OUR PATH TO THE CERTIFIED CIRCULAR ECONOMY

RECYCLING WINDOWS, BUILDING WINDOWS

TECHNAL®

By Hydro

WHAT ARE THE MAIN BUILDING CHALLENGES WITH RESPECT TO SUSTAINABILITY?

Photograph: Pasqual Cabrera (Project presented at the 2019 Architecture Aluminium TECHNAL Awards)

In today's world, we are highly aware of environmental issues and, increasingly, a product's life cycle. From manufacturing to obsolescence, this is now a priority factor when it comes to using certain products over others. The aim is to implement new industrial processes that meet these product recyclability needs. Many of the products manufactured in accordance with these principles are currently certified with the Cradle to Cradle and TECHNAL seal and, fully in line with this paradigm, there are aluminium carpentry systems that already have this distinction.
You can consult them at **www.c2ccertified.org** or at **www.technal.co.uk**

Photograph: Mariela Apollonio

OUR PATH TOWARDS THE CERTIFIED CIRCULAR ECONOMY

CERTIFY THE MATERIAL

We extrude our profiles using low CO_2-footprint aluminium. We achieve this by using renewable energy and recycling post-consumer aluminium. The entire recycling process is certified by DNV - GL, Det Norske Veritas, an independent certification company with headquarters in Oslo, Norway and 350 offices in over 100 countries around the world. The Hydro group, to which TECHNAL belongs, was the first extrusion company to achieve recognition from the Aluminium Stewardship Initiative (ASI), the most internationally recognised standard for assessing sustainability throughout the life cycle of aluminium, from its extraction and production to the use and recycling thereof.

CERTIFY THE PRODUCT

From its design to the selection of materials and how it is manufactured, the product must offer the level of performance required by the market by reducing, to the greatest extent possible, environmental impacts such as energy consumption or greenhouse gas emissions.
We classify our range under the criteria of the Cradle to Cradle seal, an independent institute that certifies products and processes from a circular economy perspective. We have numerous Cradle to Cradle-certified series, including the manufacturing in our plants. In this way, we are able to ensure that the carbon footprint of transporting our products is as low as possible.

CERTIFY BUILDINGS

LEED, BREEAM, WELL, VERDE, LEVEL(s) are the most well-known certification systems for assessing the environmental impact of buildings. Among the most relevant requirements to be awarded their certifications are the credits given to the materials used. In addition to offering products with a reduced impact on the environment, we can provide all the certifications that contribute to achieving the different green seals that are currently on the market.
Environmental Product Declarations for construction (EPD), ISO certifications for quality systems and environmental management, official test certificates, Cradle to Cradle certifications and a lot of other relevant information that we have summarised in the table below.

OUR SUSTAINABILITY CERTIFICATIONS

MATERIAL

- Certified low carbon aluminium: Hydro CIRCAL 75R (post-consumer recycled window aluminium) and Hydro REDUXA.

PROCESS

- The Aluminium Stewardship Initiative (ASI) certifies the sustainability of the responsible process of obtaining aluminium.

MANAGEMENT

- ISO 9001:2015 quality management system.
- ISO 14001:2016 environmental management system.

PRODUCT

- Certificates of product performance tests (air, water, wind, acoustic and thermal) carried out by notified bodies.
- Customised Environmental Product Declarations (EPD) for the use of low carbon footprint aluminium.
- Cradle to Cradle certifications of its products

Photograph: Adrià Goula

Hydro CIRCAL 75R, THE FIRST CERTIFIED RECYCLED ALUMINIUM

This aluminium is obtained by melting old windows at the end of their life cycle or other objects with an equivalent alloy. This process makes it possible to reduce damage at the extraction site, in addition to reducing the depletion of non-renewable raw materials, sludge from manufacturing, consumption of non-renewable energy and greenhouse gas emissions. In short, it is a much more environmentally friendly product than primary aluminium and contributes to the development of the circular economy.

HOW IS IT OBTAINED?

Its production process is characterised by a rigorous selection of the material to be recycled with the aim of achieving the optimum alloy to manufacture carpentry profiles. Aluminium is a material that can be found in dozens of different alloys (i.e. combinations with other elements such as magnesium, manganese, copper, zinc, silicon, titanium and chrome) depending on the industrial use for which it was produced. A Hydro plant in Dormagen (Germany) has developed a technology to effectively separate aluminium from other metals and to use each for correct recycling. This system allows only the recycled aluminium with the right alloy to be used to produce windows that are sent to Hydro's smelting plants.

Hydro, TECHNAL SUPPLIER OF RECYCLED ALUMINIUM

The Norwegian multinational Hydro owns the TECHNAL brand and supplies all the aluminium used to manufacture the windows. With over 20,000 employees and production plants worldwide, Hydro is the world's largest producer of aluminium. Its material is used to make trains, cars, planes, computers, mobile phones, beverage cans and many other objects used in daily life. With the launch of Hydro CIRCAL 75R, Hydro has introduced the first certified post-consumer recycled aluminium onto the market.

Consult or download the Environmental Product Declarations (EPD) for construction products (DAPc), available at **www.epd-norge.no** entering the term **Hydro 75R**

Hydro REDUXA 4.0 ALUMINIUM PRODUCED USING RENEWABLE ENERGIES

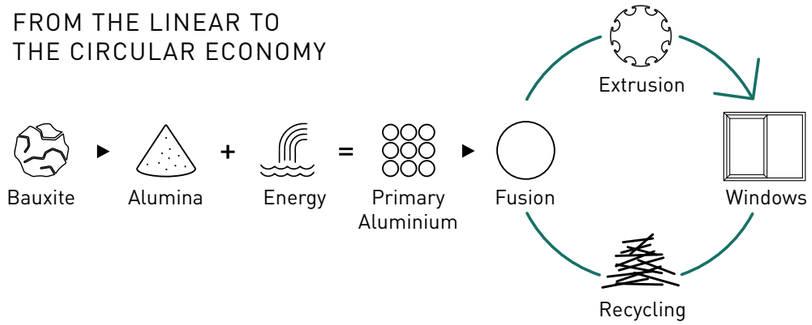
Together with urban mining, which involves the reintroduction of materials already in use into products in a new life cycle or manufacturing process, Hydro limits the environmental impact of its industrial processes by using renewable energies. Hydro REDUXA 4.0 is a primary aluminium that generates a carbon footprint of 4 kg of CO_2 per kg of aluminium, well below the European average of 8.6 kg of CO_2. As with the Hydro CIRCAL 75R, the Hydro REDUXA 4.0 production process is fully traceable and certified by the independent external body, DNV-GL, which guarantees its low carbon emissions.

Consult or download the Environmental Product Declarations (EPD) for construction products (DAPc) available at **www.epd-norge.no** entering the term **Hydro 4.0**

Aluminium
100%
infinite

Unlike other materials, aluminium can be fully recycled without any loss in its quality or physical properties. It is estimated that, worldwide, there are 200,000,000 tonnes of aluminium objects that, when their life cycle comes to an end, can be 100% usable. Hydro uses this process to replace the extraction of bauxite (the ore from which aluminium is obtained) with the recycling of post-consumer material. The aim is to limit the exploitation of natural resources, even though aluminium is the third most abundant element on the planet. But, above all, to prevent objects from being discarded into the environment that may have another infinite life. This process is called urban mining and aims to turn cities into the main supply points of raw materials, thereby keeping the natural spaces that still remain on earth intact.

FROM THE LINEAR TO
THE CIRCULAR ECONOMY



75%
of post-consumer recycled aluminium

Hydro CIRCAL 75R is the world´s first certified recycled aluminium. 75R means that at least 75% of new aluminium comes from post-consumer material. The substantial difference with other more common industrial processes that use their own manufacturing waste is that Hydro CIRCAL finds a new life for windows that have already been used in a building. Far from being the final result, for Hydro CIRCAL, 75% is a minimum requirement for a continuous process that aims to progressively reach total recycling.

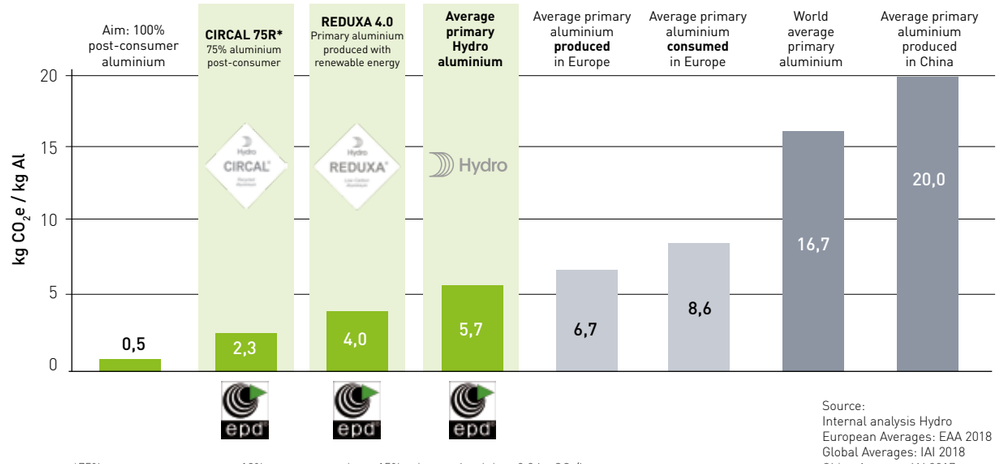
-95%
of energy consumed

With the current industrial processes, the production of primary aluminium (from the extraction of Bauxite) requires a large amount of energy, which results in abundant emissions of CO_2, the main greenhouse gas and direct cause of climate change. Post-consumer aluminium remelting saves up to 95% of this energy, obtaining a raw material of exactly the same quality.

-85%
of CO_2 emissions

The result of using Hydro CIRCAL 75R is a drastic reduction in emissions of more than 85%, if compared to the world average of primary aluminium production (16.7 kg of CO_2 per kg of material). With its 2.3 kg of CO_2 per kg of material, Hydro CIRCAL is currently the aluminium with the lowest emissions on the market. And the aim is to reduce them to total post-consumer recycling levels.

CARBON FOOTPRINT OF ALUMINIUM



*75% post-consumer scrap + 10% scrap processing + 15% primary aluminium 2.3 kg CO_2/kg

Source:
Internal analysis Hydro
European Averages: EAA 2018
Global Averages: IAI 2018
China Average: IAI 2017

IMPACT OF TECHNAL WINDOWS IN A BLOCK OF FLATS

WHAT IS THE DIFFERENCE BETWEEN USING OUR WINDOWS MANUFACTURED WITH Hydro CIRCAL 75R ALUMINIUM AND WINDOWS MANUFACTURED WITH STANDARD PRIMARY ALUMINIUM?

The average carbon footprint of aluminium consumed in Europe is 8.6 kg of CO_2 for every kg of aluminium.
With Hydro CIRCAL 75R, this impact drops to 2.33 kg of CO_2 for every kg of aluminium, which implies a savings of 6.27 kg of CO_2.
A typical window has around 20 kg of aluminium, generating an average savings of 125.4 kg of CO_2 per window.

WINDOWS

1 flat = 5 windows
1 building = 50 windows
50 flats = 250 windows

ALUMINIUM

1 window = 20 kg of aluminium
250 windows = 5,000 kg of aluminium

CARBON FOOTPRINT

5,000 kg of primary aluminium
x 8.6 kg of CO2 = 43,000 kg of CO_2

5,000 kg of aluminium Hydro CIRCAL
x 2.33 kg of CO2 = 11.650 kg of CO_2

Using TECHNAL windows made with Hydro CIRCAL in this building represents a reduction of 31,350 kg of CO_2.

- **1 m^2 of construction with conventional materials = 750 kg CO_2/m^2**
- **1 m^2 of construction with low impact materials = 250 kg CO_2/m^2**

Therefore, using 250 windows with Hydro CIRCAL aluminium implies a saving equivalent to the construction of:

- **42 m^2 with conventional materials (one-bedroom flat)**
- **125 m^2 with low impact materials (a 4-bedroom flat)**

Photograph: Jean Marc Manson

Photograph: Jordi Canosa

THE IMPACT OF MATERIALS ON THE LIFE CYCLE OF A BUILDING

Energy consumption in the use phase of buildings has been drastically reduced over the last 30 years thanks to new policies, regulatory changes, updated training and the funding of R&D projects. Currently, by combining low demand, efficient installations, off-grid or on-grid renewable energy and the proper management thereof, it is possible to reach values close to zero in new builds or energy rehabilitation.

On the other hand, this energy reduction has not followed the same path in the material production phase. Furthermore, because the amount of materials used in an efficient building is greater, its embodied CO2 content is decisive for the total resulting impact. Hydro CIRCAL 75R, with its low embodied carbon level, takes a decisive step towards reducing the impact of materials on the life cycle of a building.

ENERGY CONSUMPTION OF BUILDINGS

Before the 1993 Directive on the energy performance of buildings

After the 2002 Directive on the energy performance of buildings

Good Practices

After the 2020 Directive on the energy performance of buildings

● Operational energy consumption

○ Energy content of materials

Architectural firm: DARK Arkitekter
Facades: Staticus
Photo provided by DARK Arkitekter

14,600 m² of façade made using Hydro CIRCAL

275 Tn CO_2 saved

This is equivalent to:

- **367 m² of construction with conventional materials, or three 4-bedroom flats.**
- **1.100 m² of construction with low-impact materials, or a 10-storey, 3-bedroom multi-family building.**

A BIG RESPONSIBILITY AND A HUGE OPPORTUNITY

Photograph: Wenzel

According to the UK Green Building Council, (report (2014) the construction industry is responsible for:

- 40% of the total UK Carbon Footprint (built environment)
- 22% of the total UK Carbon Footprint (operational and embodied)
- 10% of the total UK Carbon Footprint is from heating buildings
- 59% of total UK waste

WHAT DO THE REGULATIONS SAY?

Climate Change Act (2008), updated in 2019

- All greenhouse gas emissions to be net-zero by 2050 for the entire UK
- Carbon budgets introduced which provides a five-year, statutory gap on total greenhouse gas emissions to meet the UK's emission reduction commitments
- UK contribution to global warming should be ended within 20 years of this updated legislation

GREEN INDUSTRIAL REVOLUTION

The 10 point plan (2020)

- Offshore wind renewable energy production capacity to be increased 40GW by 2030
- 5GW of low carbon hydrogen production by 2030
- Over £550 million to be invested in low-carbon energy from nuclear sources
- By 2030, new petrol and diesel cars and vans will no longer be available to purchase
- Investment into green public transport, cycling and walking
- Investment in R&D to develop zero-emission aircrafts and developing the infrastructure at airports and seaports with a view to Jet Zero and Green Ships
- Buildings to become more energy efficient with fossil fuel boilers becoming phased over 15 years
- Ambition to capture 10Mt of carbon dioxide per year and storing this to be used in various manufacturing processes
- Protection of the natural environment by the creation of new National Parks and Areas of Natural Beauty and the acceleration of ecosystem rebuild efforts
- R&D development for green technologies to be increased to 2.4% of GDP by 2027

IMAGINE WHAT'S NEXT

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