

# Sustainability through diversity



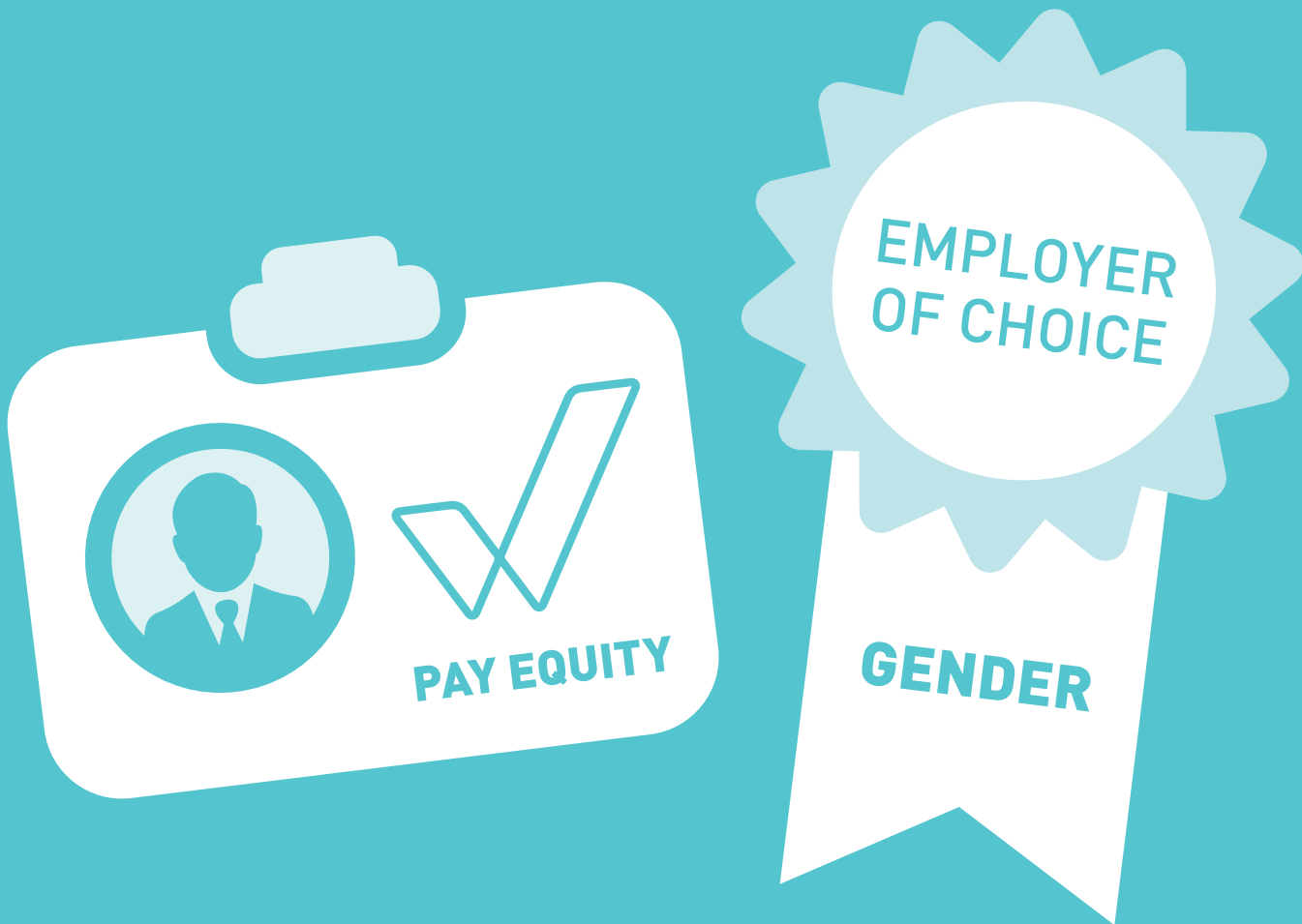
We foster an “everyone” culture; engaging employees and leveraging their diversity of thought, experience and skills. Diversity and inclusivity goals are built into our operations, compensation and human resource systems, linking leaders’ performance to our annual variable compensation. Each business unit president reports twice a year on diversity metrics and initiatives to our Executive Team. Furthermore, we have numerous employee networks that advocate on behalf of specific employee groups around the world, including the Alcoa Women’s Network; the Employees at Alcoa for Gay, Lesbian, Bisexual and Transgender Equality (EAGLE); and the Alcoa Veterans Network.



Picture: Alcoa Fjardaal potroom operators. From left: Fjola Bjorg Sigurdardottir, Hrafna Hanna Herbertsdottir and Gudlaug Margret Johannsdottir.



In 2017, our chief executive officer Roy Harvey signed the **CEO Action for Diversity & Inclusion™** pledge



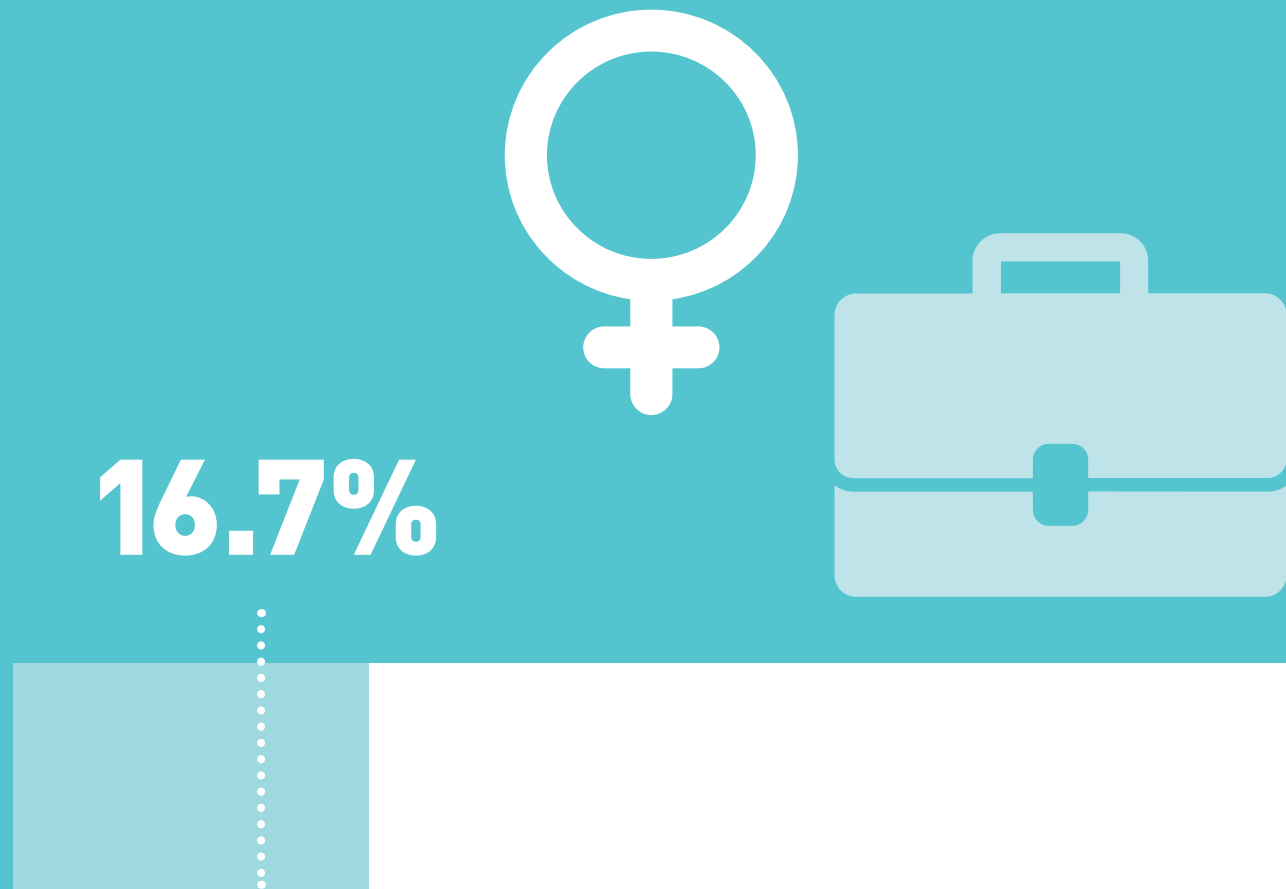
Our Australia managing director became a Workplace Gender Equality Agency **pay equity ambassador**, and Alcoa of Australia was named an **Employer of Choice for Gender**



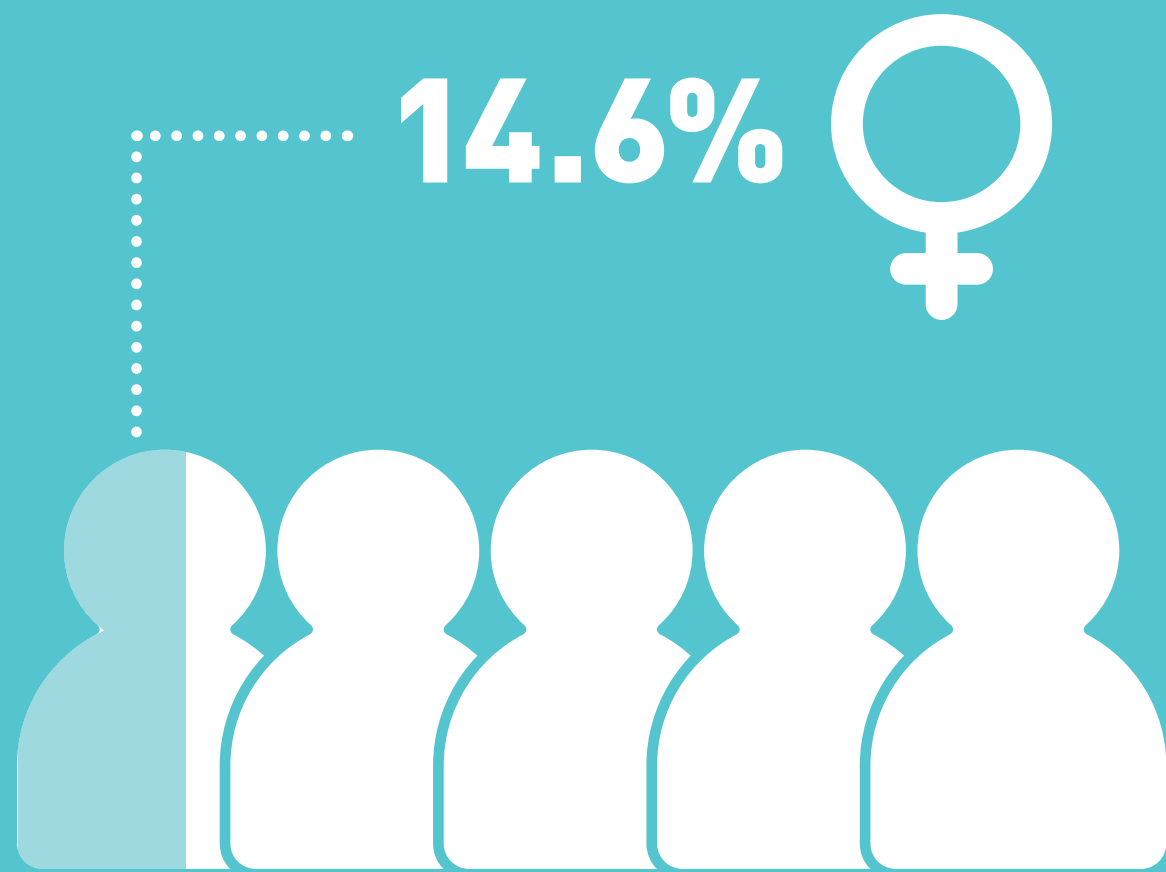
We received a perfect score of 100 on the Human Rights Campaign Foundation’s Corporate Equality Index 2018, earning the designation as a **Best Place to Work for LGBTQ Equality**.



We received the **2017 Straight for Equality in the Workplace** award from PFLAG.



We are **above the 16.7 percent average** for our industry for women board members and executives.



In 2017, **women** at all levels comprised **14.6 percent** of our global workforce.



Our Fjardaal plant in Iceland reduced the **turnover rate** for women to **4.5 percent** from 17.5 percent, and increased the **number** of women in its workforce from 20 percent to **25 percent**, in 2017.

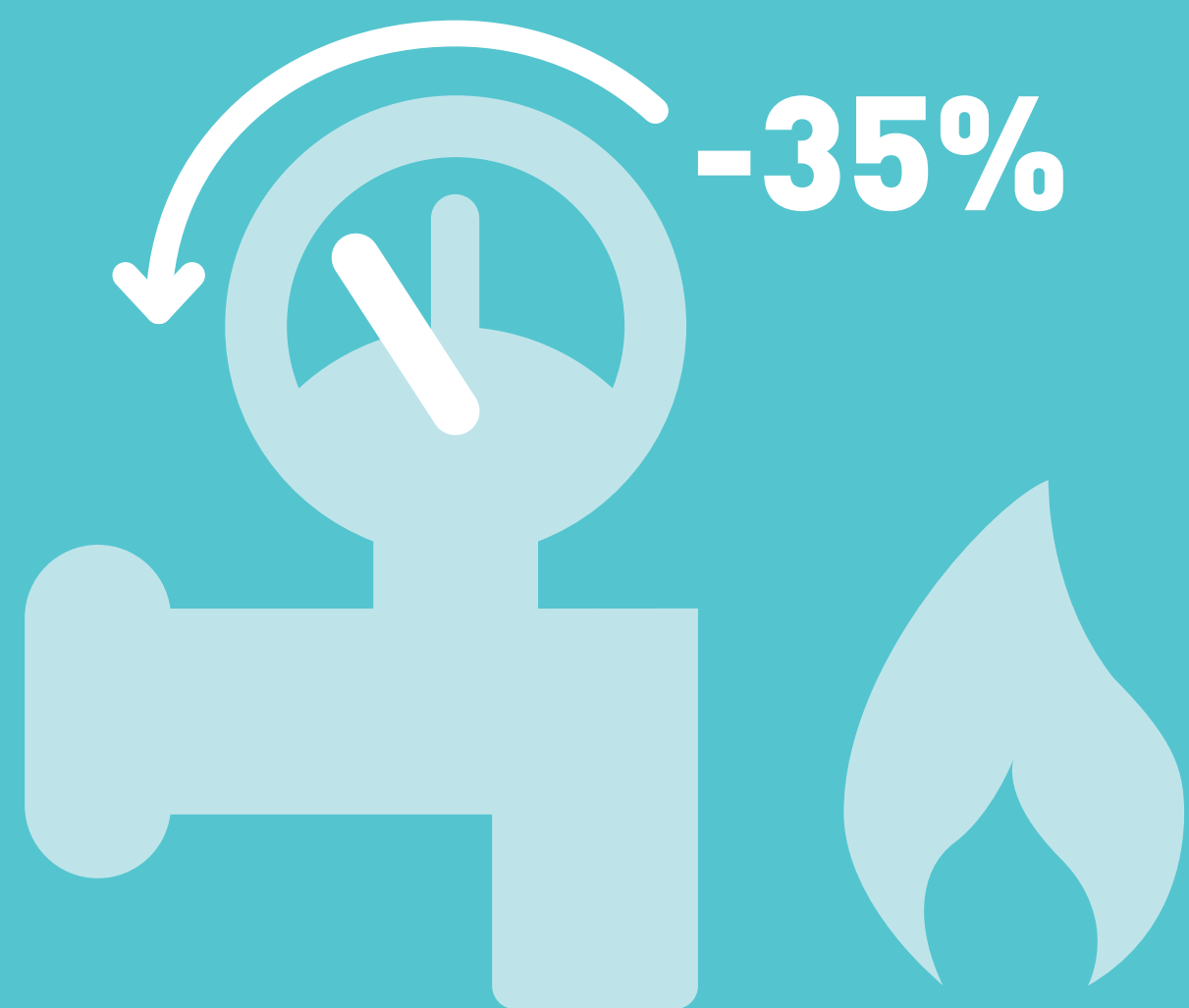
# Optimising Energy Use by Heat Recovery

**AMAG**  
AUSTRIA METALL

In this innovative project at our facility in Ranshofen, Austria, we established a system to recover waste heat from the aluminium casting process. The recovered heat is then used in the central heating systems for onsite production & office buildings.

In the past the temperature of water used for cooling during electromagnetic casting would have to be reduced before reuse. In the new system the warm water is recovered & stored in a buffer tank. After storage, heat pumps further increase the water temperature, before the retained heat is transferred to the central heating & hot water systems.

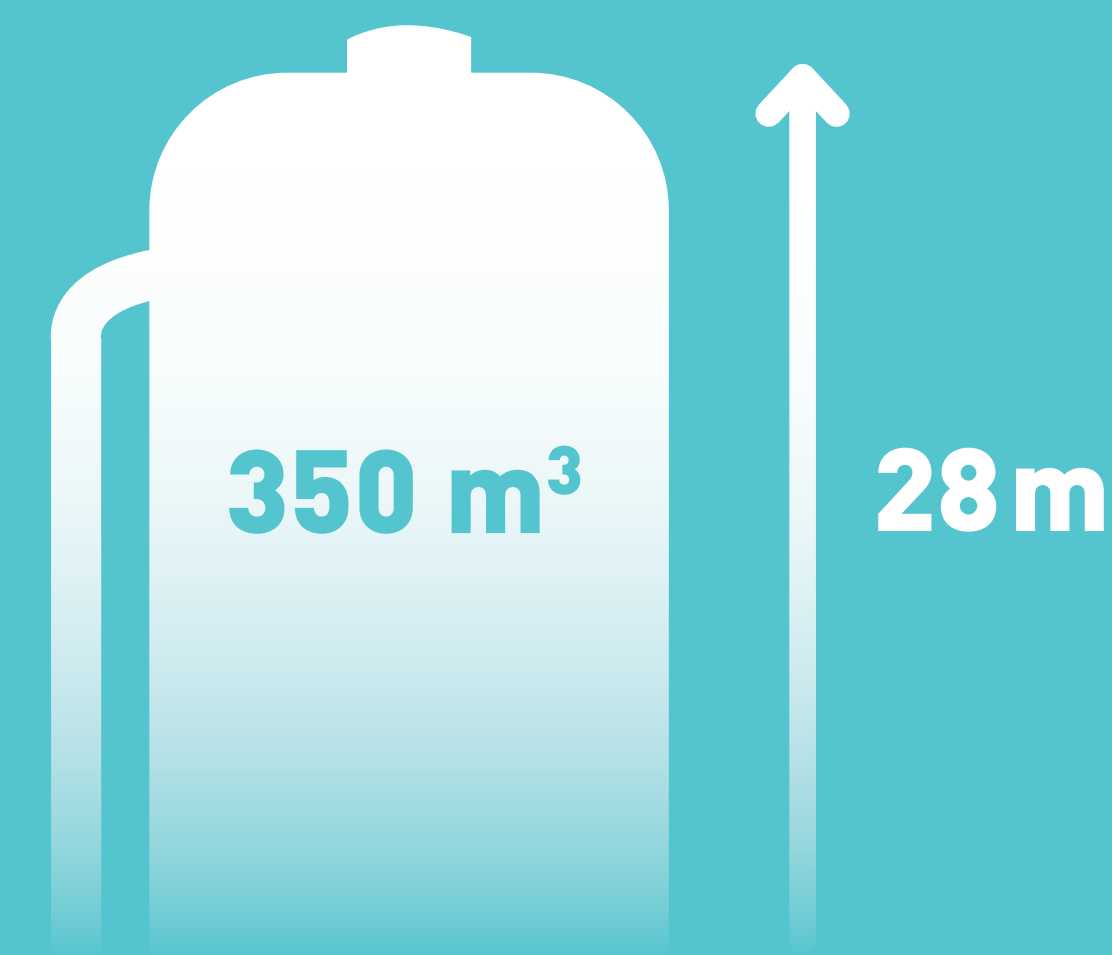
The net result is a cut in consumption of natural gas and emissions to air and a further step towards sustainable aluminium production.



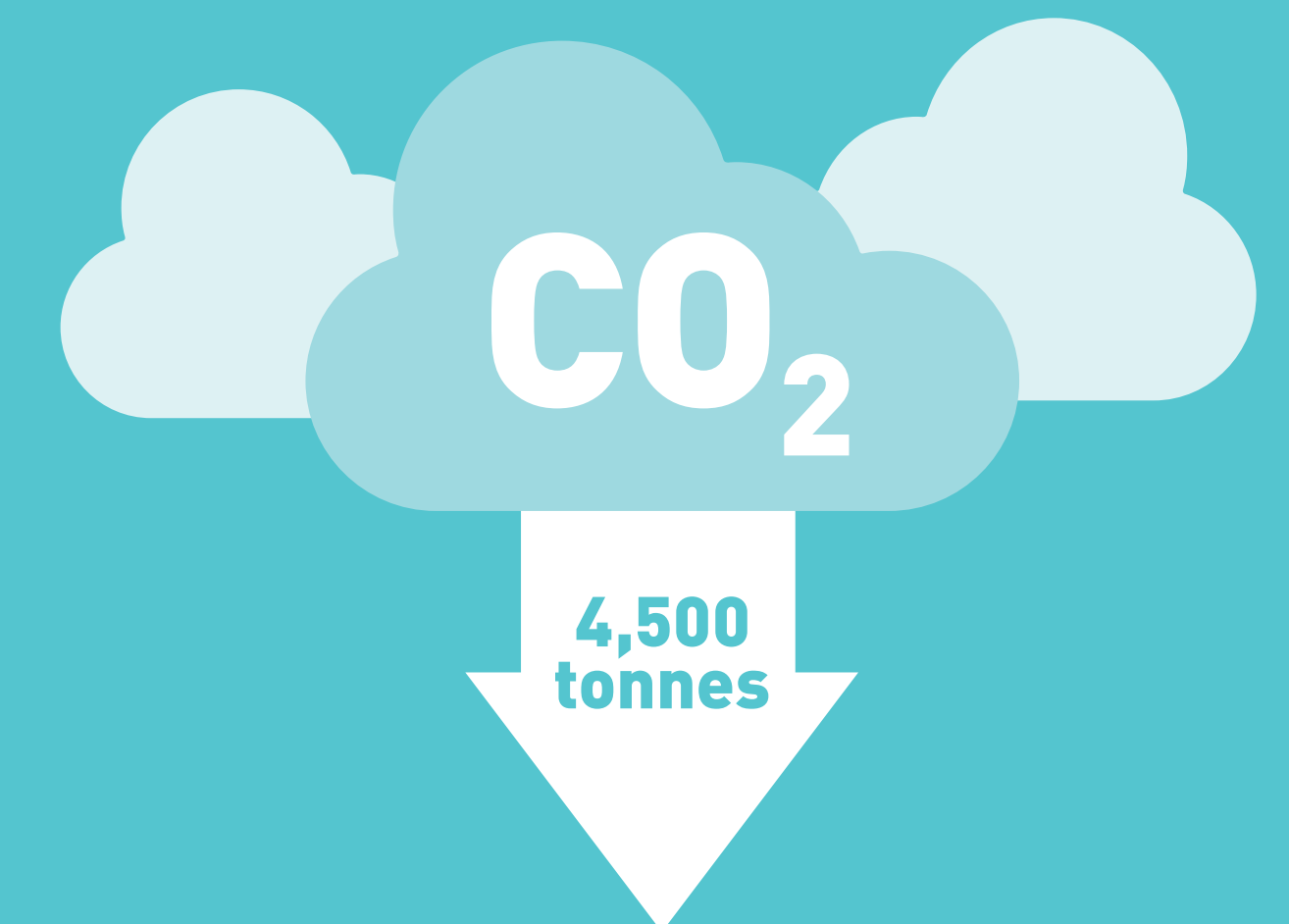
Natural gas consumption for central heating can be reduced by up to **35%**



The heat energy saved corresponds to the average annual consumption of about **700 households**



The installed buffer tank with a height of **28 meters** and a capacity of **350 cubic meters**, has become a symbol of AMAG's commitment to energy efficiency and sustainability



In total, annual CO<sub>2</sub> emissions have been cut by about **4,500 tonnes**, equivalent to average annual emissions of **2,000 cars**.

# Global LCA model for Constellium operations



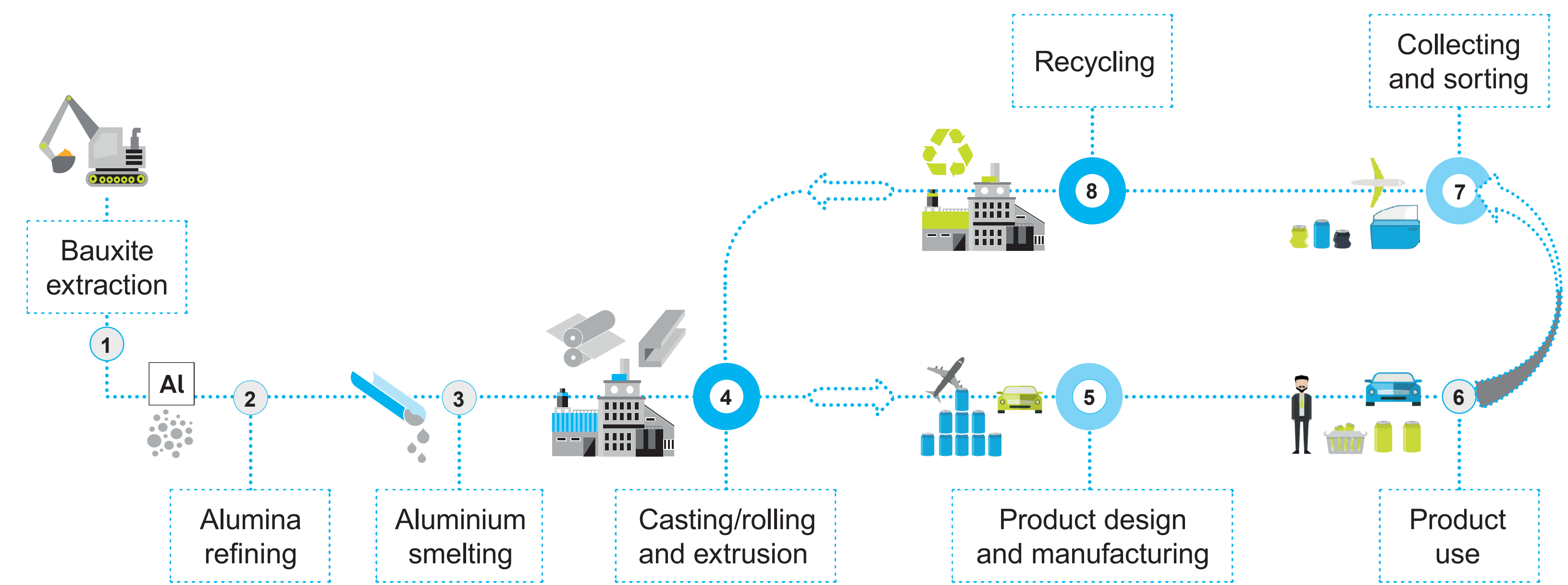
Our life cycle assessment (LCA) model calculates the environmental impact that comes from different life cycle phases of a given product or activity. It includes the impact of our own activity (energy use, waste production, air and water emissions, water consumption) and impacts from other phases of our products' life cycle:

- Upstream (from bauxite mining to metal production)
- Transportation of raw materials and products to and from Constellium sites
- Downstream (product end-of-life, mainly related to recycling)

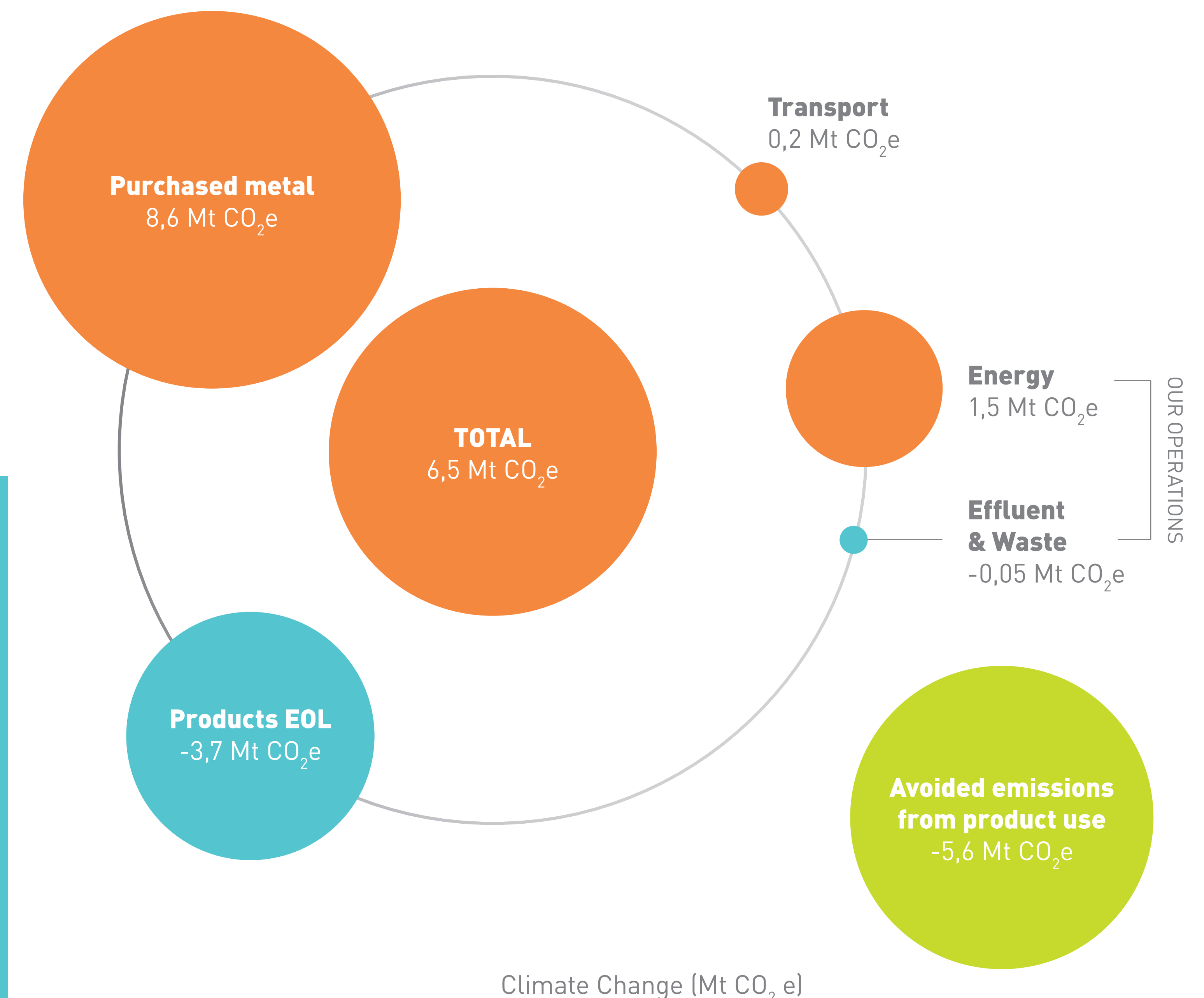
Thanks to our model, we are also able to estimate the potential savings which can be obtained on the whole life cycle of our products especially for the transport industries, by using our product instead of heavier materials.

This model is able to calculate environmental impacts over a wide range of categories, such as climate change, water eutrophication, soil acidification, and human toxicity.

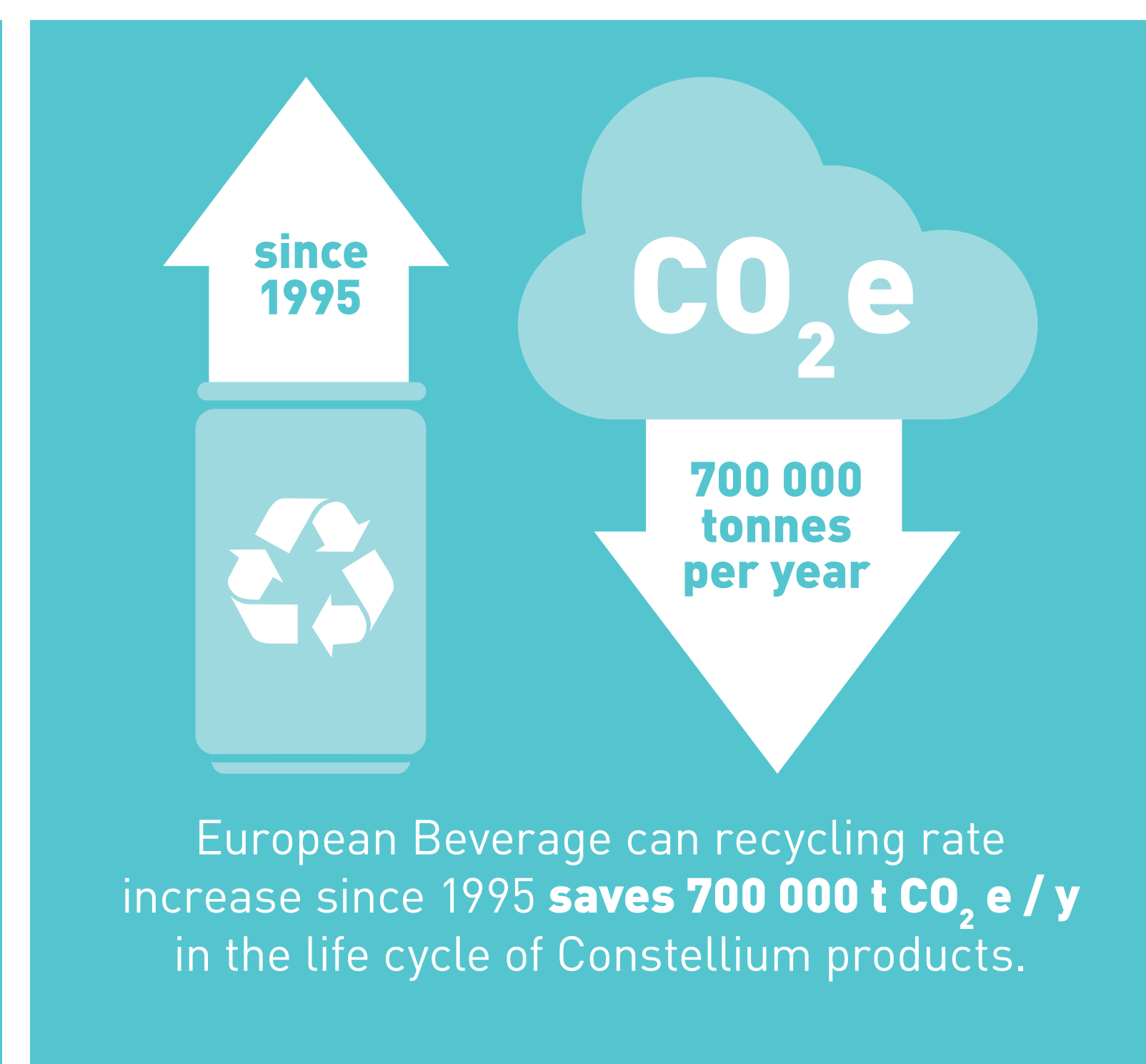
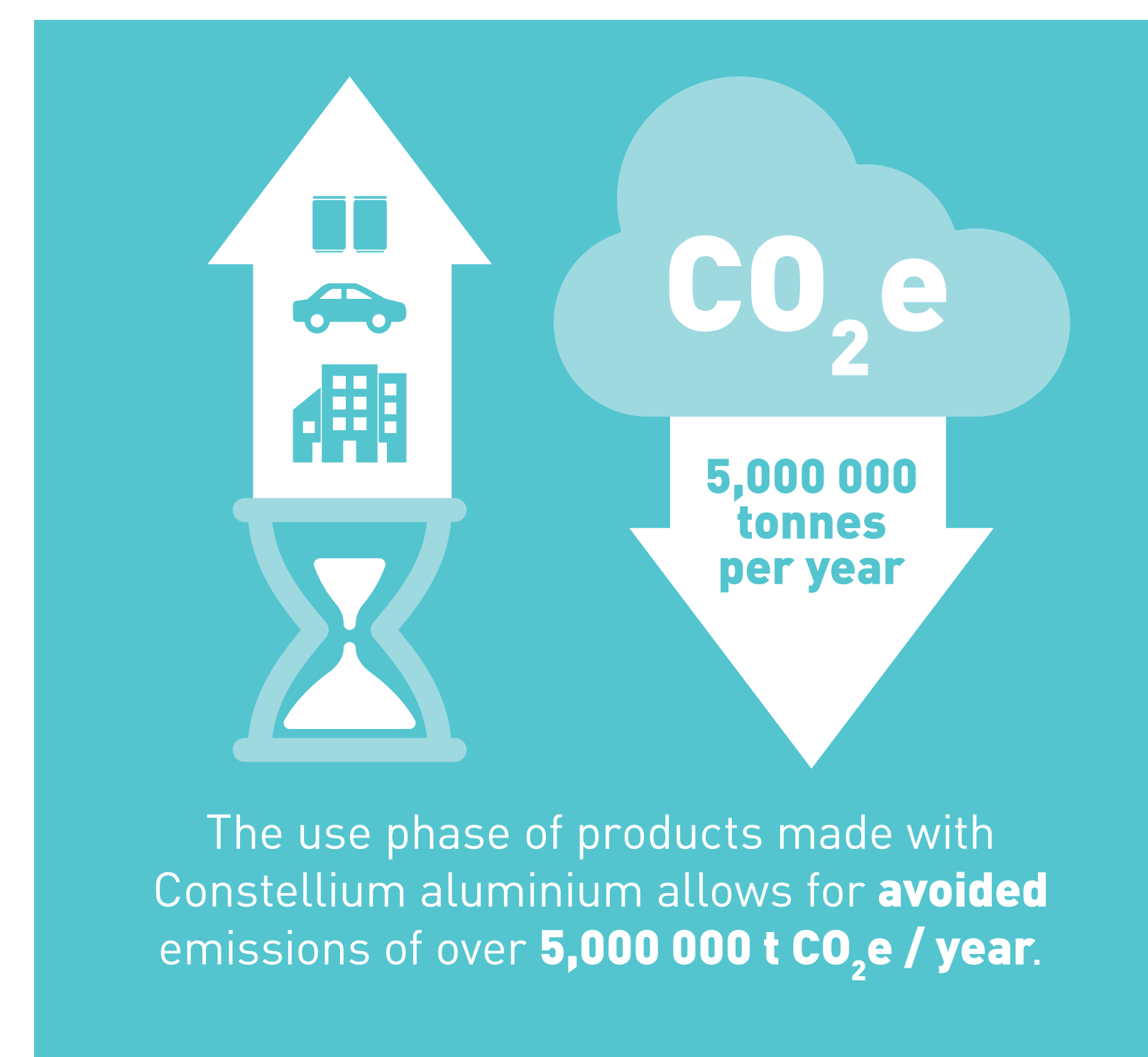
A full life cycle assessment of products is key to define the right thing to do. For instance, increasing our recycling activity increases our internal emissions while decreasing our need for primary metal and upstream emissions.



Life Cycle of Al products



Climate Change (Mt CO<sub>2</sub> e)



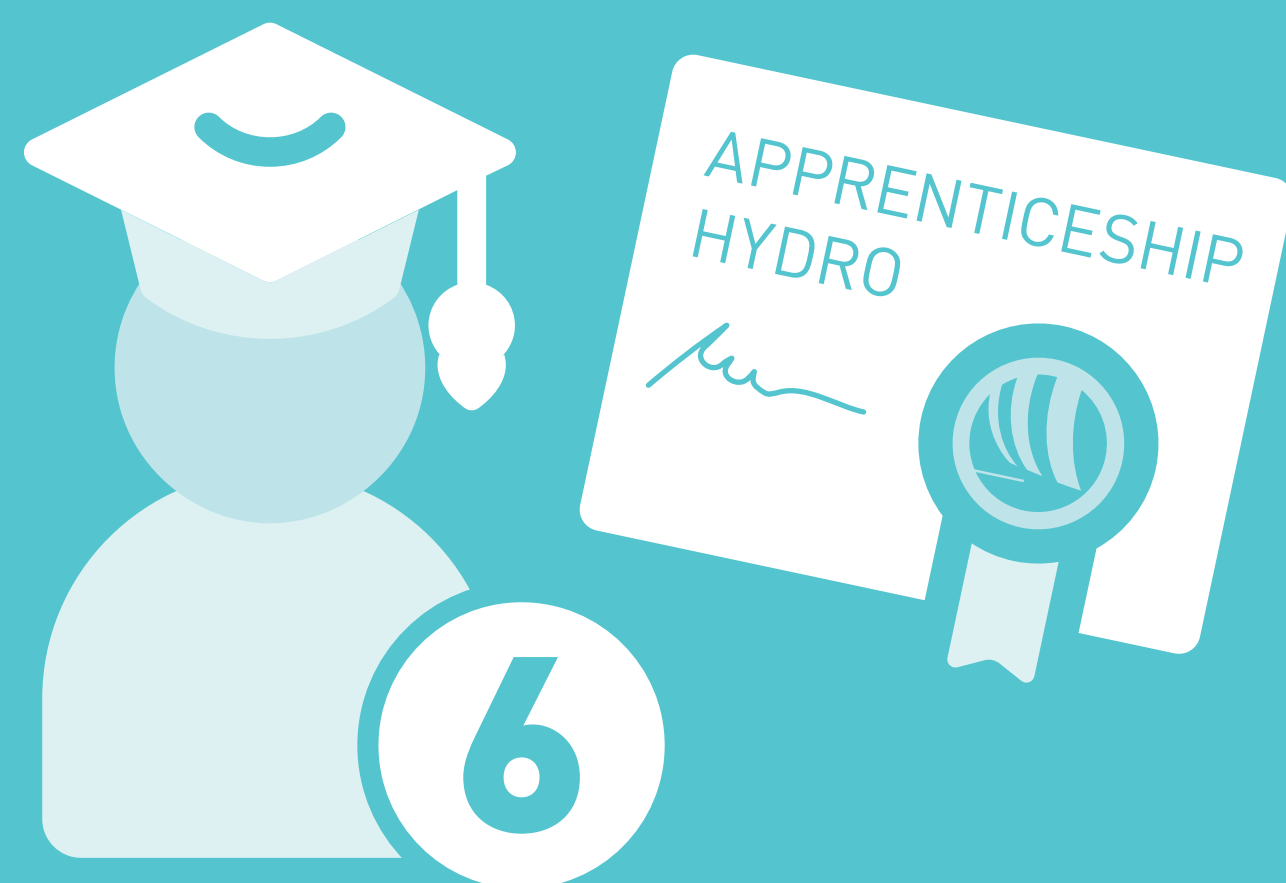
# Refugee Program in Grevenbroich



HYDRO

In March 2016, Hydro began working with a group of refugees from countries such as Iraq, Syria and Eritrea, providing them with German lessons 4 times a week.

A year forward, six out of nine are now apprentices at the different Hydro sites: Grevenbroich, Rheinwerk and Alunorf. Apprentices are completing a regular vocational training program, plus additional courses after working hours, e.g. a language training. In addition, one person was directly employed in Grevenbroich in the Logistics Department. Two participants unfortunately did not reach the language skills level necessary to progress further.



Six participants **completing** apprenticeship in Hydro's three plants



One participant **directly employed** by Hydro after the initial training



**Inter-cultural training sessions** with Hydro employees and **digital storytelling** workshops were conducted as part of the programme



Hydro is a member of the German government's refugee initiative **"We together"** ("Wir zusammen") which promotes integration over the long term

# Minimizing carbon footprint, maximizing opportunities



HYDRO

Hydro offers low-carbon aluminium products designed to help customers reach their sustainability goals and meet the demand from ever more climate-conscious consumers. As every part of the aluminum production is managed in-house, Hydro can provide customers with certified sustainable aluminum products:

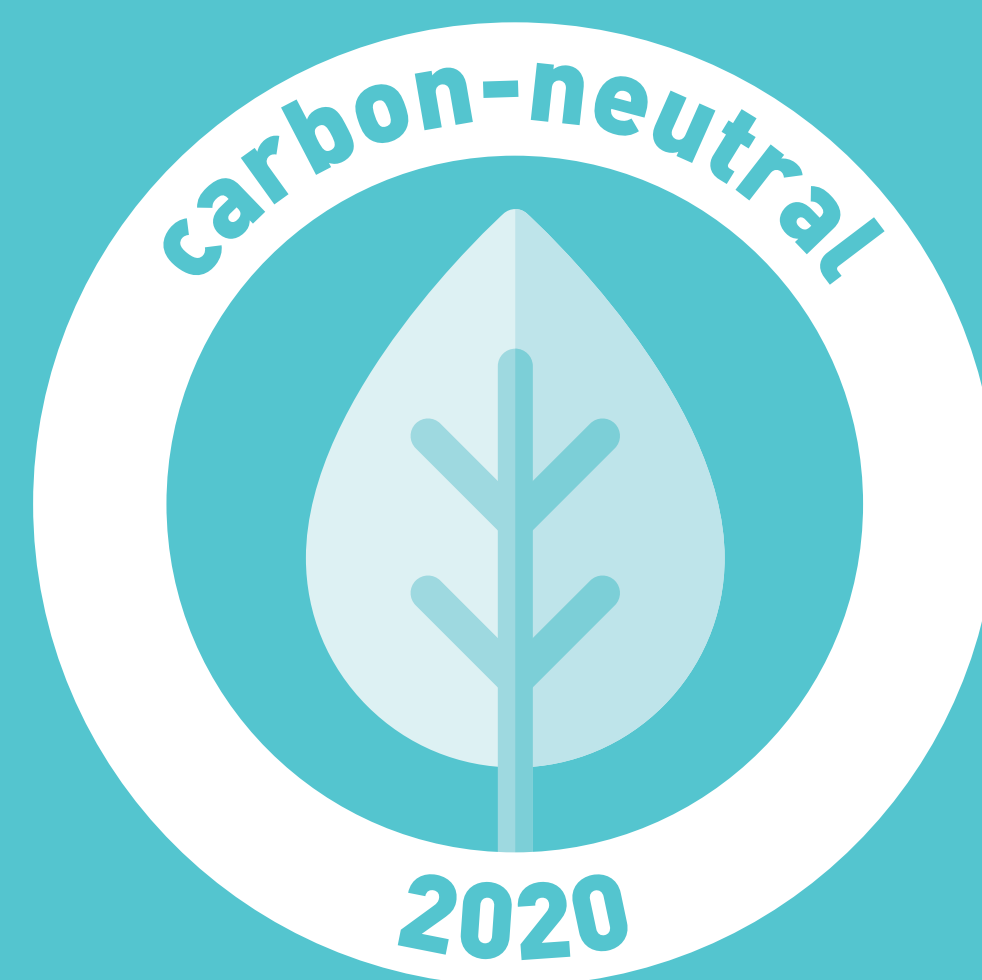
Hydro 4.0 is hydropower-based aluminium with a maximum carbon footprint of 4.0 kg

CO<sub>2</sub> per kg aluminium, covering all carbon emissions from bauxite mining and alumina refining to the production of aluminium in electrolysis and casting.

Hydro 75R is aluminium with a minimum of 75% post-consumer recycled content based on advanced scrap sorting and alloying technology.



Hydro 4.0 is **certified by DNV GL**, whilst Hydro 75R is **verified by DNV GL** based on traceability and quality principles developed by Hydro



**2020:** year when Hydro aims at becoming **carbon-neutral** from a life-cycle perspective



# Closing the loop for aluminium cans



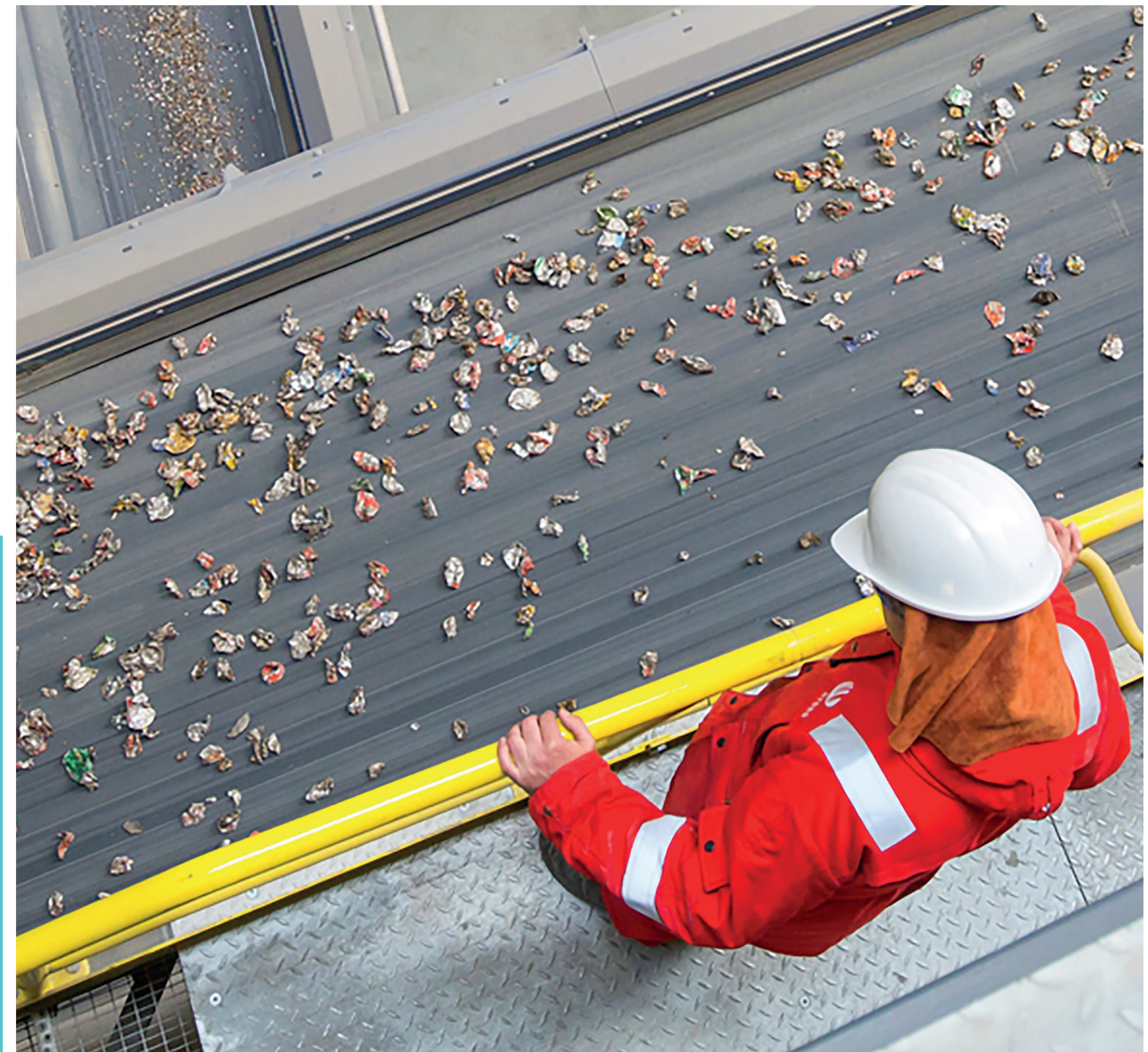
HYDRO

Countries collect used cans in various systems, where collected bulk often contains impurities and materials other than aluminium. Thanks to the use of an advanced sorting technology, Hydro's Used Beverage Cans recycling facility in Neuss, Germany, is able to efficiently process collected aluminium material with even up to 20% impurities.

Aluminium beverage cans rank as the world's most recycled packaging. Used cans constitute waste for some – and a resource for others. Hydro's turns this urban-mined resource into material for new cans, closing the loop of this product.



number of **cans recycled** by Europeans every year (equal to 450,000 tonnes of UBC)

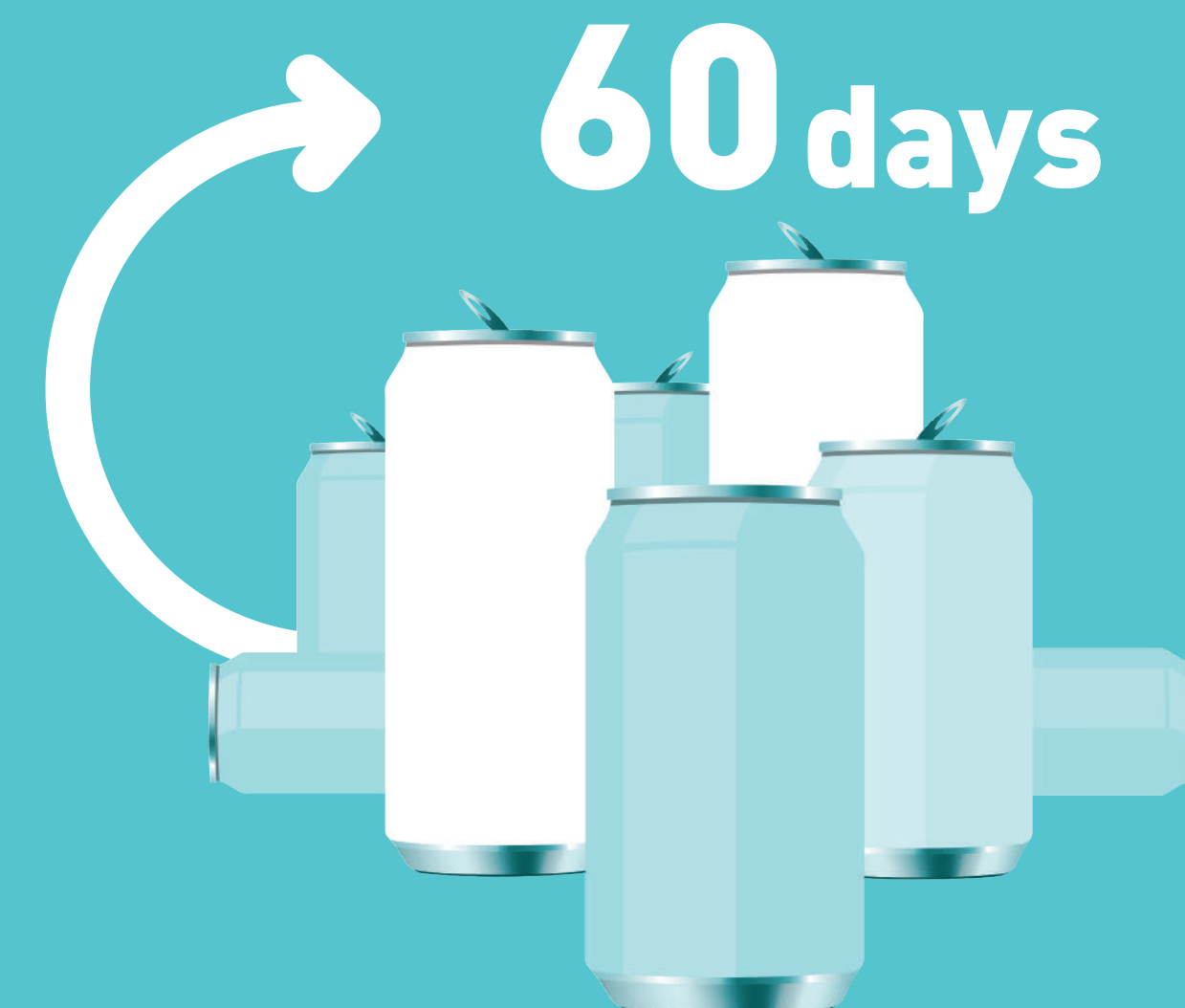


**50,000 tonnes**

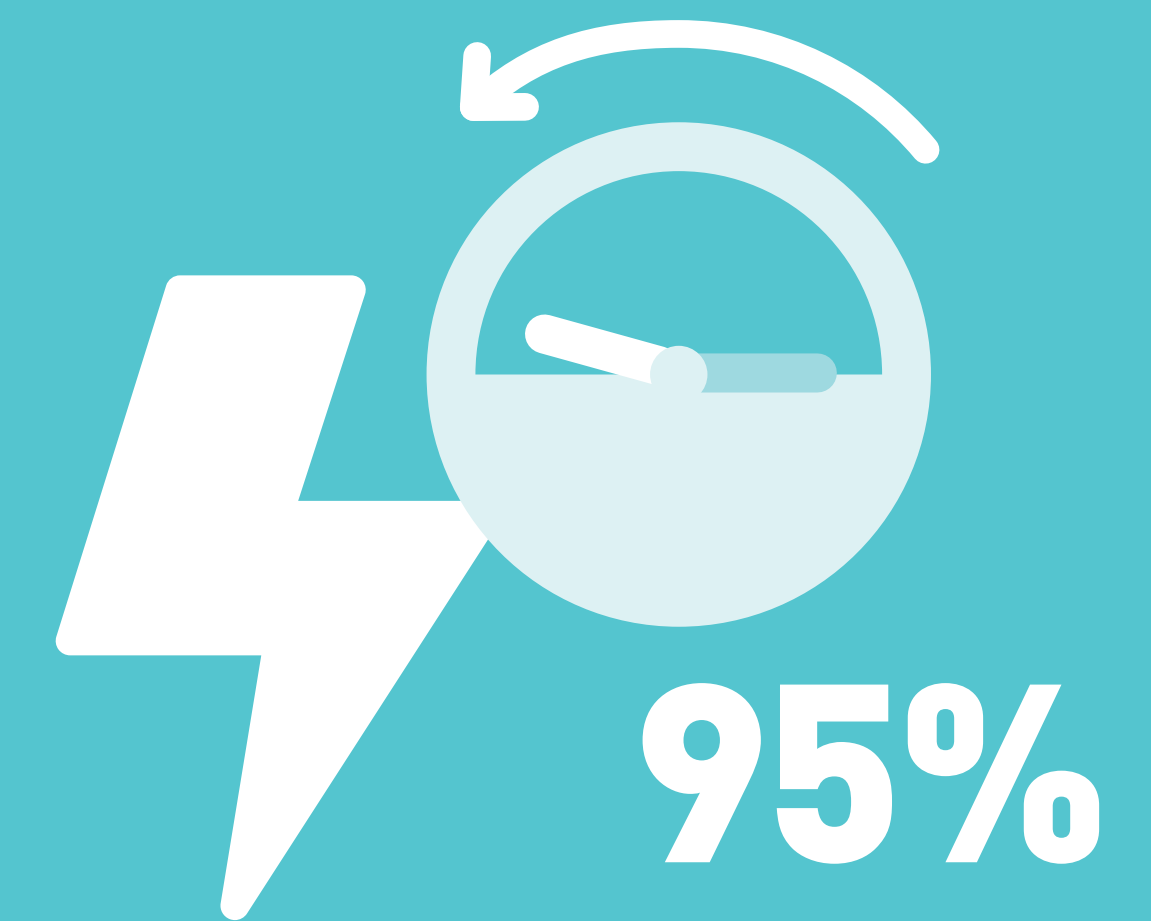
maximum **annual capacity** of Hydro's Neuss Used Beverage Cans recycling facility



**Hydro's investment** in the Neuss plant



time needed for an aluminium can to be **back on a supermarket shelf**



amount of **energy saved** by recycling in comparison to energy needed to produce primary aluminium

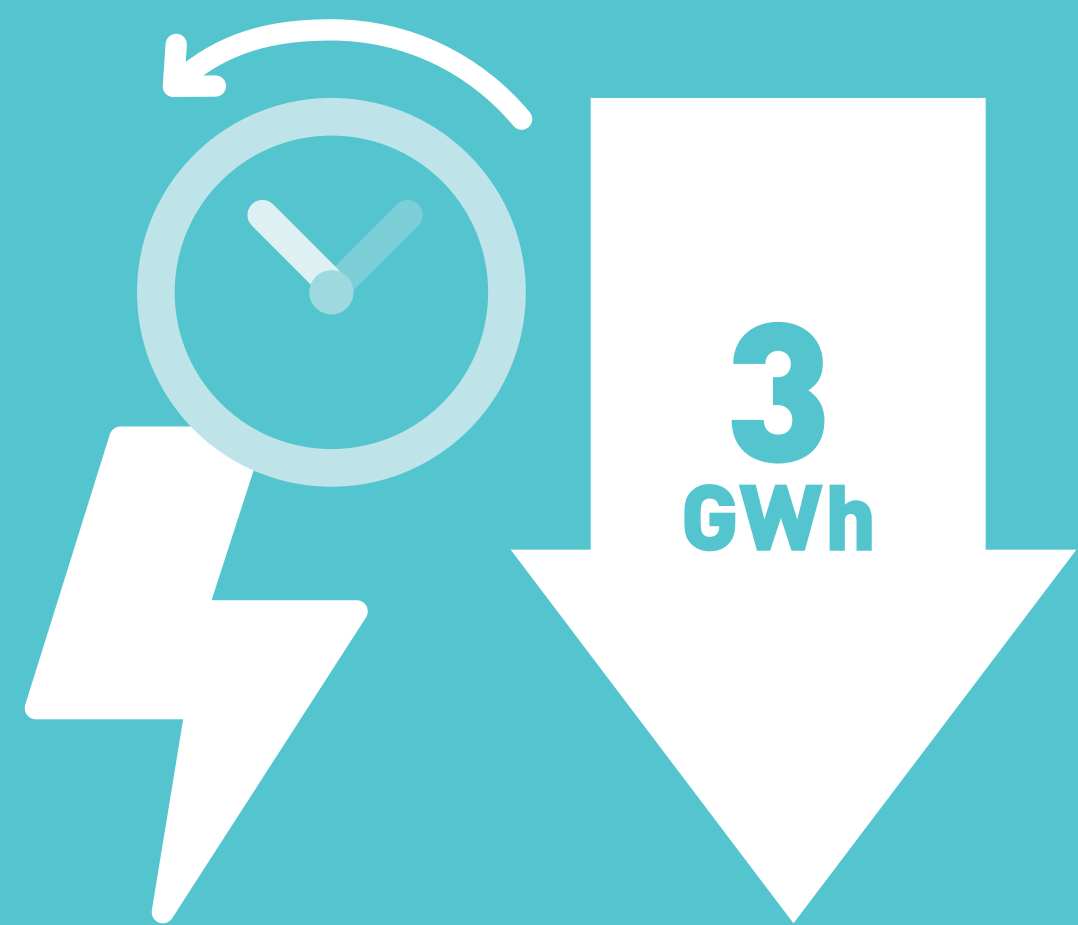
# Energy Efficiency at Aluminium Dunkerque

**RioTinto**

As part of its ongoing strategy, Aluminium Dunkerque is set on continuously improving its energy efficiency, putting in place numerous support systems to do so. The smelter aims to reduce its energy consumption per tonne of aluminium produced to ultimately become a leader and benchmark in the industry for energy efficiency.

Aluminium Dunkerque has a dedicated team of experts working closely with Rio Tinto Aluminium's technology group striving in conjunction to reach this goal and has recently been granted a ISO 50001 certification. Some examples of projects that are the basis of this transformation are the following:

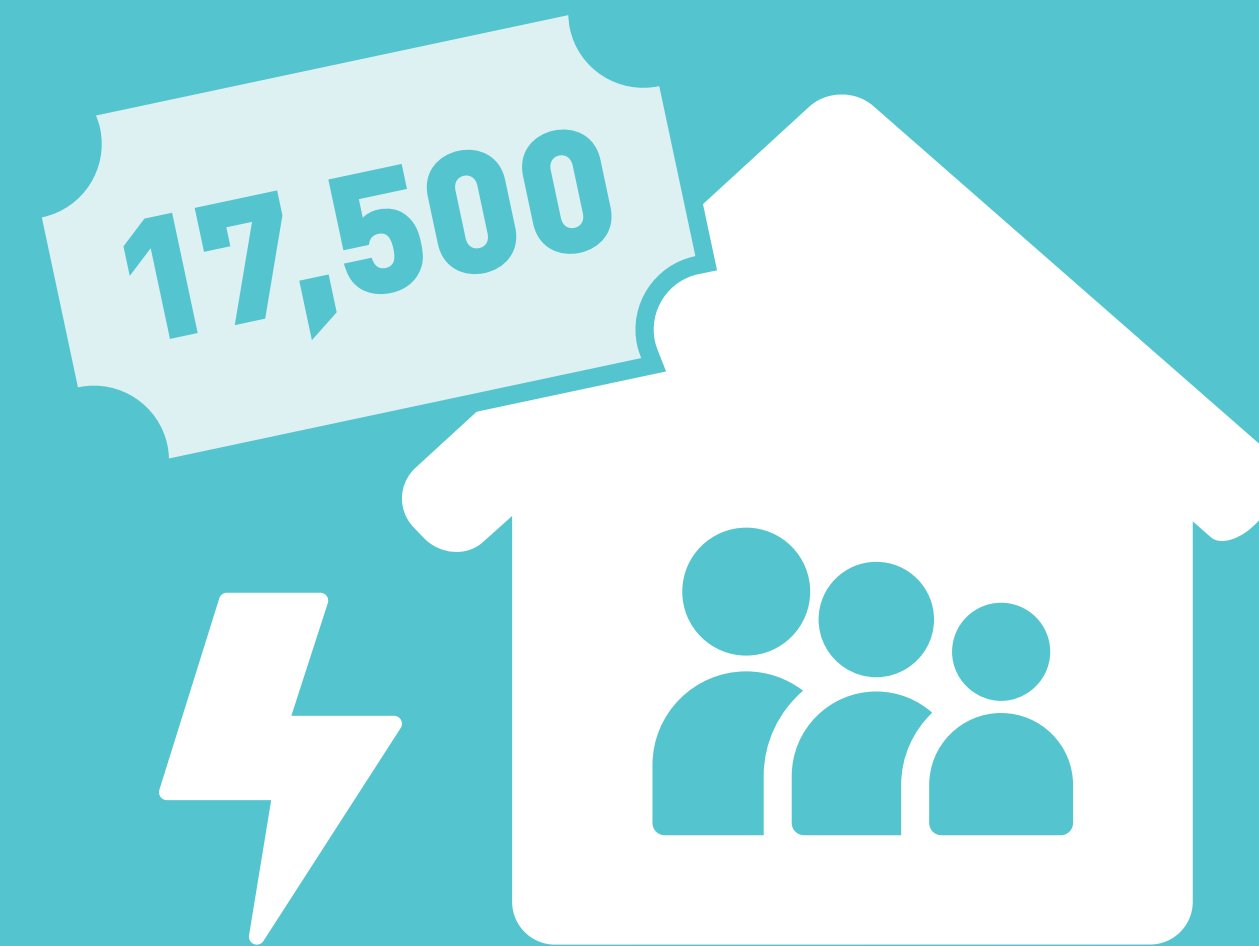
- The AD415 project to install low consumption pots
- Installation of more energy efficient lighting in electrolysis halls
- Installation of a new control system (ALPSYS) in the potline control room
- Replacement of 28 IE2 motors by IE4 motors (the more efficient version) in the electrolysis smoke treatment centres



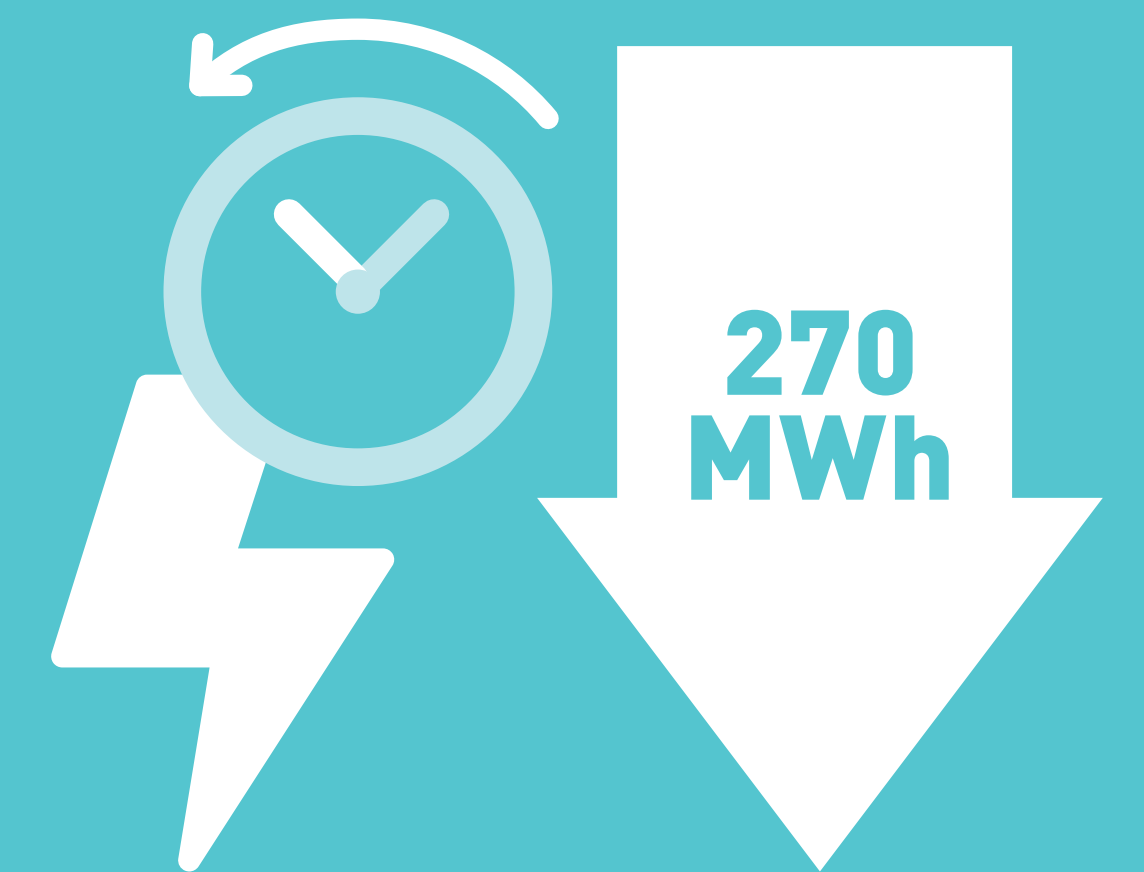
The IE2 to IE4 motor replacement project represents a **decrease** in energy consumption of **3GWh per year**



The ALPSYS installation will **reduce** GHG emissions by **60,000 tonnes per year**



The AD415 project will **decrease** energy consumption equivalent to the energy required to power **17,500 households**



By replacing the current lighting system in electrolysis halls with more energy efficient ones, the smelter will **reduce** its consumption by **270MWh per year**

# MAX, the world's first autonomous vehicle in an aluminium smelter

## RioTinto

MAX (**M**odular, **A**utonomous and able to cross (**X**) over) was designed by Rio Tinto Aluminium Technology teams in partnership with ECA Group to make work safer for employees, while being an environmentally friendly and energy efficient solution to increasing productivity.

The vehicle is a world-first, with currently no other autonomous vehicles being used in other aluminium smelters. MAX's function is to transport carbon anodes to and from the potroom. Its electric motors and capacitors

are adapted for ultra-fast and energy-efficient charging, leaving a very small carbon footprint and no emissions behind.

MAX's industrial version is set for deployment at Aluminium Dunkerque in mid to late 2018, followed by Rio Tinto's Canadian smelters in the Saguenay region of Quebec, and in British Columbia, in 2019.



5.3 m  
←3-m→

5 tonnes  
18 km/h

### MAX™ stats:

Dimensions: 5.3 metres long x 3 metres wide  
Maximum load: 5 tonnes  
Maximum speed: 18km per hour



Fully electric **fast-charging battery**



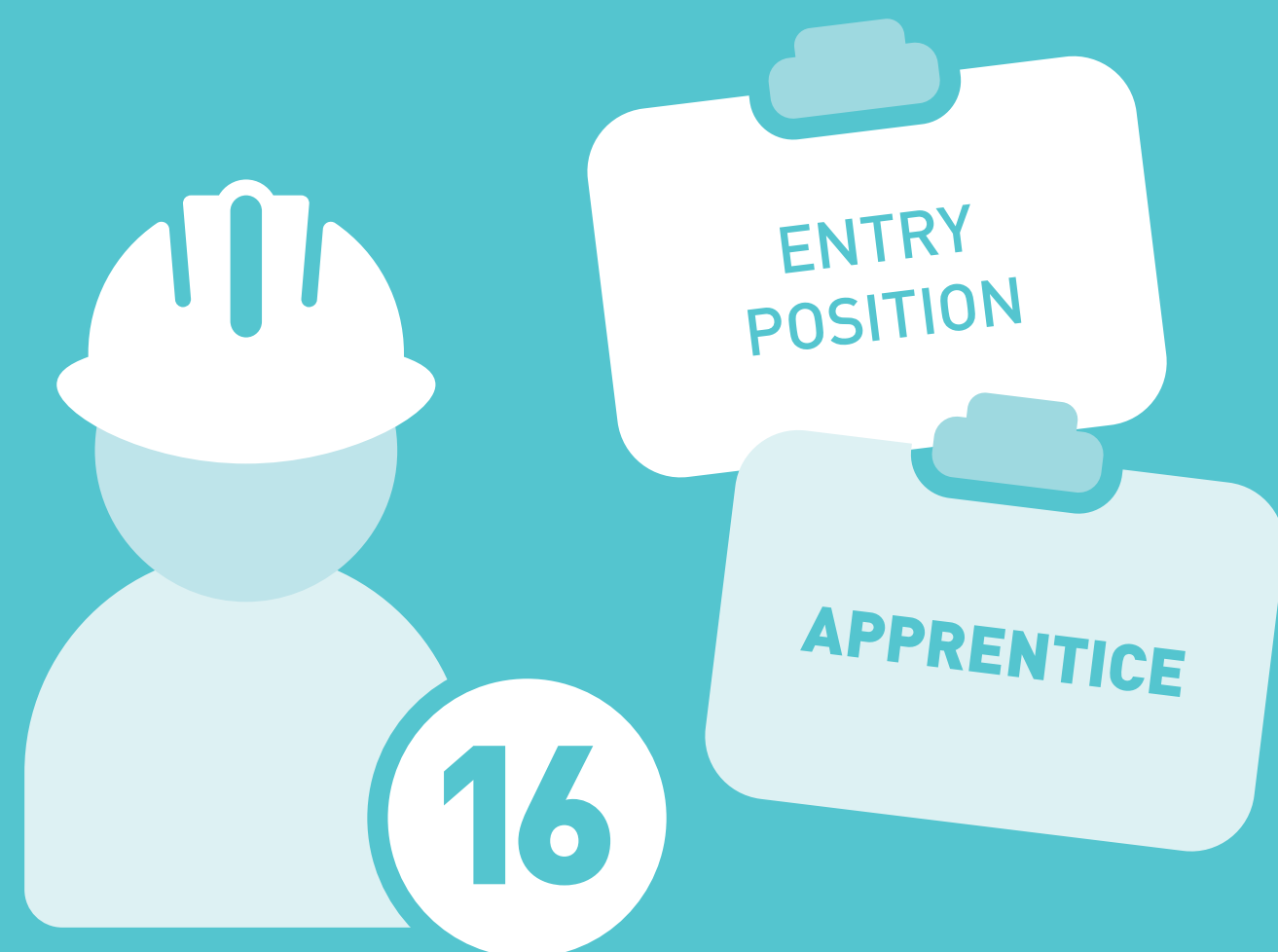
Made with **aluminium**



# Using the integrative power of industry jobs

**trimet**

The “Vocational Training for Refugees” project is an initiative of TRIMET’s founder, Heinz-Peter Schlüter. It is based on the corporation’s self-image as a family business. The project wants to help refugees start a new life in a completely foreign country and give them an outlook for their future in their new homeland. In addition to occupational training and integrative measures, the program includes preparation for initial qualifications and internships as well as accompanying language and vocational instruction.



Currently **16** refugees work at different TRIMET branches in **entry positions** or as **apprentices**.



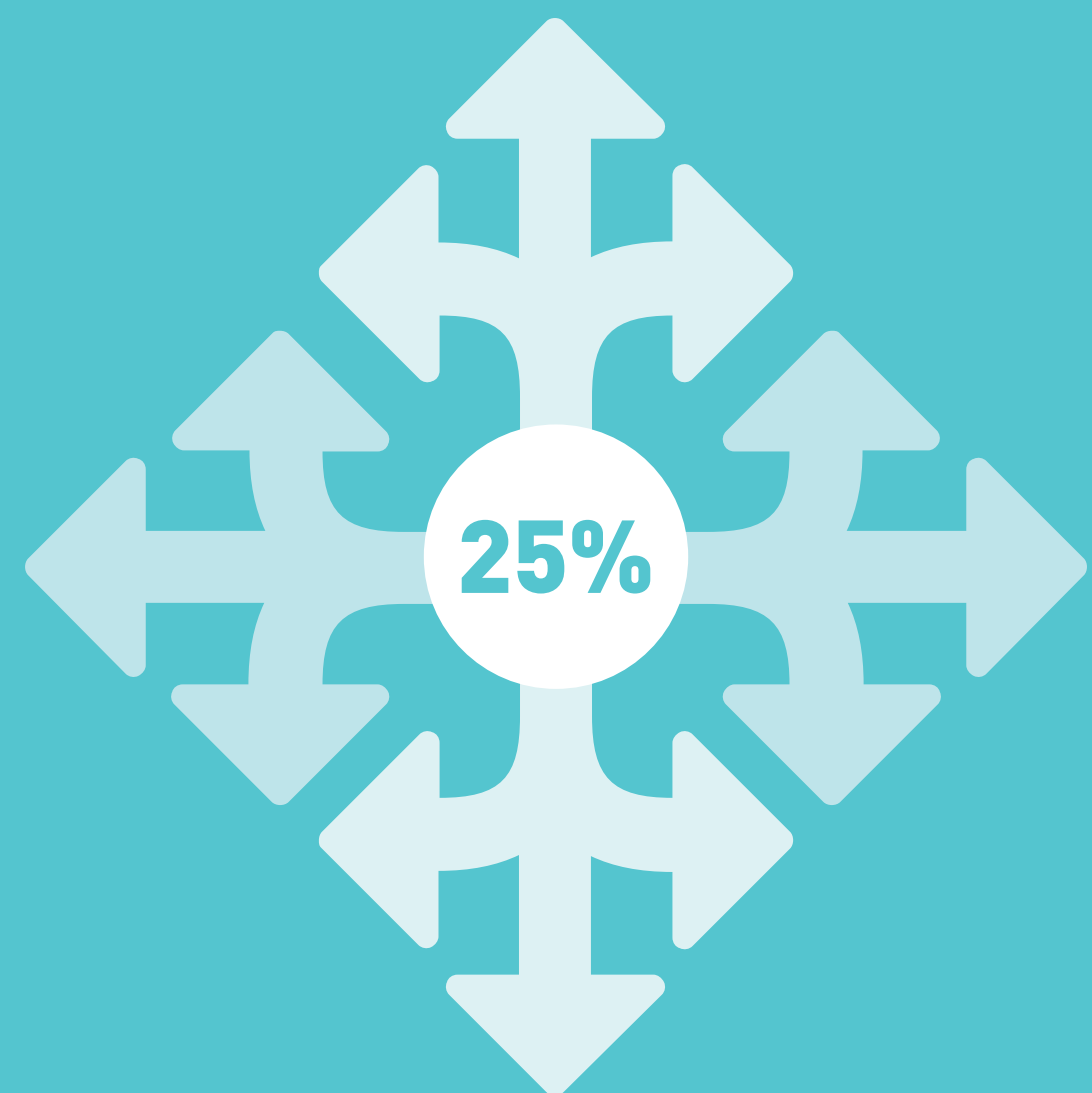
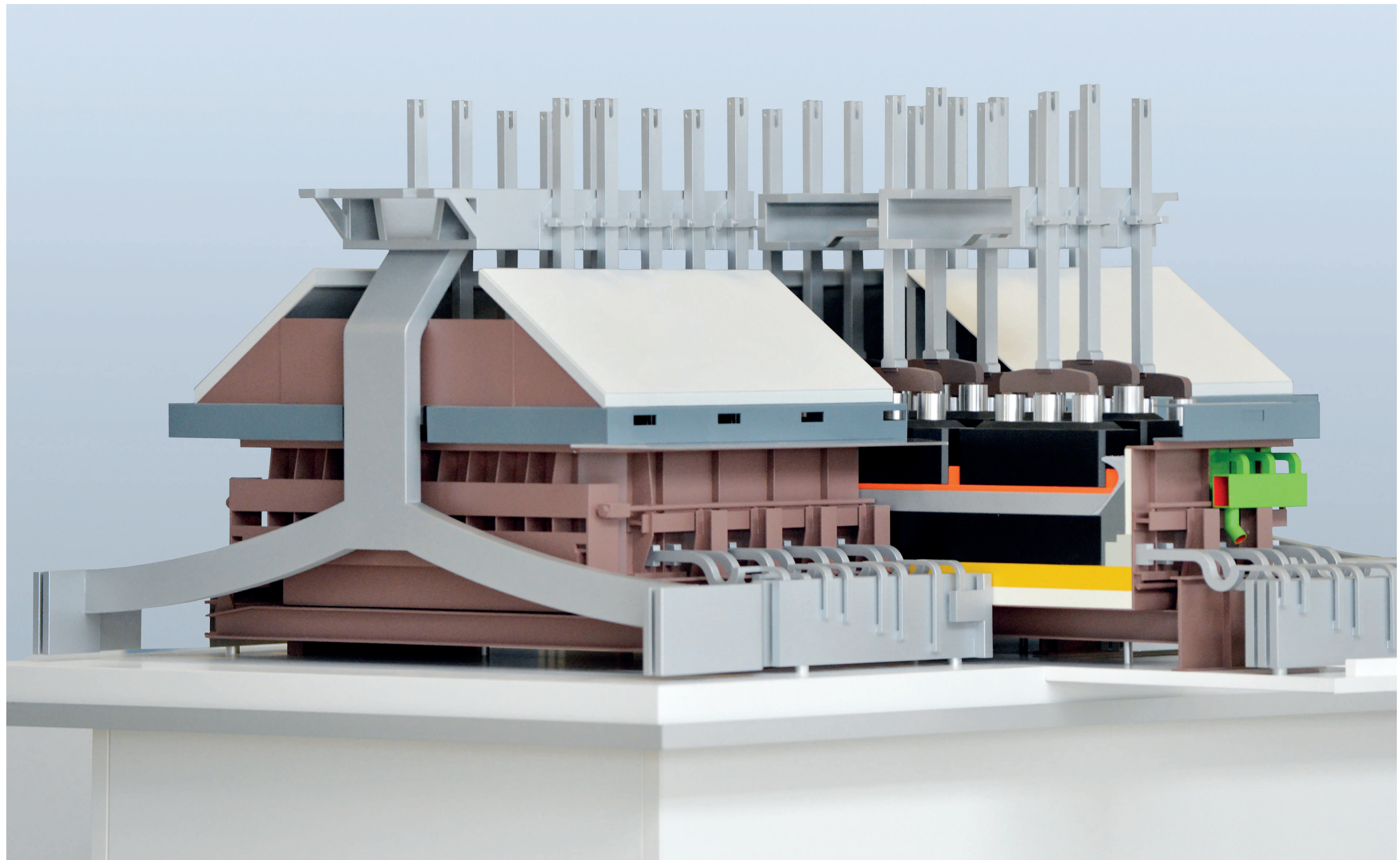
By 2022 that number is to **increase to 66**.



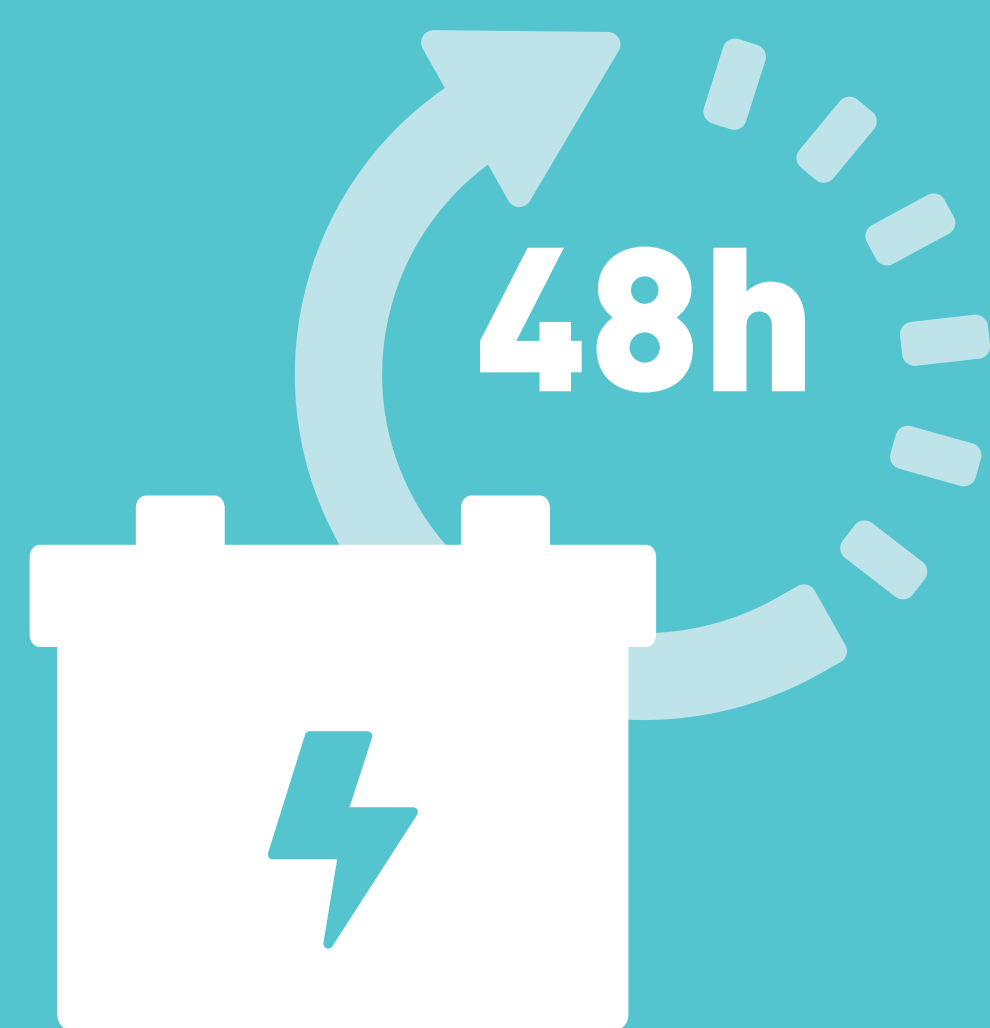
# The aluminium smelter as “virtual battery”

**trimet**

An aluminium smelter that has been converted into a virtual battery functions like a huge and intelligent energy storage facility. In order to test the new process on an industrial scale, TRIMET Aluminium SE is going to repurpose 120 furnaces in an electrolysis hall at the Essen location. The “virtual battery” of this test series has a “storage” capacity of approximately 1,120 megawatt hours, equivalent to that of a medium-sized pumped-storage power plant, combined with an efficiency level of up to 95 percent.



25% **flexible** operations



Storage performance **over 48h**

