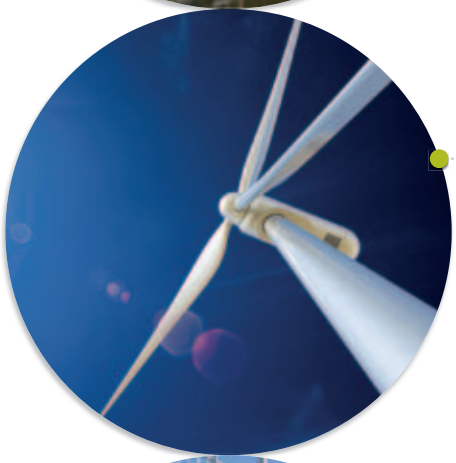
HYDRO

Aluminium
– about Hydro and renewables

Our solutions

Concentrated Solar Power, Grevenbroich, Germany

- HyBridal™ aluminium strip laminated with Solar Mirror Film 1100 from 3M;
- High reflectivity values;
- Flexible but unbreakable;
- Aluminium structures.



Wind power Grevenbroich, Germany

- Components for nacelle covers, transformers, cooling systems, platforms, doors, etc.;
- Light, yet resistant to corrosion and high-pressure;
- Fit for offshore environment.

Building-integrated photovoltaics Toulouse, France

- Photovoltaic modules integrated in facades;
- Optimized for geographical location, orientation and shades;
- Enables building's self-sufficiency in electricity.

Life-long aluminium solutions for renewable energy

Aluminium – HOW?

Reducing the initial investment costs, aluminium increasingly enables the development of renewable energy technologies – from niche products to mainstream energy solutions.

How solar energy shines with aluminium

Aluminium is today used in all solar power technologies thanks to its light weight, corrosion resistance, and efficient installation capabilities. Aluminium is a good conductor of heat and electricity, has high reflectivity and is fully recyclable.

In concentrated solar power, aluminium coils and sheets coated with our HyBridal™ reflective mirror-finish foil are ideal for the mirrors. The flexibility of the material enables to tailor the design of mirrors and fit different types of construction. Aluminium is also used in the mirrors' frames. This supporting architecture guarantees reflector alignment and provides the strength needed to withstand stresses, movements and wind loads. Hydro's frames are strong enough to handle hurricane force winds.

In solar thermal absorbers Hydro is finalising the development of HySelect™, a special selective coating for coils and sheets. With its high absorbance values of up to 90 percent, the coating remains resistant at elevated temperatures of up to 600°C. It does not need any toxic addition or solvent; an added plus in processing and for the environment.

In addition, Hydro can now offer solutions for all-aluminium solar thermal absorbers, thanks to the development of a new alloy resisting the toughest high-temperature corrosion tests ever performed for any tubes in such applications. The alloy composition enhances further aluminium's properties, strengthening its resistance to corrosion and thereby increasing the life expectancy of the tubes.

In photovoltaic technology, aluminium is used in support structures for photovoltaics modules in solar parks and in mounting systems on roofs. Photovoltaic cells can even be integrated into windows and facades which are optimized for the geographical location, orientation and shades of the building. Such solutions enable buildings to be self-sufficient for their electricity needs.

Aluminium structures are easily and fast mounted. After a long service life (more than 20 years) dismantling is as easy and the aluminium parts are recycled. It is also possible to renew only the cells and reuse the support structures for another service life. Aluminium comes into photovoltaics cells too. Its surface can be substantially smoothened to suit cell construction (HyGloss™ technology). The aluminium itself then plays a key role in the transport of electrons.

How wind energy blows with aluminium

Aluminium's lightweight provides clear advantages in wind energy installations. Since every kilo added to the overall structure will require a larger base and thus more material for securing the structure, it is critical to keep the weight of the turbines as low as possible. Lightweight is also a clear asset when it comes to transporting and assembling parts – especially at sea.

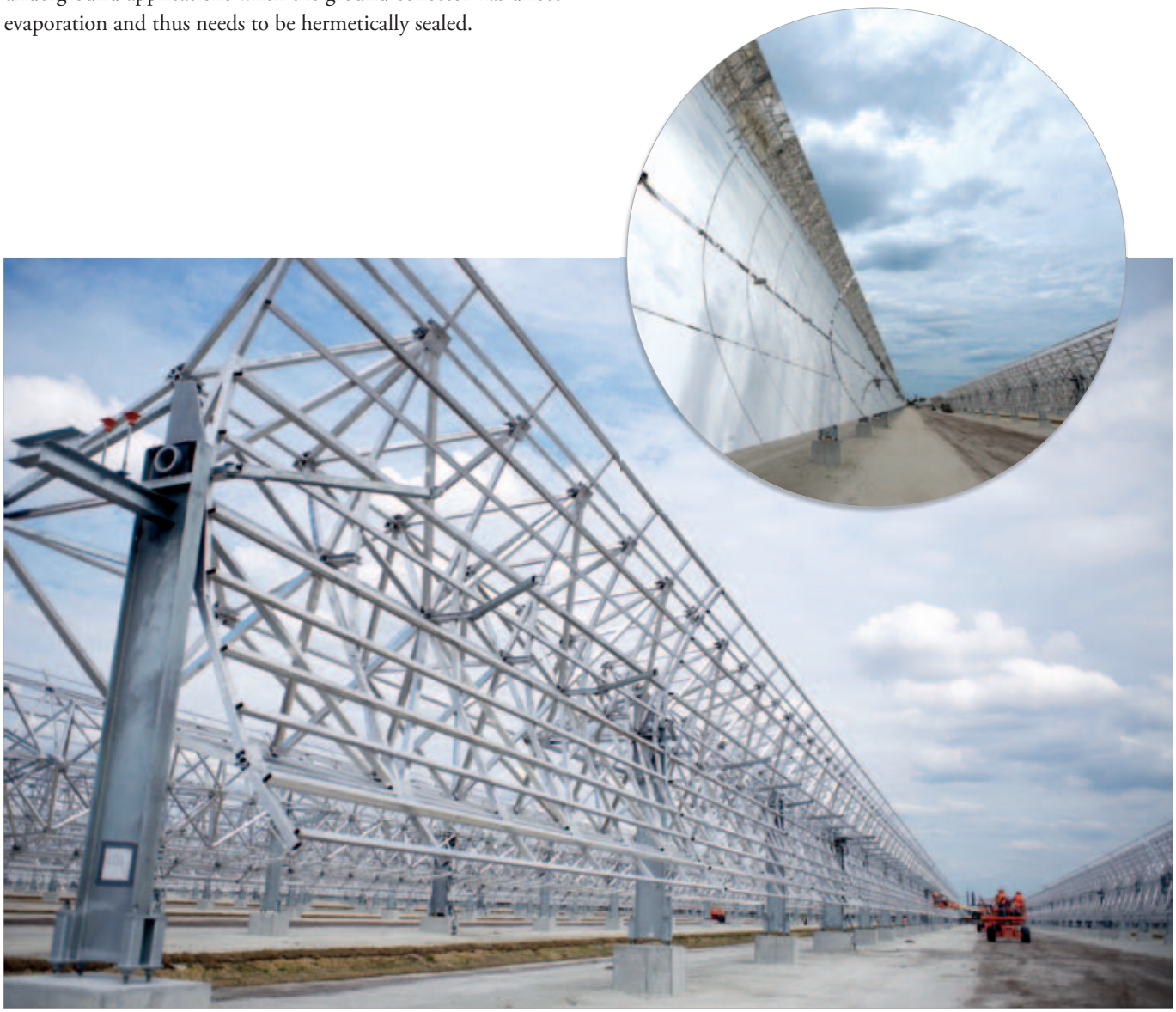
Its natural resistance to corrosion ensures low maintenance needs – even over the long lifetime of wind energy installations, which pays off in savings on the need for inspections, repairing and replacement parts. The high-pressure capability, the strength

and the gas and humidity barrier properties are other characteristics that make aluminium particularly fit for outdoor use – particularly in humid, salty and cold offshore environment. Even in harshest conditions, aluminium proves its durability.

Aluminium for the future

Aluminium is used not only in mainstream technologies such as solar and wind energy, but also in niche applications like heat pumps using geothermal energy. Hydro has developed an aluminium tube with a special alloy which is well suited for underground applications when the ground collector has direct evaporation and thus needs to be hermetically sealed.

No matter where it is used, aluminium remains fully recyclable without losing its initial properties. Recycling requires only 5 percent of the energy necessary for the production of primary aluminium. Aluminium products are thus a sort of "energy bank". Of all the aluminium ever produced since industrial production began in 1886, 75 percent is still in use today, in their first, second, third or umpteenth life cycle.



Aluminium – WHAT?

Hydro is a major global supplier of semi-finished aluminium products to the renewable energy sector. With a wide range of applications and several production sites across Europe, our Extrusion, Rolling and Precision Tubing activities offer tailor-made and cost-effective solutions to customers.

Bauxite

Bauxite is, together with energy, the main raw material for aluminium. This reddish colored mineral is mostly found in Australia, China, Africa and South America. Bauxite is refined into alumina – a white powder which looks a bit like table salt. In Brazil, Hydro operates one of the world's largest bauxite mines in Paragominas and the world's largest alumina refinery, Alunorte.

Processing

The performance of our applications for renewable energy production is linked to the high quality of the metal they are made from. Our advanced technological expertise allows the production of unwrought aluminium in a wide range of shapes and alloys to fit any use. Aluminium is produced by electrolysis at high amperage. Hydro has reduced its direct emis-sions of greenhouse gases per tonne of primary aluminium produced by almost 70 percent since 1990.

Extrusion and rolling

Our solutions for renewable energy production are based on aluminium extrusions and rolled products. Both processes turn metal ingots into various shapes. There is virtually no end to what shape aluminium products can take to meet customer needs. Different types of alloys, processing and surface treatment can further improve the metal's properties. With 19 extrusion plants and six rolling mills, Hydro is ideally placed to supply the European market.

Recycling

Recyclability is one of aluminium's greatest benefits. Aluminium can be recycled over and over again without losing its initial properties. Moreover, remelting used metal requires up to 95 percent less energy than for the primary production. Our ambition is to grow faster than the market in recycling and to take a strong position in this part of the value chain. By 2020, we aim to recover 1 million metric tons (mt) of contaminated and post-consumer scrap annually.

Hydro is a global supplier of aluminium with activities throughout the value chain, from bauxite extraction to the production of rolled and extruded aluminium products and building systems. Based in Norway, the company employs 22,000 people in more than 40 countries. Rooted in a century of experience in renewable energy production, technology development and progressive partnerships, Hydro is committed to strengthening the viability of the customers and communities we serve.

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Infinite aluminium