Planning for the Future – Building with Aluminium

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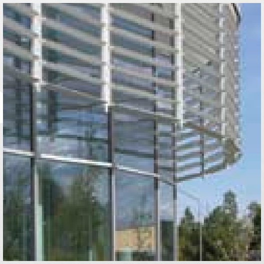

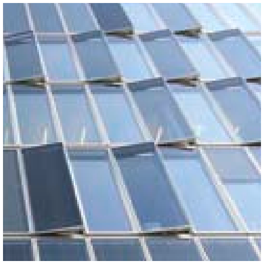

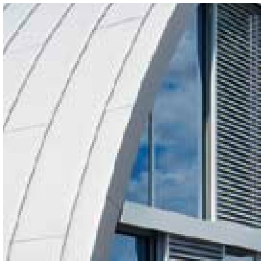

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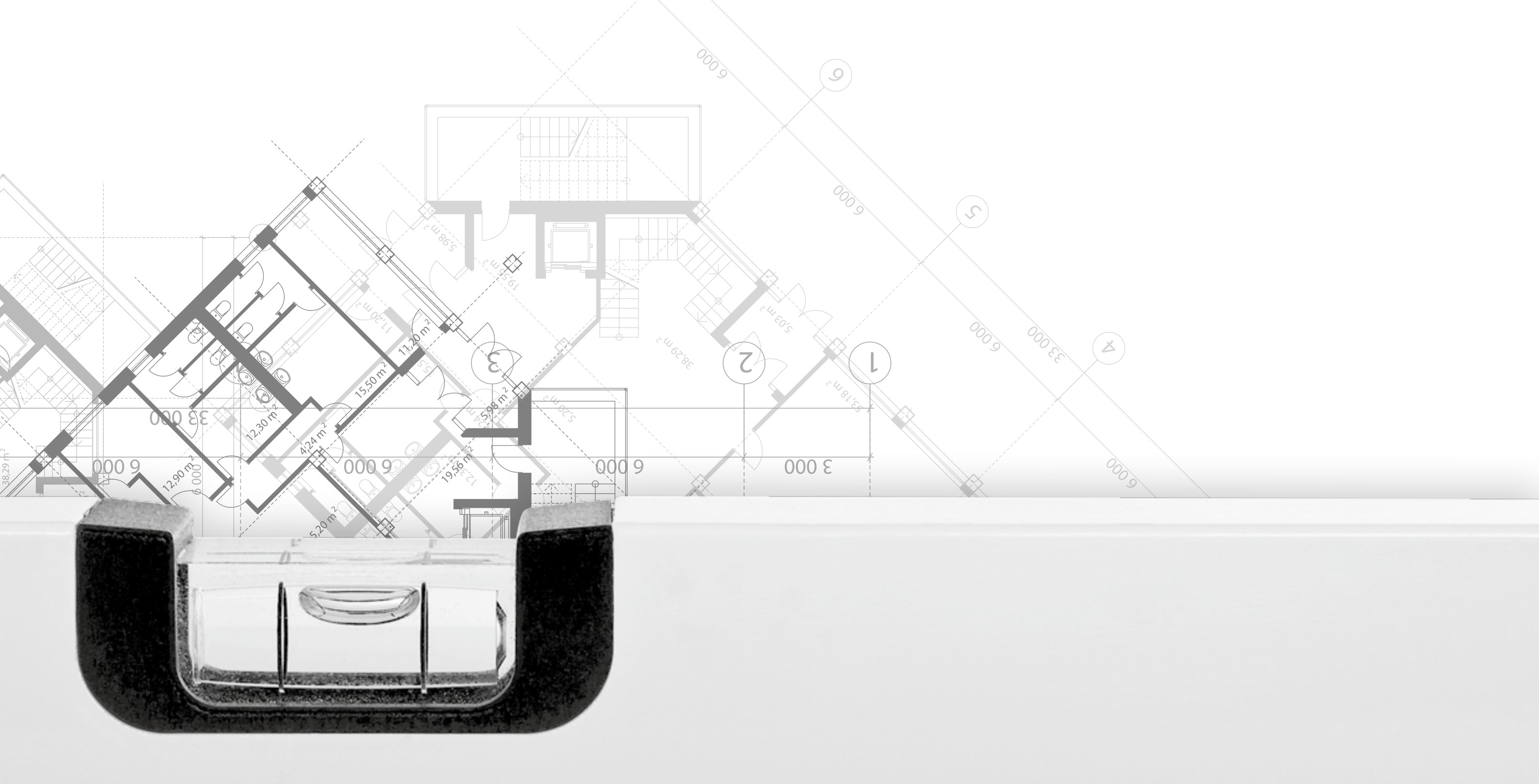


Green building – more than just a roof over one's head

Building sustainably so as to satisfy the needs of the future means more than just having a roof over one's head. Ultimately, it means designing buildings in such a way that they satisfy today's economic, ecological, societal, cultural and urban developmental demands as well as – more importantly – those of the future. In this respect one can list numerous characteristics of a sustainable method of construction: functionality, safety, health, conservation of value, living comfort, architectural aesthetics and lots more. Ecological aspects include questions relating to the conservation of resources and energy efficiency, environmental impact, recyclability of building materials, ease of maintenance and durability. Green building thus starts at the planning stage and has to take the whole life cycle of a building into consideration.

Faced with these differing requirements, aluminium has repeatedly proven to be a modern building material and has made a major contribution to shaping architecture and the building industry – whether it be as a mono-material or in combination with other building materials. Aluminium opens up almost infinite design opportunities for architects, offers an abundance of material properties that meet the needs of the future, and satisfies the most stringent demands when it comes to ecological and climate-relevant matters.

Aluminium offers more than just a roof over one's head, even under extreme conditions; the Monte Rosa mountain hut, which has won an award for self-sufficiency, is shown here.

As the third most abundant element in the Earth's crust, nature's reserves of aluminium are almost inexhaustible. Once aluminium products have entered the production loop, they can be melted down again at the end of their useful life an indefinite number of times without any loss in quality and then processed into new, high-grade products. This closed material loop is already functioning in an exemplary manner today. The recycling rate for aluminium building products is about 96 per cent.

Aluminium – the heavyweight in lightweight construction

When it comes to green building, the functionality of a material is not everything. But without a high degree of functionality, all other requirements would take a backseat. As a constructional material, aluminium is characterised by numerous physical, chemical and technical properties that assign it an outstanding role in the building sector.

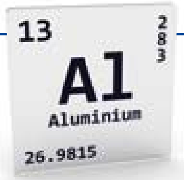
One of aluminium's outstanding properties is its long useful life. Thanks to an extremely thin but strong oxide layer, it is resistant to corrosion and the weather as well as to UV radiation. Especially with long-life objects like buildings, this is beneficial: for one thing, during service components only have to be replaced after a long time, if at all; and for another, it minimises the effort required for service and maintenance. Both of these have a favourable bearing on aluminium's environmental balance.

The aluminium alloys used in architecture exhibit good weathering behaviour even in marine environments and are resistant to seawater, which means that they maintain their mechanical properties and stability even after being exposed for long periods of time. It is possible to optimise these properties in a specific manner by means of surface pretreatment and the use of coatings. By contrast, steel structures like the Eiffel Tower or timber frames that are exposed to the elements need to be painted regularly to protect them against rusting or weathering.

Aluminium is characterised by an excellent strength-to-weight ratio – it is light but nevertheless very strong. This favourable combination offers architects a large amount of design freedom. It means narrower aluminium window frames and curtain walling can be used. The material's high strength also means it fulfils the requirements for intricate yet stable load-bearing structures. Its low density makes it possible to have lighter substructures and components with higher degrees of prefabrication than with any other metal, which ultimately also manifests itself in lower overall costs for the building project. The weight of an aluminium roof is only about 2.5 kilograms per square metre and thus a fraction of the weight of a conventional roof. This means the roof truss of a typical detached house, with about 200 square metres of roof surface, has to support a good two tonnes less weight. In industrial or administrative buildings, these savings mount up rapidly.

Aluminium façade elements offer many benefits – functionally and visually.

Aluminium's good thermal conductivity and its high reflectivity mean it utilises energy and light more efficiently. Aluminium heat exchangers are used in energy-saving ventilation units, aluminium absorber plates capture the sunlight used to heat solar collectors, and aluminium solar shading systems help to air-condition rooms. With



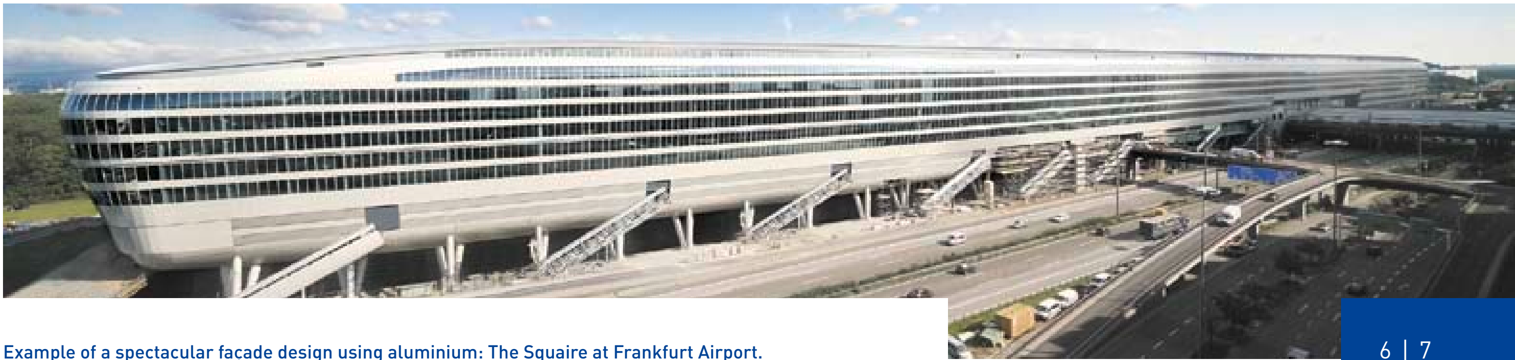
windows, where it is mainly insulating properties that are required, optimised profile design, highly insulating thermal bars and other measures can minimise thermal bridges to such an extent that aluminium is also capable of meeting the most stringent thermal insulation requirements.

Aluminium does not burn, or produce toxic gases or vapours. It is classified as A1, the highest category, in the European classification for the reaction to fire behaviour; this is also the case with colour-coated aluminium. The roofs and outside walls of industrial and commercial buildings are often made from aluminium because it withstands fire for a long time.

The development of new alloys has considerably broadened the range of applications of aluminium in building products and made customised aluminium products possible. Properties such as strength, toughness, corrosion resistance or conductivity can be modified selectively and metal processing (forming, casting or machining) can also be improved. For example, modern extrusion technology now makes it possible to produce a barely imaginable variety of different cross-sectional shapes with integrated functions.

Using multi-alloy technologies, which incorporate two suitably matched alloys in a single sheet, it is possible to achieve higher strength, for example, but with improved formability. This means one can obtain the tightest bending radii in façade elements without cracking. Or façade sheet can have significantly greater spans, which means it needs fewer stiffeners than when conventional alloys are used. Or reflector sheet can have a mirror-finish surface but nevertheless a strong core.
The surface finish on aluminium (brushed, polished or textured; anodised, powder coated or lacquered) permits a diverse combination of colours, contrasts and accents on surfaces and shapes – in short: unlimited creative design. In addition, anodising or coating enhance durability and corrosion resistance.

Aluminium's recycling properties are unbeatable. Whether plain or coated, as sheet, profile or casting, the metal can be melted down and used in new high-grade products an indefinite number of times without any deterioration in quality, regardless of whether the new products are used in buildings or other applications. In addition, aluminium is a unique energy store: remelting aluminium scrap only requires five per cent of the energy needed to produce the metal from its ore. Emissions of climate-change gases are correspondingly low.



Example of a spectacular façade design using aluminium: The Squaire at Frankfurt Airport.

Resource efficiency – keeping an eye on the life cycle

Green building is aimed at the resource-efficient use of building materials and components in order to keep environmental impacts as low as possible without ignoring economic consideration or comfort. When it comes to the life cycle of a building, protecting natural resources means above all using as little land as possible for the building, having a low requirement for resources during the erection and utilisation phase of the building, the building having a long useful life, being easy to maintain, and having a limited need for energy during its life, using renewable forms of energy, and reuse and recycling of the materials used.

When erecting a building, the choice of the building materials used, the manner in which their raw materials are obtained and their method of manufacture are of great importance. However, a holistic approach here has to take into account the end of the useful life, when the building is demolished and the materials are returned to the material loop. The pros and cons of the different building materials have to be assessed and taken into consideration when making decisions relating to planning and investment.

Usually, the utilisation phase plays the dominant role in the life cycle of a building, especially where costs and environmental aspects are concerned. In the European Union, more than 40 per cent of a building's energy requirement is used for heating, cooling, lighting and maintaining the buildings in which we live and work. In order to meet the targets for climate change prevention currently applicable worldwide, this figure has to be reduced by 60 per cent before 2050. Based on the life cycle of a building, this means a large proportion of the energy requirement is due to the use and servicing of the building.

With a utilisation phase of over 40 years, installed aluminium products are also a good source of "raw materials" in the long run.

In this context, efficient utilisation of energy for air conditioning and lighting takes on great importance. The cost of cleaning and maintenance also plays a major role where maintaining the value of a building and its ecological compatibility are concerned. Here, intelligent design, efficient façade structures and good thermal insulation can make just as important a contribution as sunshades, photovoltaic units and thermal solar technology.

At the end of a building's useful life, one has to consider demolition and the recycling and disposal of the building materials. Intelligent refurbishment of buildings also helps conserve resources. An example here is the maxCologne office building in Cologne. This former Lufthansa skyscraper is to get a new building envelope and new building services by 2013. The technical standard and concept for energy efficiency are in keeping with the criteria for green building. The building will not only use less energy but will also utilise energy from renewable resources: ground water will be used to maintain the temperature inside the offices without draughts using heating

This computer simulation shows the exemplary refurbishment of the maxCologne building in Cologne, which is due to be completed in 2013.

and cooling ceilings. The project has already been awarded gold pre-certification by the German Sustainable Building Council (DGNB). The aim is to achieve gold certification on completion of the revitalisation measures.*

If refurbishment is not possible, it is important that the resources used in the construction of the building are made available as far as possible for use by future generations. From a sustainability point of view, landfill is the worst alternative of all. However, it is only possible in the rarest cases to completely reuse building materials without any additional processing. Ultimately, what is important is the recyclability of the building materials and the extent to which they are actually recycled.

Resource efficiency in the aluminium industry means optimising material flows and scrap loops and reducing material losses along the value chain and throughout the life cycle of the aluminium products. In the past years and decades, the European aluminium industry has made great efforts to close material loops in the various markets and applications. Today, the recycling rate for aluminium products in the building sector in Europe is 96 per cent. A significant driving force for this success is aluminium's high intrinsic metal value.

* See also the section "Eco-labelling and certification for green buildings" on Page 16.

Innovative and sustainable – a modern-day material

Art not only inside the museum: with its shiny silvery expanded-metal façade, the building of the New Museum of Contemporary Art is itself a work of art.

In Germany, more than 500,000 tonnes of aluminium a year are used in building projects; in Austria the figure is about 45,000 tonnes and in Switzerland it is some 50,000 tonnes. The range of applications stretches from thermally insulated façades, doors and windows via weatherproof systems for roofs and walls, stable bridge constructions and load-bearing structures, through to interior decoration and the design of living space. Here, aluminium has proven itself to be a green building material that combines energy saving and resource conservation with an architecturally interesting appearance in new buildings and modernisation projects.

Aluminium in architecture is a broad field for façade elements. An unusual façade design confers character and originality on a building. With its shiny, silvery expanded-aluminium mesh façade, a building as modern and representative as the New Museum of Contemporary Art in New York already catches the visitor's eye from a good distance away. The method used to produce the expanded aluminium is resource-efficient: the apertures are produced by making offset cuts in the aluminium and simultaneously stretching them. The mesh of the lattice-like material, which can range from the finest gauze to heavy-duty diamond-shaped apertures, can be produced from sheet or strip and is neither woven nor welded. When suitably coated, expanded-aluminium mesh offers better performance than woven or welded versions.

The façade of a logistics centre in Spreitenbach, Switzerland, is reminiscent of crumpled packaging foil and creates a fascinating visual appearance.

There are countless examples of innovative façade cladding. One façade system is perforated with holes of differing diameters in the profiled sheeting. Besides its creative appeal, this system permits an economical refurbishment of façades to be carried out to improve the visual appearance of unsightly building envelopes or can also act as practical light protection when positioned in front of glass façades.

High-grade anodised aluminium is often used in façades. During anodising, the outermost metal layer is transformed and this produces an artificial aluminium oxide layer on the surface of the sheet or strip, which strengthens the natural oxide layer and thus makes the façade sheet even more corrosion resistant and thus more durable. Anodised aluminium was used, for example, for the large-surface façade cladding of a refurbished student hall of residence in Dresden as well as for the architecturally unusual Arche Nebra information centre at Wangen in Saxony-Anhalt, Germany.

The façade of a logistics centre in Spreitenbach, Switzerland, comprises an undulating aluminium envelope that resembles crumpled foil packaging and is pierced by long glass slits. Similarly exciting is the cultural centre building in the Upper Austrian municipality of Engerwitzdorf. The building catches the eye with its titanium-coloured aluminium envelope whose regular irregularity is like the foil used to wrap chocolate; there are various shades of colour depending on the incidence of the light.

There are now self-cleaning aluminium façade panels available commercially that render dirt and smog particles harmless when subjected to incident solar radiation in the presence of even a small amount of humidity. A titanium dioxide coating acts like a catalyst: electrons are energised by UV light and form free radicals on the surface; these decompose organic substances, such as bird droppings, moss, fumes and smog particles. At the same time, a super hydrophilic (viz. water-loving) and extremely smooth surface is produced. Even when there is only a small amount of rain or dew, the decomposed pollutants simply slide off the building, leaving behind a clean façade. The ambient air is also cleaned: smog is destroyed by the surface, which has a cleaning capacity equivalent to that of some 80 trees.

Bringing colour into everyday life: coloured aluminium cladding panels.

Aluminium is also very useful for carrying out energy-efficient upgrades of windows and façades, for example at the grammar school in Wurzen, Germany. Aluminium profiles were used for the mullion-transom façade and insulated aluminium system profiles were used for the window elements. Together with the use of triple glazing, this enabled the heating costs in this project to be reduced by more than a half. ■

Extrusion can be used to produce any desired profile cross-section with added functions.

Avoiding climate change – keeping an eye to energy saving

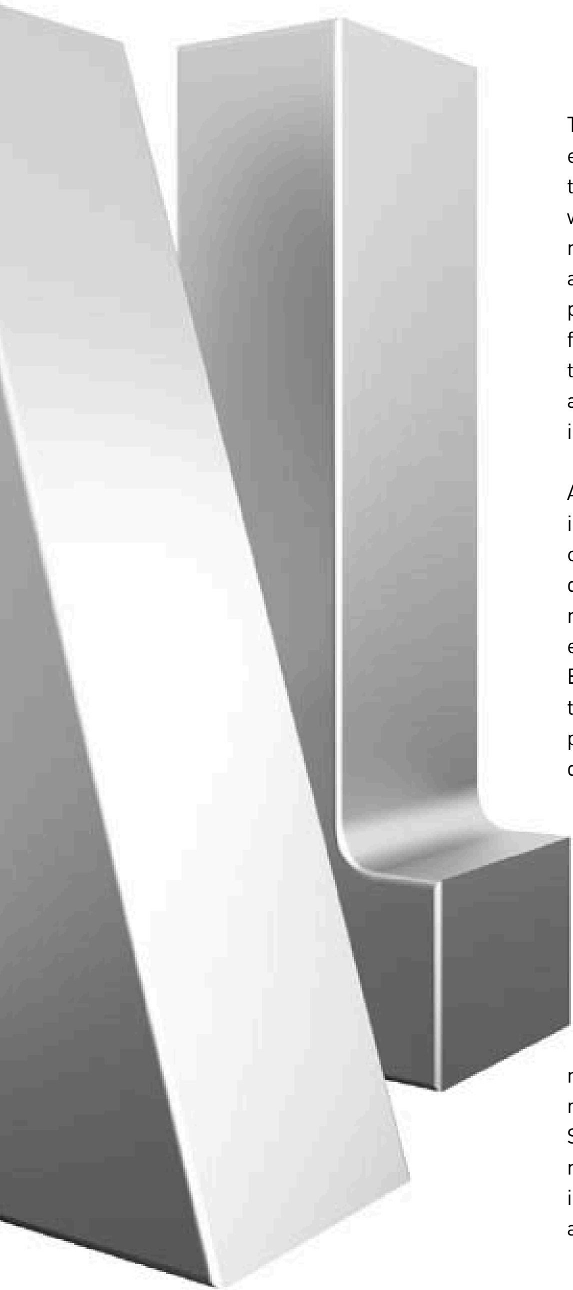
Aluminium structures are highly capable of fulfilling all the important functions of a modern building envelope and enabling façades to be upgraded in an energy-efficient manner in the simplest possible way. If the appropriate overall, modular approaches are adopted, an existing building can be upgraded energetically into a passive house by means of a second skin. It is possible to integrate functions like thermal insulation, solar shading, decentralised ventilation, heat recovery, solar electricity generation and building control systems into modern building envelopes. By combining energy saving and energy recovery, modern and modernised building envelopes that use aluminium can make an important contribution to climate change prevention. In addition, thermal insulation, solar shading and decentralised ventilation help provide more comfort and increase the user value of a building.

Effective solar shading maintains translucency and brightness in rooms without them heating up too much.

Highly translucent, aluminium-glass constructions flooded with light help reduce lighting costs. However, they require effective solar shading in the summer so that the building does not heat up excessively. Modern solar shading units installed on façades, in front of windows, on saw-tooth skylights or on pyramids of light provide optimal results. These systems are made from extruded aluminium profiles equipped with fixed or movable blades arranged horizontally or vertically. Any blade-opening angle is possible. An automatic control system angles the blades in accordance with the position of the sun. In order to satisfy functional requirements, the blades are made from aluminium. Solar shading offers enormous potential for energy savings when it comes to air conditioning a building.

Thermally insulating profiles have been available commercially for a long time and they have been improved continually to meet evermore stringent demands regarding the thermal insulation of buildings. There are now thermally insulating coatings available for extruded aluminium profiles that allow the U-value of a construction to be reduced by up to 30 per cent without having to alter the design of the profile. When powder lacquer is melted, the metal pigments near to the surface become aligned in parallel and this reduces the radiation of heat via the aluminium construction, and thus cuts down heat losses from the building envelope.

Thanks to their greater stability, aluminium window frames can be made narrower and larger than, for example, plastic or timber window frames. This results in either a smaller wall aperture being needed for the window, which reduces the heating required, or the glazed area can be larger.



This also saves on heating because modern low-emissivity glazing has a significantly better heat transfer coefficient than even the most modern window frames. Several system manufacturers now offer aluminium windows that are certified as having thermal insulation that conforms to passive-house standards. The high heat insulation factor is achieved by having an insulation zone that is optimised using foam-filled thermal bars, an extruded centre seal and thermal insulation in the glazing rebate.

Aluminium front doors also offer effective heat insulation. Using thermally insulated multi-chamber profiles as the basis, highly insulated door infill panels are combined with special all-round seals. This minimises draughts very effectively and achieves a high level of comfort. Even when the temperature outside falls to minus ten degrees Celsius, the room temperature is a pleasant 20 degrees even immediately next to the door.

There are versions of thermally insulated aluminium profile constructions available for windows and doors that conform to fire protection regulations. For protection against burglary, there are aluminium doors with security infill and a strengthened aluminium core available, and these are combined with burglar-retardant safety glazing, a lock with multiple locking points and sturdy door frames made from aluminium profiles.

Solar technology is already playing an important role in today's building industry and is contributing to resource-efficient generation of electricity and heat in buildings – in single-family homes and apartment blocks as well as in buildings requiring large quantities of heat, such as hotels, hospitals, retirement homes or indoor swimming pools. Aluminium profiles are often used as lightweight and sturdy supporting structures for solar parks or as frame profiles for photovoltaic elements. The roof of the new main stand at Arminia Bielefeld's football stadium is a unique solar unit. There are 798 solar modules on the roof and these supply about 80,000 kilowatt hours of electricity a year. Together with the solar unit on the south stand, some 15 tonnes of aluminium were used in the supporting structure.

Multiple benefits for spectators and football club: the main stand at Arminia Bielefeld's stadium provides protection against the rain and supplies a large amount of electricity.

Hybrid collectors that combine solar heating with photovoltaic electricity generation in a single unit have been on the market for some years. The frames of these collectors are made from extremely thin gauge, aluminium hollow-chamber profiles that are lightweight but nevertheless extremely rigid and stable. The profiles are supplied anodised with a visually attractive appearance and in addition are characterised by high durability. ■

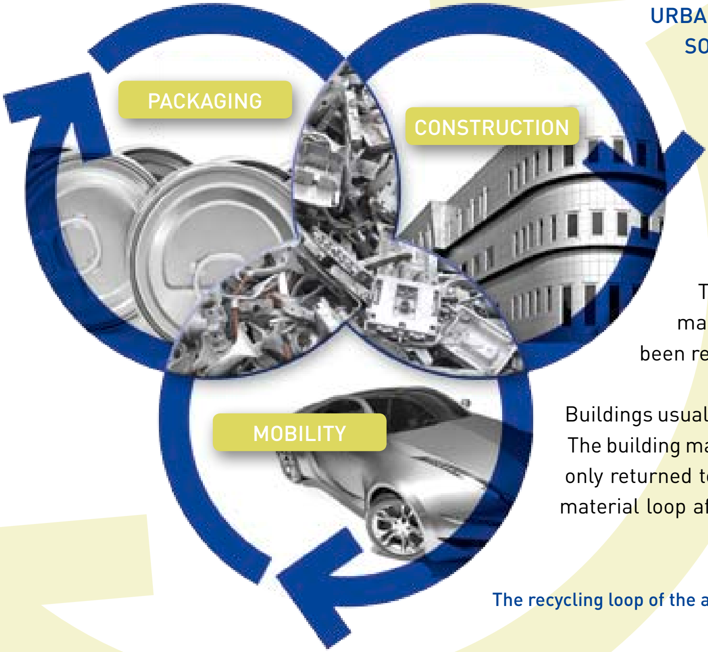
Utilising resources – with aluminium

Lightweight aluminium has an outstanding performance record in matters relating to sustainability, climate change prevention and other areas that influence the ecological footprint. Aluminium products distinguish themselves in particular in two key categories: resource conservation and energy efficiency.

For years, the recycling of aluminium scrap has made a decisive contribution to the supply of raw materials in Europe, where about 40 per cent of the demand for aluminium is now met by recycling aluminium scrap. Since 2002, for example, more aluminium has been produced in Germany by melting down scrap than by production of new metal in alumina-reduction cells.

The production of aluminium in alumina-reduction cells has now ceased completely in Austria and Switzerland. In order to utilise "urban" sources of raw materials more intensively, companies in the sector have invested in expanding recycling capacities and in doing so have resorted to plant engineering that is the benchmark for the rest of the world.

The aluminium industry is well aware of the responsibility it bears for sustainable development and knows that every tonne of aluminium recovered from scrap saves about four tonnes of bauxite ore, about nine tonnes of carbon dioxide emissions and up to 95 per cent of the energy used to extract the metal initially.



The recycling loop of the aluminium pool.

URBAN MINING – BUILDINGS AS SOURCES OF RAW MATERIALS

In the past, the aluminium industry has made great efforts to close material loops. This is evident in the fact that about 75 per cent of all aluminium ever produced is still in use today. The aluminium being used in many applications has already been recycled several times.

Buildings usually have a particularly long life. The building materials and products used are only returned to the economic cycle and the material loop after many decades. A famous example of aluminium that has been in use for more than a century is the church of San Gioacchino in Rome, which was erected in 1897. Its dome is covered in aluminium sheet, which still serves its purpose today without any noticeable signs of material deterioration. In view of the durability of buildings, it is thus not surprising that there are some 200 million tonnes of aluminium tied up long-term in architectural and building products. There is a simple rule of thumb to explain how durability pays off: if a component has to be replaced, its replacement has to be produced anew so manufacturing costs practically double.

Impervious and almost maintenance free for more than a hundred years: San Gioacchino in Rome.

Urban mining will become increasingly more important in the future given the enormous potential that the recycling of materials tied up in buildings has to offer. Urban mining aims to return those resources that are tied up in the infrastructure and products to the economic cycle at the end of their useful lives. These urban stocks of raw materials, which human beings have built up, are thus in complete contrast to classical raw materials, which involve exploration and extraction of metals from earth and rock. The increased use of urban sources of raw materials conserves natural resources lying dormant in the ground for future generations.

The potential for urban raw materials is huge. There are about ten billion tonnes of mineral substances tied up in buildings throughout Germany, and on top of this there are millions of tonnes of ferrous and nonferrous metals. Currently, some 600,000 tonnes of aluminium products a year are supplied to the building sector in Germany, Austria and Switzerland. Because of the long useful lives of buildings, a gigantic raw materials reservoir is being established, which over a period of five decades amounts to about 30 million tonnes of aluminium.

Economic and ecological reason dictates that these resources be recovered after use. There is a recycling rate of 96 per cent in the building sector; this means that nearly all of the aluminium products currently incorporated in buildings will become available again for use in new applications without any loss in quality after decades in service. Because of aluminium's low melting point, the amount of energy required to melt down scrap is only five per cent of that used to produce the aluminium initially. There is a corresponding 95 per cent reduction in emissions of climate change gases compared with primary production of the metal. This is reflected in the positive eco-balance of aluminium building products.

THERE IS A NEED TO CLOSE MATERIAL LOOPS NOT PRODUCT LOOPS

For some years the aluminium industry has increasingly been confronted with demands from politicians and building authorities to close product loops and to specify the recyclate content of products. A larger amount of recycled material in a product is meant to act as proof that a given method of production conserves resources, but this is a rather short-sighted view.

The recycled metal content of a product is not a useful indicator of a resource-conserving method of production. And especially not in a sector like the aluminium industry where the metal's high value means that for economic reasons all scrap collected is already being melted down and turned into new products.

Imagine what would happen if the use of primary aluminium in a specific product were to be restricted because a specified minimum recyclate content had to be used – for example, old window handles had to be used to make new window handles. The primary aluminium supposedly saved would simply be used for other products where otherwise the old window handles would have been used.

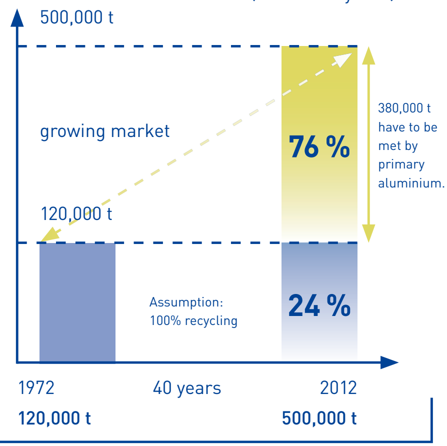
The fact that a building has a long life, and with it the aluminium used there, coupled with the growing demand for aluminium building products means that the scrap market is far from being able to satisfy current and future demand for aluminium building products.

From an ecological point of view it is thus essential that material loops be closed in the widest possible range of applications and thus ensure that resources that have already been used once are made available to the economic cycle and the material loop at the end of their product life. As far as building materials are concerned, only such an end-of life approach will benefit the conservation of resources and support a green building industry.

Given a recycling rate of 96 per cent in the building sector, the aluminium industry can point proudly to the great progress it has already made in this direction. However, there is nevertheless still a need to continue plugging any remaining gaps in the material loops.

BUILDING SECTOR APPLICATION

(Period: 40 years)



Eco-labelling and certification for green buildings

The LTD 1 building in Hamburg, which has been awarded the DGNB's gold seal of approval.

To achieve sustainability in the building industry, instruments and criteria that are transparent and as objective as possible are needed in order to be able to evaluate the performance profile prepared for a building and the building products from a sustainability point of view in a manner that is easily understood. The environmental performance of buildings is determined, amongst other things, using so-called environmental product declarations (EPD) for building products, which take the complete life cycle of a building into consideration – from the production of the materials used through to demolition and recycling. EPDs make statements, for example, concerning the use of energy and resources and about the extent to which a product contributes to the greenhouse effect and other eco-relevant emissions. EPDs thus offer an information base for preparing eco-balances of buildings and are therefore used to certify the sustainability of the buildings.

As part of its EPD activities, the European Aluminium Association (EAA) has developed tools, established criteria and prepared data records that can be used by the manufacturers of aluminium products participating in the programme to prepare reliable environmental product declarations – including declarations for aluminium windows and coated sheet. The EPD software tools take into consideration the most important international environmental standards from ISO. Individual system providers also offer software solutions for creating EPDs that help prepare the certification data.

Various aluminium companies now prepare corporate carbon footprints to determine how much carbon dioxide is released along the process chain related to the manufacture of their products and what savings in CO_2 emissions result from the use of these products in the various fields of application. The results obtained thus far show that aluminium products prevent more carbon dioxide emissions than occur during their production.

SEAL OF APPROVAL FOR GREEN BUILDING

Generally speaking, one can say that although EPDs are an important component in assessing a building, a construction or a building material ecologically, they do not cover all aspects of a green building industry.

The voluntary certification scheme of the German Sustainable Building Council (DGNB), which was prepared in cooperation with the German Federal Ministry of Transport, Building and Urban Affairs, offers a holistic approach to the planning and assessment of green buildings. Gesamtverband der Aluminiumindustrie e.V. (GDA) is a member of the DGNB. Certification schemes based on the DGNB scheme are also being operated in Austria and Switzerland. In order to ensure that there is a comprehensive quality standard, the DGNB approach covers areas that are relevant to green building. Depending on the utilisation profile, the evaluation currently takes into account over 50 criteria covering the topics ecology, economy, sociocultural and functional aspects, technology, processes and location. Where these are met in an outstanding manner, the building receives certification in one of three categories: gold, silver or bronze.

The DGNB seal of approval indicates the positive effects of a building for the environment and society. Even at the planning stage it gives investors the security that a building can achieve the desired performance when it is completed. It quantifies the high quality of a building and helps reduce the energy requirement and costs during the utilisation phase. The award serves as a communication tool for investors, owners and users with which they document their commitment to more sustainability and resource efficiency. It thus improves the prospects for selling or letting and in the case of commercial property it guarantees a top quality working environment for employees and customers.

One of the first buildings to be awarded the DGNB seal of approval in gold was the LTD 1 office building and health centre in Hamburg. The building concept was aimed at utilising every economically feasible opportunity to save energy and to minimise operating costs to a large extent. The façade comprises aluminium-glass modules and all of the materials used exhibit the Blue Angel eco-label. All offices in the building complex are lit by direct sunlight. An outer envelope that is thermally insulated to a high degree, a naturally ventilated double façade, low-energy heating and highly efficient building services ensure demand for primary energy is very small. More than 60% of the façade is transparent and this ensures that there is an optimal balance between passive solar gain in winter and limited heat input in summer.

Another building that has been awarded the DGNB gold seal of approval is the extension to the headquarters of Deutsche Investitions- und Entwicklungsgesellschaft (DEG) in Cologne. Aluminium profiles were used for a part of the modular composite façade. According to DGNB, the seven-storey office building meets ecological and health-related sustainability criteria. The fact that the highest possible energy standards have been achieved is apparent from the buildings low environmental impact due to CO_2, emissions of which are significantly lower than a comparable building.

This building was also awarded the DGNB gold seal of approval: the headquarters of Deutsche Investitions- und Entwicklungsgesellschaft (DEG) in Cologne.

Like the DGNB, the Austrian Sustainable Building Council (ÖGNI) strives to identify and promote ways and solutions that permit green building when it comes to planning, execution and utilisation. Here, the ÖGNI awards precertificates and certificates, makes assessment systems available for different types of building and undertakes independent evaluation of the documents of green buildings submitted by the auditors. The DGNB seal of approval serves as a tool for planning and assessment of buildings.

The Swiss Sustainable Building Council (SGNI) has adopted the DGNB seal of approval for Switzerland. The European DGNB assessment system has been adopted in line with the situation in Switzerland and Swiss standards and guidelines.

Aluminium – building material for the present and the future

Futuristic appearance combined with ecological compatibility: the aluminium roofs and façades of these floating houses are the optimal solution for aggressive seawater.

Modern architecture has a marked impact on a town's appearance. An elegant streamlined appearance, an unusual façade design or decorative surfaces bestow an unmistakable form to a building. This does not only apply to prestigious monumental structures. The choice of the building materials used also contributes to the impression a building makes.

Generally, a building has to be appealing, commercially viable and sustainable. As a building material, aluminium fulfils these basic principles unreservedly. It is characterised by its aesthetics, functionality and resource efficiency and plays an important role in the sustainability of new buildings and the modernisation of old ones. In this connection, one should highlight the impressive durability of aluminium building products.

One of aluminium's additional strengths is the ease with which it can be recycled. Time and time again the metal can be melted down and turned into new high-grade products without a large amount of energy being required, and is thus available to benefit future generations. In building products, aluminium makes a significant contribution towards improving the energy balance of a building. Both aspects, ease of recycling and beneficial use of energy are key factors when considering the life cycle of a building.

As a building material, aluminium has been proving itself for decades, but new developments relating to alloys and process technologies coupled with improvements related to structural engineering are forever opening up new fields of application for products made from and with aluminium. This metal has not exhausted its innovative potential by a long way.

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Alliance for Aluminium
Germany - Austria - Switzerland

Germany (D), Austria (A) and Switzerland (CH) have a long common tradition when it comes to aluminium. They have a combined population of almost 100 million, of whom some 95 per cent have German as their mother tongue. D-A-CH is thus a huge market and German is the largest language group in Europe.

This has prompted us to work closer together with the common aim of taking advantage of synergies whenever possible.

The brochure *Planning for the Future – Building with Aluminium* is the result of this collaboration. The initiators of the DACH alliance are:

- GDA (Gesamtverband der Aluminiumindustrie e.V.), Germany
- Fachverband der NE-Metallindustrie, Wirtschaftskammer Austria
- alu.ch (Aluminium-Verband Schweiz) Switzerland.

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