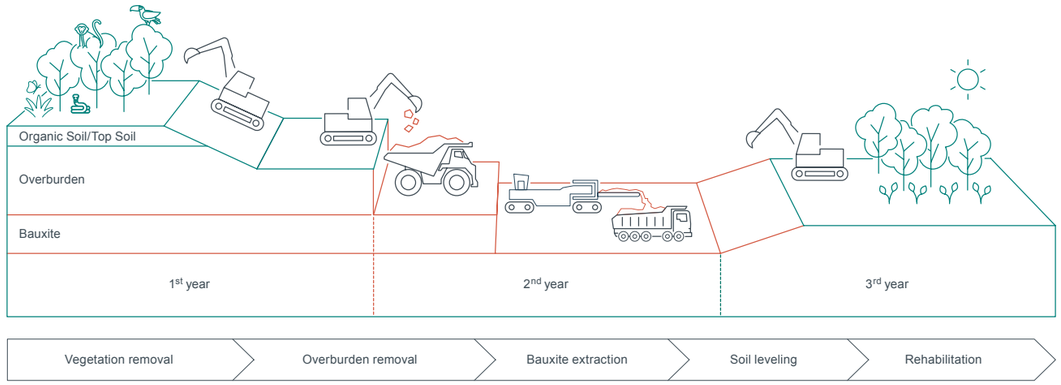
In regard to alumina refining, the last decade has seen encouraging developments with investments in cost effective technology upgrades to improve efficiency and cut greenhouse gas emissions. The industry is focusing on developing emission free or less carbon intensive solutions to deliver the required process heat.

Due to the geographical location of the world's bauxite ores, there is an inherent social risk if not managed responsibly. Companies must assess potential risks for adverse impacts on people and implement mitigating actions where needed in their operations, value chain and in the local communities. This means engaging actively with the communities to establish structured processes for an open dialogue. Responsible companies contribute to social wellbeing, economic development and thriving local communities around the bauxite mining and alumina refining operations worldwide.

Overall, extractive industries have a particular responsibility to build resilient communities and respect human rights. This should always be the key focus for the different social and other programs initiated by companies involved in mining and refining.

The broader social aspects also include revenue and contract transparency, mineral resource governance, and continuous due diligence of sustainability risks in the supply chain.

Hydro's bauxite and alumina operations



Rehabilitation process at Paragominas Bauxite Mine.

Electric vehicles in the Paragominas mine.

Hydro owns and operates one bauxite mine in Paragominas as well as the Alunorte alumina refinery in Barcarena, both in the Brazilian state of Pará and connected by a 244 km bauxite slurry pipeline.

Paragominas is home to Hydro's most ambitious environmental initiative to date, aiming for one-to-one rehabilitation of previously mined areas that are not used by or reserved for long-term mining infrastructure. Dry tailings from the mining process are transported back to mined area and stored there using Hydro's Tailings Dry Backfill method. After that, the original topsoil is carefully returned to the area before replanting with species native to the area.

Alunorte's annual output of 6.3 million tonnes of alumina results in an equal amount of bauxite residue. The use of modern press filters leaves a low moisture content which allows more efficient storage, with residue now occupying only one-fourth of the surface area that was required for our historical bauxite residue deposit. We also engage in research at both local, national and international levels to utilize residue from Alunorte for a number of purposes. In 2023, we entered a commercial research partnership with WAVE Aluminium to build a processing plant in Barcarena to extract valuable minerals from bauxite residue.

Field work by BRC Biodiversity Research Consortium Brazil-Norway.

Natural gas installation at Alunorte.

At Alunorte, we have transitioned from heavy fuel oil to natural gas in a fuel switch project which alone reduces the refinery's annual carbon emissions by 30 percent, equivalent to 700,000 tonnes CO_2e. Through electrification of Alunorte's coal fired boilers, Hydro expects to reduce emissions from the site by another 550,000 tonnes. The two initiatives are key enablers in Hydro's climate strategy and commitment to achieve a 30 percent reduction in greenhouse gas emissions by 2030.

To encourage sustainable development in the region, Hydro is involved in social initiatives through the Hydro Sustainability Fund, which serves as a financing mechanism for several community based projects covering education, entrepreneurship, workforce training, cultural activities and sports. One case of success is the Sustainable Barcarena Initiative, established in 2018, with the overall aim to bring local stakeholders together to discuss challenges and opportunities, strengthen capabilities, attract investments, and develop social initiatives.

We believe there is a way of conducting responsible, safe and more sustainable operations in the Amazon region. We view it as critical to take measures in our day-to-day operations to minimize the environmental impact and halt nature loss, while creating value to local communities and to society. This has made responsible tailings management, reforestation, wildlife preservation and the empowering of local societies in Pará core elements of Hydro's sustainability strategy.

Graduation of the Mulheres do Nosso Bairro Project, The Conexões Susten táveis Platform project is carried out by the Hydro Sustainability Fund

2.2 Smelting primary aluminium

Electrolysis, Høyanger, Norway.

The smelting of primary aluminium largely relies on the Hall-Héroult electrolytic process invented in the late 19th century. While technologies have been perfected over the years to become vastly more efficient and less polluting, the basic principles for aluminium production remain the same today as they were then, presenting several hard-to-abate obstacles.

Aluminium's carbon footprint strongly depends on power generation´

Aluminium's affinity for oxygen is a tough bond to break and this makes the smelting process very energy intensive. On average, around 14 MWh of electricity is needed to make one tonne of aluminium through electrolysis, which is about seven times more than copper smelting[3] . As a result, the carbon footprint of primary aluminium largely depends on how this electricity is generated.

A smelter run with coal based power can emit as much as 18 tonnes of CO_2e per tonne of aluminium in indirect emissions alone, plus direct process emissions. Around 60 percent of the aluminium industry's global emissions stem from the production of electricity[4] .

Process emissions

The electrolysis stage of primary aluminium production emits around 1.6-2 tonnes of CO_2e per tonne of aluminium in direct process emissions due to the nature of the Hall-Héroult process. Reducing these emissions, or eliminating them altogether, is perhaps the single most difficult task in primary aluminium production. It implies challenging the basic principles of aluminium production as we have known it for almost 140 years.

In addition to CO_2, the smelting process emits perfluorocarbons (PFC gases), which are extremely potent greenhouse gases. To minimize these emissions, it is vital to ensure a stable production process in the electrolytic cells.

Smelting operations also emit sulfur dioxide, nitrogen oxides and fluoride. They have no greenhouse implications, but may have localized impacts on the environment. In modern production, these pollutants are captured using gas treatment technologies like wet and dry scrubbers.

3 CRU explains: Copper & aluminium smelting emissions - CRU Group
4 https://international-aluminium.org/statistics/greenhouse-gas-emissions-aluminium-sector/

The cryolite bath in an electrolytic cell is maintained at around 960-980°C.

Fossil fuel burners

Certain steps in primary production, including anode baking and casthouse operations, are energy intensive processes where fossil fuel burners are needed to achieve the required high temperatures. Eliminating emissions from these production steps means replacing natural gas with a renewable alternative, either through electrification or the use of non-fossil fuels.

Cathode linings remain a challenge

The cathode lining of an electrolytic cell degrades over time and must be periodically replaced. The waste material removed from the cell is referred to as spent pot lining (SPL). This consists of two main parts: the carbon cathode and the insulating refractory material. The carbon part is considered hazardous as it is contaminated with soluble cyanide and fluoride. If this material gets wet, it can also produce an alkaline leachate.

So, what can be done?

The aluminium industry has made great strides over the last decades, most notably through the phase out of the emission intensive Søderberg technology. Modern prebake potlines, now used in over 90 percent of aluminium smelters worldwide, have contributed significantly to reducing process emissions and their environmental impact. Further reducing these emissions requires developing and deploying technologies that challenge some of the basic principles of aluminium production.

The industry is currently exploring several decarbonization pathways such as inert anode technology, carbon capture and storage, and finding ways to introduce renewable energy sources such as biomethane and green hydrogen in the production steps that traditionally rely on fuel burners, mainly anode baking and casting.

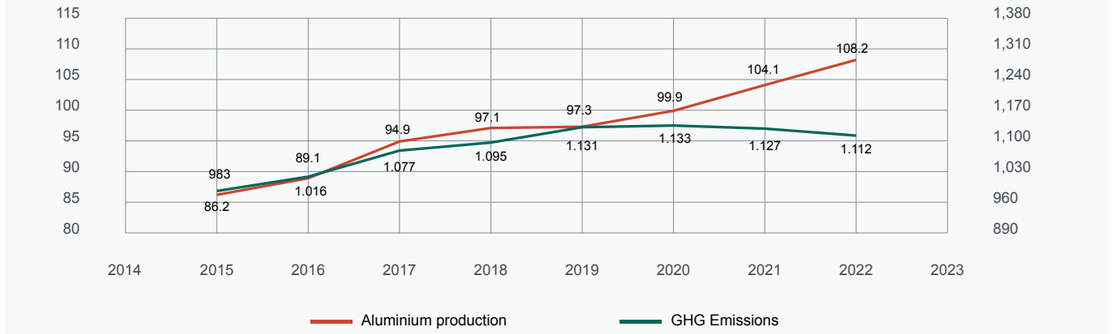
However, in later years the global average of carbon emissions in primary aluminium production has been on a steady decline. In fact, it has decreased by 11.5 percent between 2019 and 2023, from 16.8 to 14.8 tonnes CO_2e per tonne of aluminium [5]. In 2023, the International Aluminium Institute reported an overall decrease in greenhouse gas emissions from the aluminium industry, despite a production growth of 3.9 percent. The last time emissions declined was in 2009, as a result of production cuts in the wake of the global financial crisis. The trend is attributed to significant investments in mainly renewable energy generation. China's increase in the use of

5 Global Aluminium Industry Greenhouse Gas Emissions Intensity Reduction Continues, With Total Emissions Below 2020 Peak - International Aluminium Institute

hydropower, as well as more renewable energy capacity in the Middle East and Australia, are among the main contributors. Still, with demand for aluminium expected to grow significantly in the decades ahead, the industry will have to pursue ambitious decarbonization goals to further reduce the emissions intensity of production.

Regarding spent cathode lining (SPL), there are opportunities to recover and reuse parts of it, and to recover energy by incinerating the carbon rich parts. The refractory material, if not contaminated, can also be reused in cement manufacturing. However, if these opportunities are not available locally, companies can safely dispose of the SPL in landfills.

Hydropower reservoir in Sogn, Norway.



Year	Sector GHG Emissions (Million tonnes of CO_2e)	GHG Emissions intensity (tonnes of CO_2e per tonne of primary aluminium)	Primary production (million tonnes of primary aluminium)
2015	983	16,2	58,5
2016	1,016	16,1	59,9
2017	1,077	16,1	63,4
2018	1,095	16,1	64,2
2019	1,131	16,8	63,7
2020	1,133	16,4	65,3
2021	1,127	16,8	67,1
2022	1,112	15,1	69,0
2023	1,116	14.8	70.7

Source: International Aluminium Institute

We have cut emissions from our smelters by 55 percent since 1990

The Karmøy Technology Pilot

Since 1990, we have increased our aluminium smelter capacity by 70 percent, but even so, we have managed to cut emissions from our smelters in Norway by 55 percent. This is mainly thanks to the full upgrade to modern prebake potlines in the 2000s. Since then, we have worked to perfect smelter operations, culminating in the Karmøy Technology Pilot to pioneer the world's most climate and energy efficient primary production technology.

Hydropower reservoir in Norway.

With Norwegian smelters powered by renewable energy, we already deliver primary aluminium with a carbon footprint of about one-fourth of the world average. To further reduce carbon emissions, we are following several pathways of technology development.

Under development since 2016, our proprietary HalZero technology is based on converting alumina to aluminium chloride prior to electrolysis. Chlorine and carbon are kept in a closed loop, therefore eliminating CO_2 emissions from both electrolysis and anode baking, and emitting oxygen instead. A HalZero test facility is currently under construction in Porsgrunn, Norway. Our aim is to construct an industrial scale pilot facility by 2030, preparing the technology for use in greenfield smelter capacity.

Existing aluminium potlines will be retrofitted with carbon capture and storage (CCS) technology. After evaluating several options and developing a roadmap for testing and piloting of the most promising methods, the ambition is to have an industrial scale pilot running by 2030.

Lab research for the HalZero technology

We are also exploring three renewable alternatives to fossil fuel burners in primary production:

- Biomethane has already partly replaced natural gas in the casthouse at Hydro Sunndal. We also aim to switch from natural gas to biomethane in the baking furnaces of the carbon anode production facilities at Sunndal and Årdal.
- At Sunndal, we will test plasma technology to explore electrification of casthouse furnaces using the same renewable energy that powers our smelters. If successful, the pilot project has the potential to affect both the aluminium industry and other hard-to-abate industries worldwide.
- At our new aluminium recycling facility in Høyanger, we are replacing natural gas with green hydrogen in one of the casting furnaces to help unlock the decarbonization potential of hydrogen in aluminium production.

We aim to reduce the landfilling of spent potlining (SPL) generated by our operations to less than 35 percent by 2030 through several waste mitigation programs. Research is focused on extending the pot lifetime, and reducing the hazardousness of SPL to maximize opportunities for recycling and reuse for other purposes.

Primary foundry alloy production at Årdal.

3. Without trust there will be no green transition

The world has come to a point where it matters more than ever how and where materials are produced, but developing technology to produce critical metals and other raw materials more sustainably requires large investments. The bigger question centers around whether people are willing to pay more for responsibly sourced products..

Hydro REDUXA low-carbon ingots at Husnes.

Building the infrastructure of tomorrow will require significantly more materials as the green transition gathers pace. Demand for aluminium alone is expected to increase by 40 percent by 2030. At the same time, producing the materials needed is impacting climate, nature and societies. Today, production of aluminium, steel and cement account for roughly one-fourth of the world's carbon emissions.

With the naked eye, when you look at any of these materials, you cannot see whether they have a large footprint or a lighter one. For example, it is impossible to tell from the physical appearance or metallurgical characteristics of aluminium where and how the bauxite was mined, or whether renewable or fossil energy sources were used to power the smelter. But it means that from one batch to another, the embedded carbon footprint could vary from below 4 to over 20 kg CO_2e per kg aluminium.

Creating a pull for responsibly produced materials

Developing new technologies to produce materials in the most sustainable and responsible way possible requires huge efforts, both financially and in terms of brain power. To justify investments there must be incentives to purchase products with a lower footprint or higher recyclability, and willingness to pay for the "green premium."

The good news is we see the tide is turning in consumption patterns, where sustainability is increasingly becoming a baseline for purchase. Research is suggesting that we are on the brink of a shift where producers making good on their promise to people and the planet will seize the advantage from those who make undocumented or implausible claims[6] . In combination with regulatory demand, growing consumer awareness can accelerate the green transition by creating a pull for more sustainable and responsibly sourced materials.

6 Research: Consumers' Sustainability Demands Are Rising, Harvard Business Review, September 2023

Trust is a key driver for the green transition

As an aluminium company aiming to shape the market for greener products, we also see positive change. For several years now, customers have been turning to suppliers who can deliver aluminium with the lowest possible footprint and have credible pathways toward the ultimate target: net-zero.
The key driver for all "greener" products is trust. If the customer or consumer doesn't trust that the material or product is what it claims to be, there will be no willingness to pay the extra price. This trust starts with transparency.

From organic foods to tire sizes, many industries have developed standardized certifications and reporting methods that provide insight. Reporting on production emissions, environmental and social impact should be mandatory for all materials, including primary aluminium. Transparency and standardization in the measurement of carbon footprint is necessary to avoid greenwashing, and to drive a true low-carbon and circular economy.

That's why producers of raw materials must strive towards being able to document all steps of the value chain. In Hydro, we are working towards increasing the transparency in our value chain, starting with primary aluminium where we provide our customers with comprehensive documentation on environmental and social impact that allows them to make informed and responsible choices.

Environmental Product Declarations (EPDs) as nutrition labels

However, pioneers alone do not make a movement. If customers or consumers in general cannot see the difference between a carbon intensive and low-carbon product, how can they make the right choices. And why should they be willing to pay for the more expensive alternative?

The EU, with its new directive for sustainability reporting, due diligence, and the taxonomy for environmentally and socially sustainable activities, is challenging us to pursue several sustainability goals simultaneously. We must go beyond the climate issue to learn more about other impacts on nature and people.

Environmental Product Declarations (EPDs) is one example of how certified documentation can function as "nutrition labels" that follow materials throughout the value chain, down to the end product. They give consumers the ability to compare apples with apples, thereby enabling them to make informed choices, such as buying a new car with a documented and lower embedded carbon footprint than the alternatives.

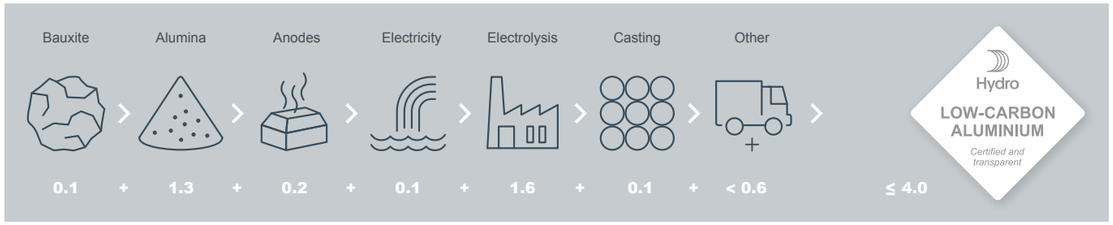
EPDs are verified by independent third-party reviews, and transparently communicate the environmental performance or impact of any product or material over its lifetime. They also provide customers and partners with precise knowledge of the environmental impact of their supply chain. After all, customers are becoming more and more conscious about where and how materials are produced.

Beyond EPD's – Hydro REDUXA provides transparency batch-by-batch

Whereas an EPD provides the average emissions per tonne of product over the previous year, some customers prefer to know exactly what is in the material that has been delivered to them.

Our premium low-carbon product, Hydro REDUXA, is verified by DNV according to ISO 14064 and comes with a batch-by-batch certificate that shows the carbon footprint of each individual customer delivery. Only renewable energy from water and wind is used to produce Hydro REDUXA. Its carbon footprint is guaranteed to be maximum 4.0 kg CO_2e/kg aluminium, including all process steps (Scopes 1, 2 and 3).

DNV audits the verification process annually, such that the correct emissions for each site are updated. The process also assures best practice and described methodology is applied to calculate direct emissions as well as specific emissions related to the input materials at each casthouse. In addition to the batch-by-batch certificate, Hydro REDUXA is produced at ASI Performance Standard certified plants and is backed by an EPD.



Turning challenges into opportunities

As the global demand for critical materials grows, so does the need to reduce their footprint. At Hydro, we are convinced that being open and transparent about challenges is the first step towards changing how we make a critical material like aluminium.

That's why we make an effort to map our impacts on the climate, environment and communities throughout the primary aluminium value chain, while at the same time turning every stone to reduce our footprint. With more transparency and traceability, we aim to earn the trust of customers and end-consumers, enable them to make informed choices, and create a pull for responsibly sourced materials.

By turning challenges into opportunities, we will continue to drive the green aluminium transition in the decades to come.

Primary foundry alloys at Sunndal.

Due diligence in the supply chain

Hydro's approach to responsible sourcing is based on the OECD Due Diligence Guidance for Responsible Business Conduct and can be summarized in three steps:

- Mapping of risks. All suppliers are subject to a qualification process, including mapping of risks related to business practice, human rights, working conditions and environment. If Hydro identifies concerns related to such issues, it conducts a more comprehensive review of the potential supplier to clarify whether the supplier meets its requirements before any agreements are signed. The mandatory due diligence process for high-risk suppliers is described in the company procedure, Sustainability in the Supply Chain, and is based on three levels of inherent sustainability risk levels.

- Clear expectations. Hydro's Supplier Code of Conduct sets out the minimum sustainability requirements for all its suppliers. The code is based on internationally recognized standards such as the Universal Declaration of Human Rights, UN Global Compact and the ILO Core Conventions.

- Support and development. We build our relationships with suppliers on mutual trust and development. The company actively discusses and promotes ethical business practice, safe working conditions, human rights and environmental issues.

With more than 20,000 suppliers, we have an indirect impact on society and the environment. These suppliers also have an impact on our own ambition to become the preferred sustainability provider to our customers. Having a responsible supply chain is therefore key to our ability to deliver on our sustainability promise.

Hydro's standard contracts include clauses on auditing rights and the supplier's responsibility to actively promote the principles with its own suppliers/contractors and sub-suppliers/sub-contractors of any tier that have a material contribution to the supply of goods and services to Hydro under the contract.

We are working towards increasing the transparency in our value chain, starting with the alumina to aluminium step where we provide our customers with comprehensive documentation for environmental and social impact or certifications such as ASI CoC or other third-party verification.

Over the next few years, we will be expanding our documentation to cover more of our suppliers and to adhere with new regulations for due diligence and human rights.

Hydro Sunndal primary aluminium plant.

References and source material:

Research: Consumers' Sustainability Demands Are Rising

Facts: Industry structure - The Aluminium Story

Decarbonizing the Primary Aluminum Industry - Light Metal Age Magazine

CRU explains: copper & aluminium smelting emissions - CRU Group

Transparency in manufacturing is vital for green transition | World Economic Forum

3 ways the aluminium industry can decarbonize faster | World Economic Forum

Aluminium demand is rising – here's how to make it sustainable | World Economic Forum

Radical transparency is key for electric vehicle expansion | World Economic Forum

Aluminium industry reports decline in greenhouse gas emissions - International Aluminium Institute

Sustainable aluminum: Decarbonizing at a cost that makes sense | McKinsey

Advances in Processing Alumina Refinery Bauxite Residue Waste - Light Metal Age Magazine

Industries that matter

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Hydro is a leading aluminium and renewable energy company committed to a sustainable future. Our purpose is to create more viable societies by developing natural resources into products and solutions in innovative and efficient ways.