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SUSTAINABILITY OF THE EUROPEAN ALUMINIUM INDUSTRY 2010

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INTRODUCTION

The aluminium industry – a sustainable industry for future generations

The European Aluminium Association (EAA) and its member companies launched in 2002 a pioneering exercise: a list of 34 measurable Sustainable Development Indicators (SDIs) was identified in collaboration with the UNEP/Wuppertal Institute Collaborating Centre on Sustainable Consumption and Production (CSCP), the University of Versailles and an additional peer group of internal and external stakeholders, with the clear intention to monitor their evolution over time and to report it publicly.

The reason for this choice is simple: aluminium is one of the best performing and most sustainable materials, thanks to its unique properties including recyclability and the industry is ready to support this statement with quantitative and qualitative evidence.

This pragmatic and transparent approach has encouraged the entire European aluminium industry, from large integrated companies to small and medium sized ones, to participate in the survey and to track its progress in the field of sustainability.

The data published in 2004, 2006 and in the present report clearly show a committed industry making improvements in many areas, such as reduction of environmentally damaging emissions and natural resource use, improvement of workers safety and training, recycling rates and more. This set of results shows important positive trends, despite the recent economic crisis which had a severe impact on our industry.

In addition, with the aim to better reflect the state of our industry and to promote a holistic approach, the 2010 report includes for the first time additional qualitative and quantitative indicators for the main applications of aluminium: automotive & transport, building and packaging. These additional indicators were identified through a transparent consultation process, which involved two stakeholder workshops jointly organised with the UNEP/Wuppertal Institute Collaborating Centre on Sustainable Consumption and Production (CSCP).

Decoupling growth from environmental and social impact is the driving principle behind a successful sustainable development strategy. Progress needs to be benchmarked and interpreted within the context of internal and external business opportunities and constraints. Reliable measurement is essential to guarantee continued monitoring, careful evaluation, committed implementation and tangible results. These are the cornerstone principles behind the European aluminium industry's SDIs report.

The aluminium industry - essential to meet EU 2020 targets

In March 2010, the European Commission launched its growth strategy for the coming decade(*). In particular, the EU aims to encourage a growth which is smart (i.e. fostering knowledge, innovation, education and digital society), sustainable (i.e. making our production more resource-efficient while boosting our competitiveness) and inclusive (i.e. raising participation in the labour market, the acquisition of skills and the fight against poverty).

EAA and its members are fully committed to facilitate - in the relevant fields of activity - the achievement of these welcome objectives.

Aluminium is experiencing an increasing success in industry sectors as diverse as automotive, mass transport, building and packaging. The increasing demand, both from professional and private consumers, demonstrates the utility of aluminium in everyday life and the increasingly important economic contribution made by the aluminium industry.

An estimated 255 000 people are directly employed in the aluminium value chain, of which 33 000 are in metal supply (alumina, primary aluminium and recycling) and 222 000 in the downstream activities (rolling, extrusion, castings, foil, wire rod, finishing, etc.). In addition, many more people are employed in indirect services and in aluminium fabrication for end-user industry sectors. Thus, the whole aluminium value chain provides employment for more than one million people in Europe.

Even in the digital age and in the era of knowledge and services, manufacturing industries remain an essential foundation of the economy. Apart from providing a substantial part of Europe's employment and economic output, manufacturing industries are also fundamental to the provision of the infrastructure and equipment through which knowledge is developed and transferred, services are invented and provided. Industry supplies the essential hardware on which the whole software of the digital economy operates.

Europe's industry is in fierce competition with every other region of the world. Therefore, the competitiveness of European industries can only be measured against the benchmark set by their global competitors. Costs imposed by significantly divergent policies threaten Europe's ability to invest in the development and innovation of its base industries and their downstream products, thus running the risk that the whole continent could become a regional follower instead of a world leader of global trends.

An indispensable condition for allowing the European aluminium industry to keep increasing its efficiency, and continuously contributing to the overall objective of a sustainable society, is to preserve its competitiveness, which is under serious threat.

High energy prices and decreased availability of some alloying elements and scrap are putting strong pressure on our sector. The deteriorating cost position of the European primary aluminium industry and the increasing reliance on imported metal is leading to the progressive migration of the European aluminium industry to other regions of the world.

As widely known, the price for aluminium, as for other non-ferrous metals, is determined globally on the London Metal Exchange (LME). On the other hand, the structure of the production costs for aluminium is mostly local with the exception of raw materials, whose price is usually determined with a reference to the LME prices.

(*) More information at http://ec.europa.eu/europe2020/index_en.htm

However, aluminium producers located in other competing regions do not bear the costs of the EU Emissions Trading Scheme, hence these costs are not included in the LME price. European producers of aluminium, who indeed have to bear these costs, cannot pass them on to their customers and as such suffer a cost disadvantage compared to their non-European competitors, resulting in the potential for carbon leakage(*). The same reasoning is valid for all other regionally imposed costs, and similar effect is experienced by other non-ferrous metals like copper and zinc.

Europe's economy will only manage to be "connected and greener" if it can remain "competitive" in the first place. Industry is at the core of this competitiveness, and it is the responsibility of the European authorities' to ensure that it can be preserved. Notably, the commitments endorsed unilaterally by Europe to pursue our environmental objectives must be shared in a fair, transparent and proportionate manner, and each industry sector has to bear its fair share of the burden in Europe but also globally.

The Commission's Europe 2020 Strategy acknowledges for the first time the need for a fresh approach to Industrial Policy(**) by presenting it as a flagship initiative.

EAA welcomes this initiative and the stronger commitment by the European institutions in developing a comprehensive industrial policy fully integrated with other key policies such as Energy, Environment and Trade. The aluminium industry is confident that the new EU industrial policy currently under development will facilitate the recovery of its competitiveness and allow European industry to compete effectively and successfully face global challenges.

(*) Effect of the relocation of industrial activities to countries with a less stringent legislation on the emissions of greenhouse gases

(**) More information at http://ec.europa.eu/enterprise/policies/industrial-competitiveness/industrial-policy/index_en.htm

Social Responsibility - caring for employees, partners and communities

As well as highlighting the contribution of aluminium and the aluminium industry to employment and social progress in Europe, this sustainability report also includes data on health & safety and community relations. The trends show improvement in reporting from both a safety and environmental perspective. In its role as an integral part of European society, especially on a local level, the aluminium industry is continuously involved in a variety of community activities ranging from neighbourhood programmes to community health initiatives. Communities are about partnerships and working together, accepting responsibility and living up to one's role within the local community. The indicators clearly show an aluminium industry behaving as a responsible partner in society.

Furthermore, EAA is firmly committed in the field of education. Educational activities are mainly designed to promote the sustainable use of aluminium across Europe, and various projects are developed for both the general public (e.g. schools, consumers) and the technology experts (e.g. designers, architects).
With the help of its members, EAA aims to transfer and disseminate knowledge and best practices, mainly focussing on:

- The development of a European educational network,
- The promotion and the creation of modern web-based educational materials.

In this respect, it is worth mentioning here that in 2006 and 2007 the EAA's "AluMatter" initiative, an interactive e-learning tool, received an award for best practices supporting European cooperation in Vocational Education & Training (VET) under the EU Leonardo da Vinci's programme.
Other educational activities and projects are presented in this report in the chapter dedicated to aluminium in use.

Sustainability in a product life-cycle perspective

Ideally, sustainability should be assessed throughout the product life cycle. Hence, one of the major objectives of the European aluminium industry is to maximise the sustainable performance through all stages of an aluminium product's life cycle from production to use and subsequent recycling.

As a frontrunner in the area of Life Cycle Assessment, the European Aluminium industry has for many years developed the various environmental datasets needed to assess the environmental impacts of aluminium products on their whole life cycle. In order to further strengthen this pioneering role, the European Aluminium Industry has now introduced in this new report a series of sustainability indicators addressing directly key applications. The publication of such product-related sustainability indicators clearly demonstrates the commitment of the industry to strive for more sustainable aluminium processes and products.

Recyclability is one of the key attributes of aluminium, with far reaching economic, ecological and social implications. More than half of all the aluminium being produced in the European Union (EU27) originates from recycled raw materials and the trend is on the increase. In view of growing demand, Europe has a huge stake in maximising the collection of all available aluminium and developing the most resource-efficient scrap treatments and melting processes. The high value of aluminium scrap and the excellent physical characteristics of the material are the main drivers for recycling, which can be further optmised by legislative or political initiatives. Efficient recycling is key to the sustainability of the aluminium industry.

Way forward: an invitation to dialogue

EAA and its member companies are willing to continue in a constructive dialogue with all the relevant stakeholders, and will welcome comments and suggestions on this new sustainability report. By doing so, we will be able to present the next edition of the report with further refinements, if needed, and a proven track record of improved performance on all the major sustainability aspects of our industry.

EAA SUSTAINABILITY MISSION STATEMENT

The European Aluminium Association and its member companies are committed to pursuing the principles of Sustainable Development, i.e. “meeting the needs of the present, without compromising the ability of future generations to meet their own needs”.

This means remaining a competitive and growing industry, while:

- Meeting the needs of modern society and creating value by offering aluminium products with unique properties, including recyclability;
- Reducing the environmental impact of our production processes and that of our products through their life cycle;
- Demonstrating our social responsibility towards employees, customers, suppliers, local communities and society as a whole;
- Achieving continuous progress through the sharing of best practices and regular indicator-based reporting;
- Encouraging member companies to work along the lines of international environmental and social conventions, such as the UN Global Compact.

NOTE TO THE READER

Production of aluminium

a) The list of indicators

In order to improve the reporting, the list of indicators presented here has been further improved from the 2006 EAA Sustainability Report. Some flexibility is necessary to keep the reporting dynamic and always in line with the evolution of the industry and the overall context in which it operates.
More in detail:

- The indicators of the total use of aluminium, of the metal balance and of the net imports have been added
- The indicators for greenhouse gas emissions and energy consumption are now referred to specific processes, in order to provide more detailed information
- The indicator regarding the plant certifications has been simplified, and the one on "Severity Rate" in the Health and Safety section was removed, due to the fact that companies tend to consider the Total Recordable Incidents as the most reliable and meaningful indicator on safety.

In addition, the order and grouping of some indicators has been streamlined to simplify the reading.

b) Geographic coverage of the indicators

In order to improve the comparability of the indicators over time, and to take into account the enlargement of the European Union, all the figures in the production phase section of the report refer to EU27+EFTA (i.e. Norway, Iceland, Switzerland and Liechtenstein), unless otherwise stated.
Hence the figures reported here may differ from those in the previous report, although the trends and evolution over time are substantially unchanged.

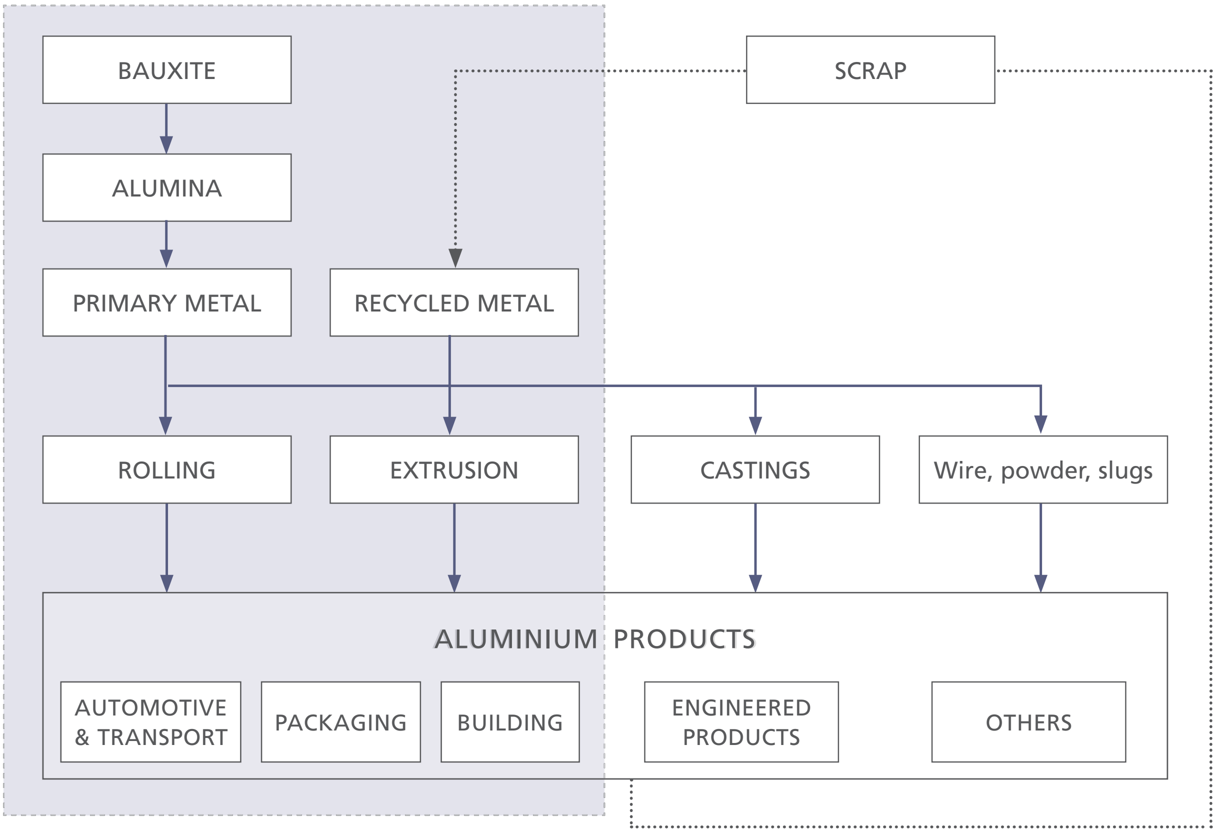
Indicators in section 9 – Resource Use at Global Level - refer to a wider geographical area since most of the bauxite used in Europe is imported.

c) Vocabulary

It is understood throughout this report that:

a. **Alumina and metal production**
   = alumina, primary and recycling
b. **Semi-fabrication**
   = rolling and extrusion
c. **Aluminium industry**
   = alumina, primary, recycling, rolling and extrusion

The highlighted area in the chart below indicates the boundaries of this exercise.



- For the cases in which the available data were not sufficient to calculate an indicator, figures are replaced by L.D. = Limited Data. The threshold used was a response rate of one third.
- Furthermore, wherever an indicator was not calculated for a specific year, the figures are replaced by n.a. = not available.

d) Response rate

The Response rate is the percentage of production generated by companies who responded to the questionnaire. This is calculated for each industry sector and for each indicator in comparison to the total production in EU27+EFTA.

In the Annex to this report you can find all the results of the SDIs and the respective response rates.

e) Scaling up

Wherever relevant, the information on the economic and social data submitted by the companies through the EAA questionnaire has been scaled up to represent the industry total in EU27+EFTA.

The scaling up factor, for each indicator, was the ratio of the total production in EU27+EFTA for the relevant production process, divided by the cumulative production of the companies which provided information on that specific indicator.

This calculation was possible thanks to the collection of the total aluminium production data in Europe which EAA performs annually.

f) Caution

The data in the tables should be read keeping in mind the response rate to each question.

In any case, the environmental SDIs provided in this document are not intended for LCA purposes. More detailed numbers and guidance on LCA can be found in the Environmental Profile Report published by EAA and publicly available on its website.

Aluminium in use

As already mentioned in the introduction to this report, the extension of the scope of the EAA Sustainability Report to the use of aluminium can be considered as a pioneering exercise. No other major industry has done anything similar in the past, and as a consequence, no benchmark is available at the moment to compare methodologies and results.

For this reason, the EAA organised a process to develop the list of indicators reported in the following sections, involving stakeholders and experts active in the field of sustainability, with the coordination of Pré consultants and UNEP/Wuppertal Institute Collaborating Centre on Sustainable Consumption and Production (CSCP).

The draft indicators for automotive & transport, packaging and building applications were presented and discussed in two subsequent workshops. The final choice on the relevant indicators was then made taking into account the outcome of these meetings, as well as the specific characteristics of each application.

For the automotive & transport section, the selected quantitative indicators were calculated on the basis of the latest available figures, which in some cases are gathered and published by some third-party organisations, e.g. the European Commission. In addition, qualitative indicators were included to describe the benefits of the use of aluminium for the transport applications.

For the packaging section both quantitative and qualitative indicators were identified. The former were calculated on the basis of both historical and latest available figures from the industry, while the latter represent the educational activities carried out in Europe, aimed at informing stakeholders about aluminium's properties and the importance of collecting and recycling end-of-life aluminium products.

Finally, it was soon apparent that the positive impact of aluminium applications in buildings is better represented by qualitative indicators. Indeed, a building is an extremely complex system, and is normally designed, certified and assessed as a whole, as the overall performance is not simply the sum of the individual components.

In future issues of the EAA Sustainability Report, the relevance of these indicators will be reassessed, with the aim of providing an improved and transparent overview of the main applications of aluminium, from a sustainability perspective.

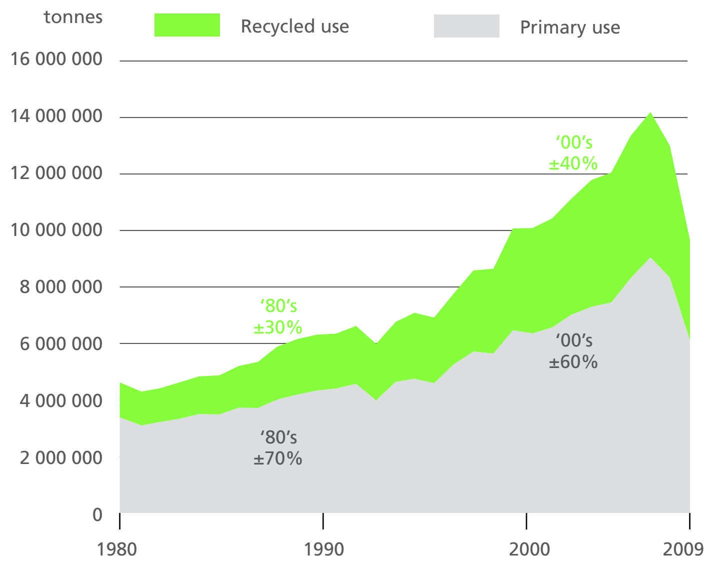
Sustainable Development Indicators

PRODUCTION OF ALUMINIUM

1. USE OF ALUMINIUM

Over the last 30 years, the aluminium market has increasingly expanded in Europe. This trend can be explained by the specific properties of aluminium, which are more and more making it the material of choice for engineers and designers as well as consumers, to fulfil the needs of society.

1.1. Total Use of Aluminium in Europe



This first indicator represents the best possible estimation of the evolution of the use of aluminium in Europe.

During the past 30 years, the supply of recycled metal used in Europe increased from about 30% to about 40% of the total. Due to its intrinsic value, all the available scrap is recycled, which demonstrates the aluminium industry's engagement in recycling.

However, it is also evident that the recycled metal alone is not sufficient to cover the demand for aluminium; hence European primary production is still necessary to satisfy the increasing demand for aluminium in Europe.

1.2. Aluminium Use per Capita

		EU15 +EFTA	EU27 +EFTA
		kg/person	kg/person
Aluminium use per capita	1997	19,3	n.a.
	2002	23,5	n.a.
	2005	26,0	23,1
	2008	27,2	25,2

This indicator shows the average use of aluminium for each European citizen.

The average use of aluminium, in the EU15 +EFTA region, grew steadily from 1997 to 2008, registering an impressive 40% increase. The positive trend is also evident when including the 12 countries which joined the EU since 2004, despite their lower per capita use.

2. PRODUCTION

An increased supply of both primary and recycled aluminium is needed to serve the growing demand for aluminium products in Europe.
Although the European aluminium industry has increased its primary production and recycling production, the growth rate has not been enough to meet the increasing demand. The EU policy-imposed high cost structure, mainly related to the energy market, renders new investments in primary production non-competitive with production in other parts of the world. Consequently, increased demand is being met by higher imports rather than increased domestic primary aluminium production.

2.1. Total Production

European aluminium production grew from 1997 to mid-2008, however the aluminium industry was strongly affected by the economic downturn, and experienced significant volume reductions in 2009 compared to 2008 for all its sectors.

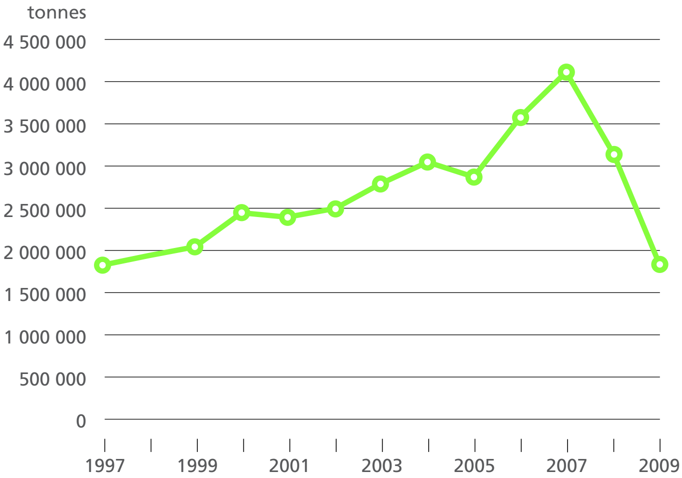
In particular, alumina production fell by more than 30%, primary production by 20%, and rolling and extrusion by 18% and 22% respectively.

		Production kt
Alumina	1997	6 096
	2002	6 756
	2005	7 626
	2008	6 997
	2009	4 748
Primary	1997	3 732
	2002	4 426
	2005	4 941
	2008	5 186
	2009	4 091
Rolling	1997	3 770
	2002	4 036
	2005	4 327
	2008	4 294
	2009	3 514
Extrusion	1997	2 234
	2002	2 645
	2005	3 005
	2008	3 080
	2009	2 394
Recycling*	1997	2 807
	2002	3 889
	2005	4 600
	2008	4 700
	2009	3 520

**The figures for recycling include: refiners production and scrap intake of remelters, excluding inhouse remelting. The geographic coverage is EU25 until 2002, EU27 for the remaining years.*

The above figures for recycling do not include the remelting of internal scrap. However, the aluminium industry is committed to make use of all the available scrap, due to its intrinsic value. This commitment, supported by increased investments in aluminium recycling capacity and increased aluminium scrap collection, generates significant environmental benefits for the industry as a whole.

2.2. Net Imports



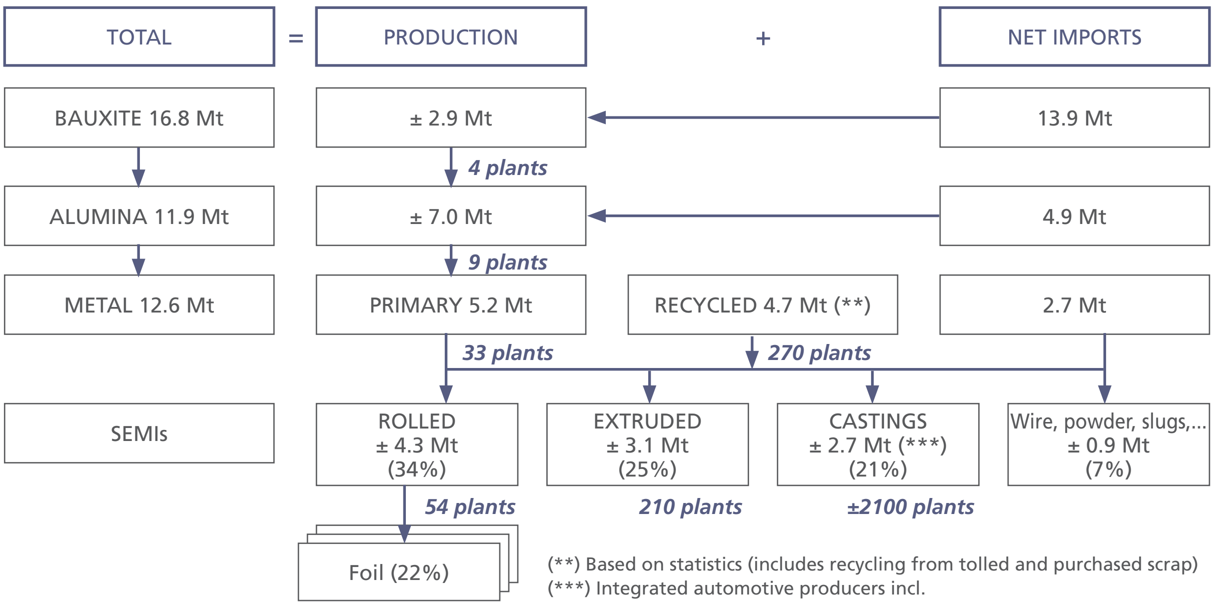
The graph represents the evolution in time of the net imports of unwrought aluminium (HS trade code 7601[(*)]).

The graph shows that the imports to EU27+EFTA of unwrought aluminium, mainly coming from primary production, are significant, with an increasing trend from 1997 which peaked in 2007. Subsequently, the net-imports fell sharply until 2009, when they reached a level lower than 1997.

(*) 7601 is the Harmonised System trade code for unwrought aluminium, alloyed and not alloyed

2.3. Metal Balance

The following flow-chart gives, with reference to 2008, an indication of the metal balance in EU27+EFTA, in terms of production and imports, which supplies the demand for aluminium identified in the previous section.



(**) Based on statistics (includes recycling from tolled and purchased scrap)
(***) Integrated automotive producers incl.

3. PLANT CERTIFICATION

In order to demonstrate its commitment to quality and transparency, the aluminium industry is adhering to international certification systems.
For the purpose of this report, the ISO 14000 standard on environmental management systems and the international OHSAS - Occupational Health & Safety Assessment System - were selected.

Voluntary plant certifications based on production continued to grow as identified in the previous report, and shown by the figures for both 2008 and 2009. ISO 14000 certification is now applied by 91% of the European aluminium industry, while the certification on occupational health and safety has been obtained by 78% of the industry.

		ISO 14000	OHSAS
Alumina and Metal Production	1997	15%	4%
	2002	60%	5%
	2005	83%	41%
	2008	94%	67%
	2009	96%	68%
Semi-fabrication	1997	14%	0%
	2002	62%	5%
	2005	79%	31%
	2008	85%	82%
	2009	88%	84%
Aluminium industry	1997	15%	2%
	2002	61%	5%
	2005	80%	35%
	2008	88%	76%
	2009	91%	78%

4. REVENUES AND INVESTMENTS

Continuous investments and new R&D investments are fundamental to ensure the sustainability of the aluminium industry in the medium to long term. To ensure a future for the aluminium industry in Europe, the right level of security for investment has to be created through constructive policies and incentives.

		M€
Alumina and Metal Production	1997	12 265,1
	2002	15 463,8
	2005	15 972,9
	2008	17 378,9
	2009	10 538,9
Semi-fabrication	1997	16 687,5
	2002	19 731,2
	2005	19 676,3
	2008	22 572,9
	2009	15 658,9
Aluminium Industry	1997	28 952,6
	2002	35 195,1
	2005	35 649,2
	2008	39 951,8
	2009	26 197,8

4.1. Total Revenues

This indicator shows the total revenue for companies in the selected year, expressed in million Euro per year. The revenue is calculated here as the total revenue for all plants in all sectors considered in the survey, without any subtractions of adjustments between sectors (i.e. no consolidation).

Revenues are a combination of volumes and prices, and in particular for metal production they are a combination of volumes and prices driven by the London Metals Exchange (LME) prices, which reflect the worldwide balance of supply and demand. Volumes increased steadily until 2008, and prices peaked in 2007 – 2008. In 2009, on top of the previously mentioned 20% volume reduction compared to 2008, the metal production industry suffered from an average decrease in LME by 35% in $ and 32% in €.

4.2. Value Added

The value added is calculated as the difference between the total revenue of a company or a plant and the cost of energy and raw materials – expressed in million Euro per year.

For the aluminium industry as a whole, the decrease in added value between 2008 and 2009, after a positive trend recorded since 2002, can be estimated at 4.5 billion euros. When expressed in percentage, i.e. 35%, it is in line with the decrease registered for the revenues.

However, as in the case of revenues, the alumina and metal sectors, and in particular primary production, were more affected by the crisis than semi-fabrication, registering a decrease of 51% compared to only -26% for the semi-fabrication.

		M€
Alumina and Metal Production	1997	L.D.
	2002	3 670,8
	2005	4 477,8
	2008	4 676,5
	2009	2 288,8
Semi-fabrication	1997	L.D.
	2002	5 219,4
	2005	6 746,1
	2008	8 414,7
	2009	6 242,5
Aluminium Industry	1997	L.D
	2002	8 890,2
	2005	11 223,9
	2008	13 091,2
	2009	8 531,2

4.3. Capital Investments

As indicated in the previous report capital investments (excluding investments for acquisitions) were used as an indicator for the first time in 2005 in place of taxes, due to the variability of the latter on a country to country basis.

The European aluminium industry significantly increased its investments between 2005 and 2008, but investment declined during the subsequent economic crisis.

An additional item to consider in the decrease of capital investment is the uncertainty created by the planned extension of the scope of the EU Emission Trading Scheme for carbon dioxide, in which the aluminium industry will be included from 2013 onwards.

		M€
Alumina and Metal Production	1997	na
	2002	na
	2005	589,4
	2008	708,4
	2009	328,9
Semi-fabrication	1997	na
	2002	na
	2005	693,1
	2008	926,4
	2009	549,0
Aluminium Industry	1997	na
	2002	na
	2005	1 282,4
	2008	1 634,9
	2009	877,8

In the absence of a global agreement on climate change, imposing similar costs on competing regions, the EU aluminium industry requires the full exercise of the provisions in the ETS Directive, intended to limit carbon leakage. Unfortunately, the mechanisms to provide financial compensation for the cost of CO_2 in electricity have not been defined yet. As, currently, this amounts fully to 10 per cent of the selling price and could easily be double that amount in 2013, the industry will continue to drain primary production until the promised compensation is provided.

4.4. R&D Expenditure

		M€
Alumina and Metal Production	1997	L.D.
	2002	107,1
	2005	148,7
	2008	147,1
	2009	142,7
Semi-fabrication	1997	L.D.
	2002	159,3
	2005	98,3
	2008	102,7
	2009	104,0
Aluminium Industry	1997	L.D.
	2002	266,4
	2005	247,0
	2008	249,8
	2009	246,7

This indicator represents the total annual amount spent by the European aluminium industry for both in-house and externally funded R&D, expressed in million Euro per year.

Despite the strong economic downturn of 2008-2009, the European aluminium industry remained committed to innovation and continues to spend ~250 M€ per year for both in-house and outsourced R&D.

4.5. R&D People Employed

		# persons
Alumina and Metal Production	1997	L.D.
	2002	622
	2005	959
	2008	741
	2009	688
Semi-fabrication	1997	L.D.
	2002	974
	2005	678
	2008	679
	2009	645
Aluminium Industry	1997	L.D.
	2002	1 595
	2005	1 637
	2008	1 420
	2009	1 334

This indicator represents the total number of persons directly employed in R&D by the European aluminium industry.
The European aluminium industry employs more than 1 300 people for its in-house R&D activities.
This figure appears to be decreasing slowly over time. In fact in the last few years the major global aluminium producers have been through a considerable amount of industry consolidation and acquisition, which in various cases caused the R&D activities to be centralised outside of the EU. Furthermore, industry is working more and more in R&D and innovation networks, leading to an increasing percentage of R&D funding going to external agencies.

5. EMPLOYEE DEVELOPMENT AND RELATIONS

The European aluminium industry, considering the sectors of alumina refining, primary and secondary smelting, rolling and extrusion, employs directly around 90 000 people. When accounting for the workforce for other activities not listed here, i.e. casting, foil, wire rod, finishing, the number of direct European jobs linked to the aluminium industry reaches an estimated total of 255 000.

5.1. Total Number of Employees

This indicator reports the total number of people directly employed in the industry, excluding contract workers.

During the economic crisis, the industry used various measures (e.g.: reduction of the overtime, introduction of more flexi-time) in order to retain the maximum possible in-house trained personnel: as a result, the 7,5% reduction in workforce from 2008 to 2009 is much less in proportion to the production volume loss of 20% in the same period.

		# persons
Alumina and Metal Production	1997	32 450
	2002	31 051
	2005	29 614
	2008	28 235
	2009	25 932
Semi-fabrication	1997	57 101
	2002	60 901
	2005	57 960
	2008	67 367
	2009	62 534
Aluminium Industry	1997	89 551
	2002	91 952
	2005	87 574
	2008	95 602
	2009	88 466

5.2. Training Performance

This indicator is calculated as the average number of hours for job-related training per person and per annum.

The European aluminium industry significantly increased its investment in employee training between 1997 and 2008. As a consequence of the economic crisis, this effort decreased by 10% in 2009 versus 2008. This decline was much less than the volume decrease and demonstrates the ongoing commitment to people development within the aluminium industry.

		hours per year per person
Alumina and Metal Production	1997	19,9
	2002	35,9
	2005	31,7
	2008	28,5
	2009	28,7
Semi-fabrication	1997	13,5
	2002	19,3
	2005	28,0
	2008	33,4
	2009	29,4
Aluminium Industry	1997	15,8
	2002	24,9
	2005	29,2
	2008	32,0
	2009	29,2

Regarding the trend for alumina and metal production, it should be noted that the total number of employees has reduced since 2002, and this also implies that less new workers have been hired. Hence, an increasing proportion of the current workforce has received greater training, in comparison to previous years.

5.3. Wage Level

This indicator shows the average aluminium industry wages compared to national average for workers (blue collar in manufacturing industries, excluding managerial and technical/ commercial staff).

Value is expressed in % of average calculated at the national level in manufacturing industries and aggregated to a European level according to the number of employees at each plant.

The data for alumina and metal production show a workforce paid roughly 6,4% above national averages, even during the very low year of 2009 for the manufacturing industry in Europe.

		% of EU average
Alumina and Metal Production	1997	L.D.
	2002	112,0%
	2005	112,8%
	2008	108,1%
	2009	106,4%

It is worth noting that the inclusion after 2005 of some smelters located in new member states, with a flatter compensation system, brought the European aluminium wages nearer to the average.

The response rate for the semi-fabrication data, and consequently for the aluminium industry as a whole, remained under the threshold hence it was not considered as sufficient to draw reliable conclusions.

6. HEALTH AND SAFETY

The aluminium industry in Europe has clearly put a great deal of emphasis on the prevention of accidents in the workplace. The figures show clearly improved results endorsing the industry's commitment to provide a safe workplace for all employees.
The aluminium industry considers the target of "zero fatalities" as a must for a responsible and sustainable industry. Hence, all possible efforts are being put into fatality prevention programs, in order to achieve this important goal.

6.1. Total Recordable Incident Rate

Total Recordable Incident Rate (TRI) is the total number of fatalities, lost time accidents, restricted work cases and medical treatment cases (*) per million hours worked.

Continued strong investments in safety by the industry and good communication and training programs led to a 82% reduction in TRI rate over the 12 last years. It has to be noted that this strong focus on safety didn't stop even during the recent economic crisis, as evidenced by the 2008-2009 improvement.

(*) A lost time incident is an accident where the employee is away from his/her normal workstation for one working day or more following the accident. A medical treatment case is an incident following which the employee can go back to the regular workplace after treatment.

		Rate
Alumina and Metal Production	1997	33,4
	2002	27,4
	2005	9,4
	2008	9,0
	2009	8,3
Semi-fabrication	1997	34,1
	2002	18,9
	2005	12,4
	2008	6,0
	2009	5,0
Aluminium Industry	1997	33,8
	2002	22,0
	2005	11,3
	2008	7,2
	2009	6,2

6.2. Lost Time Incident Rate

Lost Time Incident (LTI) rate is the number of lost time accidents, including fatalities, in the industry per million hours worked.

This indicator also benefited from the strong investments in safety and good communication and training programs put in place by the industry, registering a 80% improvement in LTI rate over the past 12 years, which means a major reduction in the number of serious safety incidents.

Again, as for the TRI rate, the LTI rate continued to improve in 2008-2009, despite the economic crisis.

		Rate
Alumina and Metal Production	1997	11,7
	2002	12,4
	2005	3,1
	2008	4,6
	2009	3,9
Semi-fabrication	1997	18,3
	2002	10,7
	2005	5,7
	2008	2,8
	2009	2,4
Aluminium Industry	1997	15,4
	2002	11,3
	2005	4,8
	2008	3,5
	2009	3,0

6.3. Fatalities

		#
Alumina and Metal Production	1997	n.a.
	2002	0
	2005	1
	2008	3
	2009	2
Semi-fabrication	1997	n.a.
	2002	1
	2005	2
	2008	0
	2009	1
Aluminium Industry	1997	n.a.
	2002	1
	2005	3
	2008	3
	2009	3

This indicator represents the total number of fatalities incurred each year in the European aluminium industry.

Despite a continuous focus on safety, as demonstrated by the reduction of the other indicators described above, the annual number of fatalities remained stable at 3 in 2005, 2008 and 2009.

6.4. Employee Exposure and Health Assessment

		% penetration
Alumina and Metal Production	1997	52%
	2002	90%
	2005	97%
	2008	98%
	2009	98%
Semi-fabrication	1997	75%
	2002	89%
	2005	95%
	2008	89%
	2009	89%
Aluminium Industry	1997	65%
	2002	89%
	2005	96%
	2008	92%
	2009	93%

Since the 2002 SDI results, because of their similarity, the employee exposure assessment indicator and the employee health assessment indicator have been combined to generate the employee exposure and health assessment indicator.

This figure gives the number of plants with formalised systems to assess risk and/or impact of exposure to chemical, physical, biological and radiation hazards. The indicator is expressed in percentage of plants with either a formal system in place or an occupational health service.

The inclusion of new Member States in the EU from 2005 brought the figures down in 2008, and the impact of the economic crisis was an obstacle to improvement in 2009. However, having more than 90% of employees covered by an exposure/health assessment can already be considered as a good achievement.

7. COMMUNITY DEVELOPMENT AND RELATIONS

The aluminium industry has a long history of good relations with the local communities in which they operate. Good community relations are one of the fundamental pillars to ensure community acceptance and involvement.

7.1. Community Expenditure

This indicator represents the total expenditure for social, cultural, sports and other community activities at a local level, including voluntary work organised by the company. The figures are expressed in million Euro.

This indicator can present fluctuations, as special programs of limited duration can take place in one or more installations on a given year, e.g. in correspondence of the start-up of a new plant or a new line, or as a support to one-off local communitiy activities.
This is particularly evident in the data for the semi-fabrication, which present an uneven trend in the reported years.

The figures for the alumina and metal production are also influenced by specific local initiatives which took place in 2002, causing a peak in the total expenditure for that year.

		M€
Alumina and Metal Production	1997	L.D.
	2002	15,1
	2005	7,8
	2008	7,0
	2009	3,4
Semi-fabrication	1997	L.D.
	2002	10,7
	2005	13,0
	2008	6,0
	2009	L.D.
Aluminium Industry	1997	L.D.
	2002	25,8
	2005	20,8
	2008	13,0
	2009	L.D.

The figures for 2005 and 2008 are more stable, although in 2009 they show the effect of the economic crisis.

7.2. Community Dialogue

This indicator is defined as a formal structure and process for communication with local communities and authorities, expressed here in percentage of plants that have a structure for community dialogue in place.

The percentage of plants with a formal structure and process in place has grown from 27% to 80% between 1997 and 2009. The strong commitment of the industry to pursue community dialogue's related activities was sustained even during the crisis.

		% penetration
Alumina and Metal Production	1997	26%
	2002	53%
	2005	83%
	2008	77%
	2009	78%
Semi-fabrication	1997	27%
	2002	42%
	2005	76%
	2008	78%
	2009	81%
Aluminium Industry	1997	27%
	2002	46%
	2005	79%
	2008	78%
	2009	80%

7.3. Community Health Initiatives

This indicator reports the community health programmes, if relevant, or health/fitness programmes for employees and their families which can range from direct health programmes – in areas where official health care is lacking – to programmes such as training, rehabilitation, smoking cessation and others, both for the employees and their families. The figures are expressed as a percentage of respondents with programmes in place.

The reported results clearly show that the European Aluminium Industry has taken active interest in the health of local communities and didn't stop this effort during the crisis.

		% penetration
Alumina and Metal Production	1997	19%
	2002	29%
	2005	76%
	2008	72%
	2009	72%
Semi-fabrication	1997	27%
	2002	41%
	2005	63%
	2008	65%
	2009	66%
Aluminium Industry	1997	23%
	2002	36%
	2005	68%
	2008	68%
	2009	68%

8. EMISSIONS AND SOLID WASTES

The aluminium industry has for a long time been committed to reducing emissions and waste generation, and the downward trend is shown in this section. The indicators selected represent the most relevant emissions and wastes for the aluminium industry as a whole, although in some cases they refer to specific processes, as explained below:

Greenhouse gases (direct emissions)

These gases, expressed as tCO_2 equivalents, are produced either by process-specific chemical reactions (e.g. consumption of the carbon anodes in the electrolytic cells; production of PFCs – PerFluorinatedCompounds – during electrolysis) or from the combustion of fuels (e.g. in the boilers for alumina refining, in the remelting furnaces, rolling and extrusion etc.).

Fluorides

These emissions are relevant for the primary production, as they are generated in the electrolytic cells from the fluorine present in the cryolite bath where the electrolysis of the alumina takes place.

Benzo(a)Pyrene

BaP is used as an indicator for the total emissions of PAHs (Polycyclic Aromatic Hydrocarbons), which typically occur in the paste plants, anode baking plants and Søderberg primary smelters.

Bauxite residues

Bauxite residues, also called red mud, are generated by refining the bauxite through the Bayer process into aluminium hydroxide, which can be then calcined into alumina. The amount of residue depends on the quality of the bauxite used.

Spent Pot Lining (SPL) and other hazardous wastes

SPL is the residue from used carbon cathodes, which line the bottom of the electrolytic cells. The end-of-life cathode is replaced with a new one, and is currently normally disposed of through landfilling, or increasingly recycled. The "other hazardous wastes" category represents the hazardous residues produced by the semi-fabrication processes, such as the caustic bath/sludges from extrusion, and the etching salts from rolling.

8.1. GreenHouse Gas Emissions

This indicator provides data on the anthropogenic emissions of greenhouse gases as defined in the Kyoto Protocol, expressed here as kilogram of CO_2 equivalent per tonne of metal produced. The annual emission of CO_2 and PFC are converted to CO_2 equivalents using 100 year Global Warming Potentials (GWPs).

In order to provide detailed information, for this indicator metal production and the semi-fabrication have been split into their component parts.

The most important process in terms of greenhouse gas emissions per tonne of product is by far the primary production.
Between 1997 and 2009 the indicator for this process registered a significant reduction of almost 50%, thanks to process improvements, which allowed for a dramatic reduction of the PFCs emissions, and the closure of the less well-performing smelters.
The last available figures however show that the industry has almost reached the best achievable performances with the current technology. Hence, in the absence of new breakthrough technologies, further improvements will be limited.

For alumina refining, recycling and semi-fabrication, the emissions of greenhouse gases derive from fuel combustion, hence they strongly depend on the local availability of low-carbon fuels.
Further factors that can considerably influence the fuel consumption and related greenhouse gas emissions are the quality of the raw materials in the metal production, i.e. bauxite for the alumina refining and scrap for the recycling, and the product mix for the semi-fabrication.

			$kgCO_2eq/t$
Metal Production	Alumina	1997	723
		2002	757
		2005	652
		2008	638
		2009	688
	Primary	1997	3 634
		2002	2 703
		2005	2 465
		2008	1 993
		2009	1 941
	Recycling	1997	411
		2002	265
		2005	214
		2008	205
		2009	197
Semi-fabrication	Rolling	1997	120
		2002	115
		2005	117
		2008	111
		2009	117
	Extrusion	1997	L.D.
		2002	146
		2005	162
		2008	148
		2009	164

For LCA purposes, more detailed numbers and guidance can be found in the Environmental Profile Report published by the EAA and publicly available on its website at http://www.eaa.net/en/environment-health-safety/lca/environmental-profile-report/.

8.2. Fluoride Emissions

This indicator provides the total (gaseous and particulate) emissions of fluoride from primary aluminium electrolysis plants. The figures are expressed as annual average of total fluoride emissions in kilogram per tonne of primary aluminium produced.

		kg/t
Primary	1997	1,24
	2002	0,98
	2005	0,96
	2008	0,62
	2009	0,56

The fluoride emissions have been reduced by 55% between 1997 and 2009, thanks to the closure of some old plants and the upgrade of the remaining ones to the highest environmental standards. In particular, all the current smelters are equipped with state-of-the-art abatement systems for fluoride emissions.

8.3. Benzo(a)Pyrene Emissions

Benzo(a)Pyrene emissions are emitted by paste plants, anode plants and Søderberg primary smelters. This indicator provides an average emission expressed in grams per tonne of primary aluminium.

		g/t
Primary	1997	3,20
	2002	1,44
	2005	1,11
	2008	0,65
	2009	0,69

The reduction of the BaP emissions attributed to primary production between 1997 and 2009 is very significant, and amounts to a reduction of 80%. This very good result was obtained through improvements in the existing equipment, the closure of old Søderberg lines and the introduction in the remaining ones of the so-called "new Søderberg technology", which allows for an average reduction on BaP emissions in the range of 60-80%.
As of 2009, all three remaining Søderberg lines in EU27+EFTA are equipped with this new technology.

8.4. Bauxite Residue Deposited

This indicator refers to the quantity of residue deposited at designated landfill sites after separation and sand removal at alumina plants. The data is provided as kilograms of bauxite residue, in dry weight, per tonne of alumina produced.

		kg/t
Alumina	1997	673,0
	2002	713,4
	2005	706,0
	2008	667,2
	2009	530,3

The amount of residues produced depends on the quality of the bauxite used, however the trend shows a steady reduction of the residues produced per tonne of alumina since 2002, related to an increase in the alternative uses of the residues.

8.5. Spent Pot Lining And Hazardous Waste Deposited

This indicator relates to primary production and expresses the quantity of SPL from electrolysis pot rooms deposited after the removal of materials which can be reused and recycled.
Additionally, since 2005 the table also represents the amount of hazardous wastes deposited from semi-fabrication operations, after reuse and recycling.
The indicator is expressed in kilograms per tonne of aluminium produced.

After the consistent reduction of SPL deposits between 1997 and 2005, the increase registered thereafter is explained by the closures of some plants, in particular various Søderberg lines, or the idling of pot lines which were later relined.

The deposit of hazardous wastes from the semi-fabrication processes also shows a decreasing trend.

Spent Pot Lining		kg/t
Primary Production	1997	22,90
	2002	19,77
	2005	14,78
	2008	17,83
	2009	24,76

Hazardous Waste deposited		kg/t
Semi-fabrication	1997	n.a.
	2002	n.a.
	2005	3,25
	2008	3,10
	2009	2,82

9. RESOURCE USE AT GLOBAL LEVEL

Bauxite is a common raw material, and aluminium accounts for 8% of the earth's crust, hence this resource is far from being in short supply.
The total worldwide bauxite production amounted to 218,5 million tonnes in 2008. The European share represented only 2%.
Europe has 5 countries with bauxite mines, 3 of which (France, Greece, Hungary) are in the EU.
Due to the global nature of the resource, the figures are collected and provided by IAI, the International Aluminium Institute.(*)

9.1. Bauxite Area Mined

This indicator reflects the area, in kilometres squared, of mined land in a specific year worldwide.

		km^2
Bauxite/ Alumina industry	1997	16
	2002	20
	2005	25
	2008	30
	2009	L.D.

As a result of the growing penetration of aluminium in Western countries and the economic growth of emerging countries, the areas mined for extracting bauxite doubled in 10 years. As a consequence of the economic crisis, global bauxite production decreased by 12% in 2009 versus 2008, while European production dropped by 29% in the same period.

(*) "Bauxite Mining Report", available at http://www.world-aluminium.org

9.2. Mine Rehabilitation Rate

This indicator, which has improved with respect to the previous report, provides a comparison between the total of the areas that were mined out in a given year and the total of the areas that were rehabilitated in the same year, both expressed per tonne of bauxite, for the global aluminium industry.

		Mined area (m^2/t)	Rehabilitated area (m^2/t)
Bauxite/ Alumina industry	1991	0,20	0,15
	1998	0,18	0,14
	2002	0,20	0,16
	2006	0,16	0,16

The latest available figures, referring to 2006, show that the total of the rehabilitated areas was for the first time equal to the total of the mined areas.

This is indeed a very important result at global level, and reflects the commitment of the aluminium industry towards the communities where it operates, its active engagement with the global biodiversity conservation targets and the efforts that it is deploying towards a sustainable use of the natural resources.

10. RESOURCE USE AT EUROPEAN LEVEL

In a resource constrained world, resource efficiency is essential. The aluminium industry has for many years been focusing on the optimisation of energy resources and fresh water consumption, and is committed to further improvements.

10.1. Energy Consumption

			kWh/t
Alumina and Metal Production	Primary	1997	15 630
		2002	15 434
		2005	14 869
		2008	14 999
		2009	15 055
Semi-fabrication	Rolling	1997	547,0
		2002	525,9
		2005	662,0
		2008	502,9
		2009	526,5
	Extrusion	1997	L.D.
		2002	792,1
		2005	736,2
		2008	737,5
		2009	795,4

In order to provide more detailed information, similar to how it has been done for greenhouse gas emissions, the indicators in this section are reported for each of the most relevant processes in both alumina and metal production and the semi-fabrication sector.

a) Electrical energy consumption per tonne:

This indicator represents the electrical energy used expressed in kWh per tonne of product, for the processes with the most significant consumption.

As, however, noted for greenhouse gases, the industry is close to best achievable performance with the current technology; hence further improvements will be limited, barring technology break-through.

For LCA purposes, more detailed numbers and guidance can be found in the Environmental Profile Report (*) published by EAA and publicly available on its website.

b) Other energy consumption per tonne:

This indicator provides the amount of energy used, other than electrical (e.g. fuels, gas), per tonne of product expressed in Mjoule, for the processes with the most significant consumption.

			MJ/t
Alumina and Metal Production	Alumina	1997	10 509
		2002	10 583
		2005	9 227
		2008	9 061
		2009	10 413
	Primary	1997	16 226
		2002	15 128
		2005	14 672
		2008	14 702
		2009	14 748
	Recycling	1997	6 645
		2002	4 404
		2005	3 715
		2008	3 668
		2009	3 490
Semi-fabrication	Rolling	1997	2 153
		2002	2 034
		2005	2 083
		2008	2 020
		2009	2 141
	Extrusion	1997	L.D.
		2002	2 491
		2005	2 874
		2008	2 603
		2009	2 926

The largest consumption of energy other than electricity is in alumina and primary metal production, in particular, in the production and use of the prebaked anodes.

For the latter process the figures show a significant reduction since 1997, (the remaining margins of further reduction are limited).

Recycling production continued its reduction of energy use, almost halving its consumption since 1997, thanks to process optimisation and energy efficiency.

The figures related to the semi-fabrication kept steady, at lower levels. This is mainly due to the greater stability of the semi-fabrication processes in terms of energy consumption.
The increase registered in 2009 for both rolling and extrusion are due to non-optimal use of equipment, as a result of idle production capacity, due to the economic crisis.
As said before, the industry has almost reached the best achievable performances with the current technologies. Hence, further improvements will be limited.

(*) Available at http://www.eaa.net/en/environment-health-safety/lca/environmental-profile-report/

10.2. Renewable Electrical Energy

Renewable energy is energy which comes from natural resources such as hydro-electricity, solar energy, wind, tides, and geothermal heat, which are renewable (naturally replenished).
The figures below represent the percentage of electrical energy coming from these renewable sources for primary production.

		%
Primary	1997	41%
	2002	45%
	2005	46%
	2008	45%
	2009	48%

The figures regarding the other processes are not represented here because, being strictly dependent on the local energy grids, they would simply reflect their evolution in time.

The increase in the use of renewable energy for primary production can be explained by the number of bilateral agreements signed by primary smelters for the dedicated supply of renewable energy.

10.3. Fresh Water Use

The use of fresh water for each sector is expressed in m³ per tonne produced.

Water is commonly used throughout the aluminium industry for cooling purposes, typically cooling of metal (liquid or hot) after remelting, or cooling of tools during hot metal fabrication (rolling, extrusion). The cooling water is discharged after use, with constant monitoring of the quality of water effluents.

		m^3/t
Metal Production	1997	28,1
	2002	12,6
	2005	12,9
	2008	7,4
	2009	7,7
Semi-fabrication	1997	10,1
	2002	6,0
	2005	4,1
	2008	2,5
	2009	2,4

The water use for a given plant can be very different according to whether it has a single or multiple cooling use through water recycling systems – the latter resulting in a very low net water input. The system used depends on local water availability.

We notice a continued and significant decrease of fresh water consumption, which in 2009 is about one quarter of the 1997 value for both metal production and semi-fabrication.

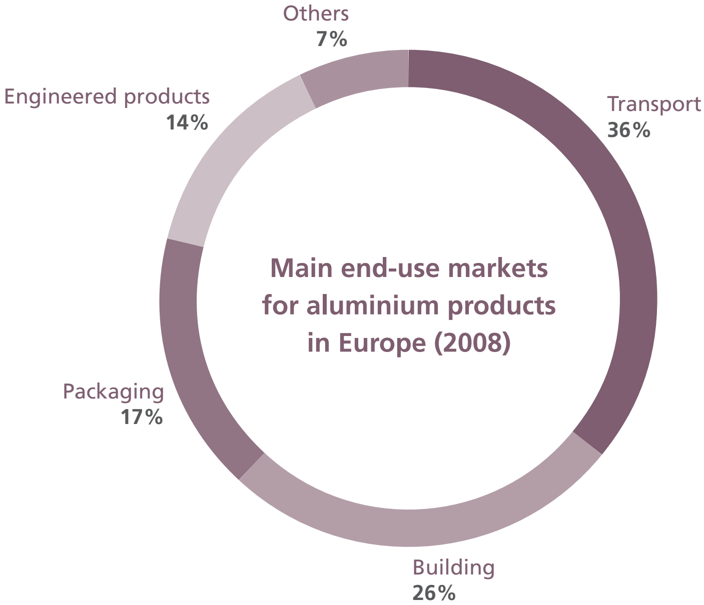
The use of fresh water has to be evaluated in the context of scarcity. EAA will look further into this aspect in the future sustainability reports.

Sustainable Development Indicators

ALUMINIUM IN USE

INTRODUCTION

The industrial-scale production of aluminium started about 125 years ago, and from the beginning of the 20th century the new metal has been increasingly applied in transport (cars, planes, ships) and in building applications. During the last decades aluminium has also become a widely used material in packaging, in consumer goods and in many other highly valuable end-use markets including spacecrafts, electric and electronic products. In addition, thanks to its unique properties it is often the material of choice for attractively designed products such as furniture and lighting.



It is mainly during its use phase that aluminium is able to show its impressive contribution to sustainability, more than offsetting the consumption of raw materials and energy needed for its primary production. In fact, aluminium is a light material which helps to reduce weight in all transport applications, thus contributing to reduced fuel consumption. Additionally, aluminium also allows for lightweight construction and energy efficient solutions in buildings. Due to its unique properties as an efficient barrier for air and light, a minimal amount of aluminium is sufficient to pack valuable foodstuffs and drinks, and helps to prevent food spoilage.

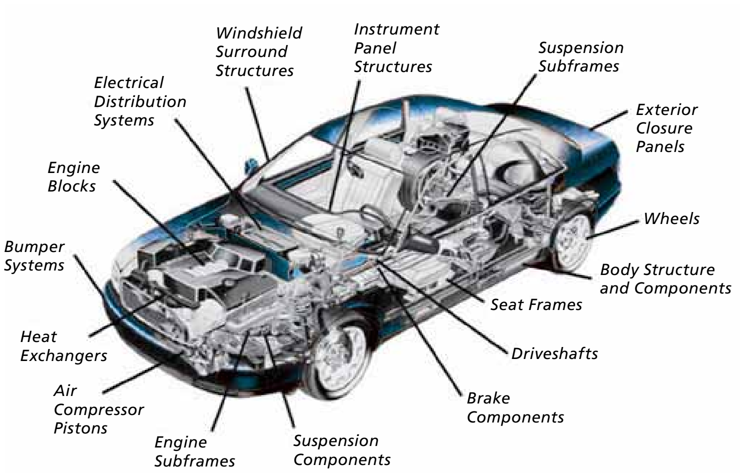
Currently about 700 million tonnes, that is more than 70% of all aluminium ever produced, is still in use, thanks to its long life cycle (10 to 20 years in transport but up to 50 to 80 years in buildings). As it can be recycled infinitely without loss of quality, aluminium has impressive recycling rates of over 90% in transport and building applications, more than 55% in packaging and up to 90% in some countries for beverage cans.

The recycling of aluminium saves up to 95% energy and greenhouse gas emissions and helps to save natural raw materials: a used engine block can easily become a new cast automotive component while window-frames can be remelted into new profiles; a used beverage can easily become a new can within 60 days or end up in other valuable products such as a bicycle or a casting product for a car.
Future generations will increasingly benefit from the savings in raw materials and energy, if the collection and recycling activities keep on being improved.

AUTOMOTIVE & TRANSPORT

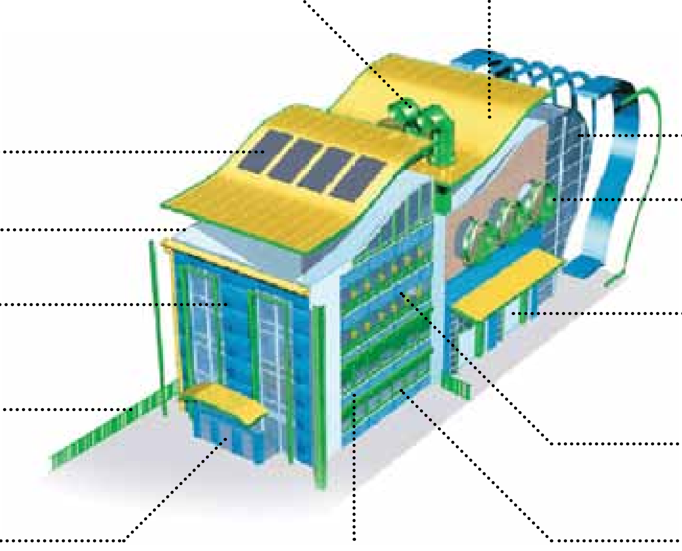
The **automotive & transport** sector is the largest end-use market for aluminium in Europe, accounting for about 36% of aluminium applications. Today, aluminium is widely used in cars, trucks, buses, coaches, trains, metros, ships, ferries, aircraft and bicycles. Passenger cars remain the most important segment, although the public transport sector is growing as well. The new generation of fast ferries and cruise ships would never have been possible without the unique combination of sturdiness and weight reduction. Also Europe's ultra-fast trains and in particular double-decker carriages owe their existence to the newest aluminium alloys. To sum it up, aluminium brings to transport applications a unique combination of strength and lightness, corrosion resistance, improved safety and design flexibility, and excellent recyclability.

The following figure gives some examples of the use of aluminium in various parts of a passenger car.



BUILDING

The **building and construction** sector accounts for approximately 26% of the European aluminium end-use markets, with a wide range of internal and external applications. The main drivers for aluminium in buildings are its high strength-to-weight ratio, its long service life, the low maintenance it requires, its high reflectivity and a huge design flexibility thanks to the wide choice of alloys and surface finishes that are available.
Aluminium is extensively used for windows, curtain walls, rolling blinds, doors, exterior cladding and roofing, suspended ceilings, wall panels and partitions, heating and ventilation



equipment, solar shading devices, light reflectors and complete prefabricated buildings. Structures like offshore living quarters, helicopter decks, balustrades, scaffolding and ladders, are also commonly made of aluminium. The latest breakthrough is the unique combination of aluminium structures with solar panels to give light, weather resistant structures for all types of roofing with no need to modify the architecture or engineering of the buildings.

The above figure gives some examples of the use of aluminium in various parts of a building.

PACKAGING

Cans and foil are the best known aluminium end-uses in the **packaging** sector: about 17% of all aluminium in Europe is employed to produce beverage and food cans, containers, trays, aerosols, tubes, capsules and a wide range of thin (laminated) foil applications such as wrappings, lids and pouches. Aluminium packaging, via its unique combination of properties, which provide an absolute barrier protecting the goods, contributes to the efficient fabrication, storage, distribution, retailing and usage of many products. It has become part of everyday life as it can contain, protect, decorate or even dispense products as diverse as soft drinks, juices, beer and wine, pet foods, vegetables, fish and take-away meals, toiletries, coffee, tea, chocolates and chilled foods, pharmaceutical products and even tennis balls and welding rods.

The following figure gives some examples of the use of aluminium in packaging applications.

OTHER APPLICATIONS

Other applications such as **engineered products**, e.g. machinery equipment (14% of all end-use shipments of aluminium in Europe), **electrical equipment and consumer durables** (around 7% of the shipments) are not investigated in this report. A very new application for aluminium is in **solar panels**. The use of aluminium in solar panel systems represents a real potential and its possible inclusion in the future reports will be scrutinized. The same will apply to other applications in the energy sector.

AUTOMOTIVE & TRANSPORT

The transport sector accounts for about one quarter of overall EU emissions of carbon dioxide and about half of it, i.e. 12% of the total, is being produced by passenger cars.

For this reason, the existing European legislation is presently focused on passenger cars for which an EU reporting system is in place. The main driver for aluminium lightweight design is the improved fuel consumption, i.e. a reduction of the CO_2 emissions during the use phase.

Combined with EAA's own expertise and surveys, it was possible to derive comprehensive SDIs for passenger cars in 2000 and 2005. Data for 2010 results are being collected and will be available by the end of 2011.

The development of SDIs to cover other transport modes will depend on the evolution of the European legislation which may induce the development of proper data collection and related EU reporting that is missing today.

For more detailed information, readers are invited to refer to the EAA brochures "Aluminium in Cars" (*) and "Moving up to aluminium: the future of road transport."(**)

A growing market share

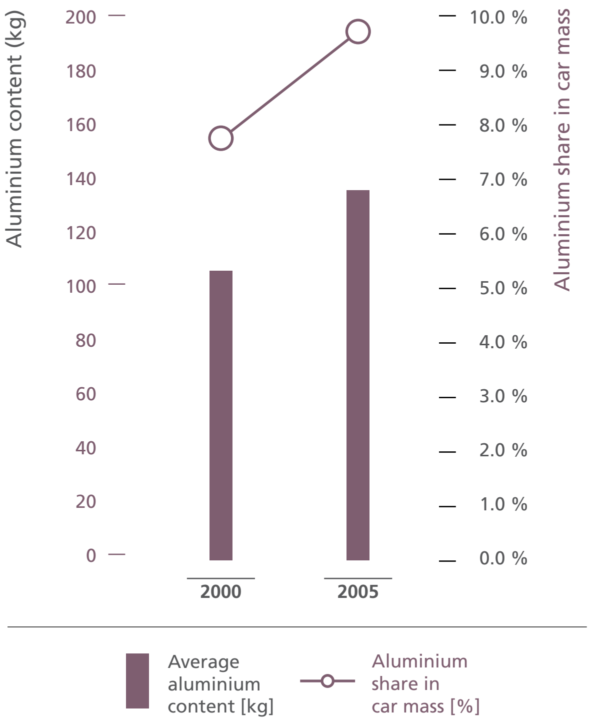
The aluminium share in the average car mass reflects how the aluminium and automotive industries are progressing to develop and integrate cost effective lightweight solutions in European vehicles.

Besides well-known aluminium-intensive cars like the Audi A8 or the Jaguar XJ, many cars contain significant amounts of aluminium, so that the average aluminium content of cars produced in Europe in 2005 was already 132 kg, i.e. about 10% of the total mass.

This percentage can be further split into 7% or 94 kg for cast parts (mainly used in engines, chassis, suspension and transmission) and 3% or 38 kg for parts made out of aluminium forgings, extrusions and sheets where the biggest short term growth potential lies. Indeed, a full penetration of proven and cost efficient light-weight aluminium body components such as bonnets, wings, doors and bumpers would increase the average aluminium content in cars by more than 50 kg.

(*) Available at http://www.eaa.net/en/applications/automotive/aluminium-in-cars/
(**) Available at http://www.eaa.net/en/applications/transport/brochure-moving-up-to-aluminium/

Ligthweighting reduces CO_2 emissions



The main driver for aluminium lightweight design is the improved fuel consumption, as 100kg saved on the weight of a car saves 0,35 litre of fuel per 100 km and 9 grams of CO_2 per km at the exhaust pipe (*) .
The reduction of the CO_2 emissions during the use phase of the car amounts to up to 80% of the CO_2 emissions over the complete vehicle life cycle. At the same time, the reduced vehicle mass enables significant safety improvements as well as better driving performance and higher comfort.

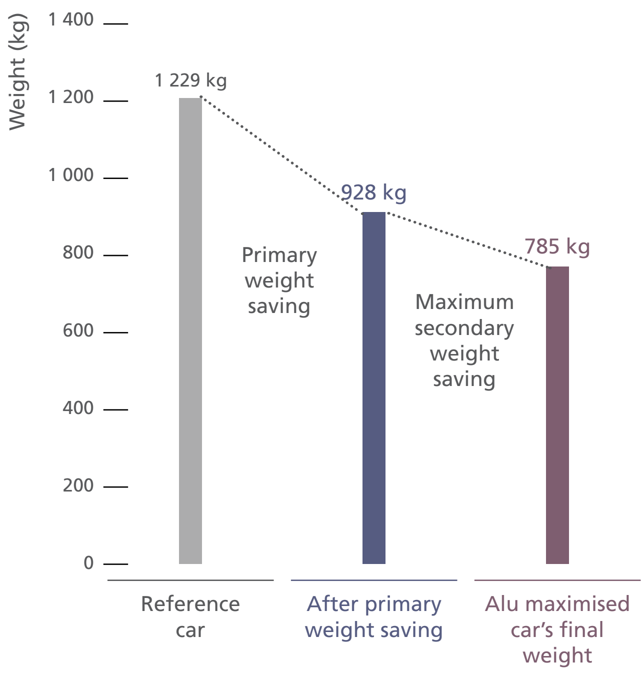
	2000	2005
Avoided weight surplus [%]	7,0	8,4
Avoided CO_2 emissions [%]	5,5	6,6

The avoided surplus weight shows how much heavier cars registered in a year would be and how much more CO_2 they would emit in the absence of aluminium lightweight solutions.

An impressive lightweighting potential remains untapped

a) Total vehicle weight could be cut by one third with aluminium

Aluminium allows a weight saving of up to 50% over competing materials in many applications. Keeping a car's performance constant, these primary weight savings allow the downsizing of other car parts (powertrain, brakes, fuel tank, crash management systems etc.), leading to the so-called "secondary weight savings".
The Alu-maximised Car study (**) determined the weight saving achievable in a car designed to make optimum use of aluminium wherever possible. The results are quite significant; the 'Alu-maximised' car is remarkably lighter than the reference model. The reference car, an amalgam of five popular small family cars, weighs 1 229 kg without fuel or occupants. Based on latest technology, the 'Alu-maximised' car's final weight after primary and maximum secondary weight savings is just 785 kg, i.e. 36% lighter!



(*) 2005 figures
(**) Alu-maximised Car study, ika-RWTH (Aachen University), ika 2003

b) Car bodies could become 40% lighter with aluminium

The "Stiffness and Crash Relevance of Car Body Components" study (*) found that using aluminium could result in significant weights savings for the typical components of a compact class car body, ranging from 14 to 49 %. Based on a state-of-the art steel reference car, the maximum weight reduction potential of aluminium in car bodies is approximately 40 %. Weight reduction potential using high strength steel was limited to a reduction of only 11 percent. The reason why the potential weight reduction using high strength steel is smaller, is that nearly 40 % of the parts analyzed simply cannot be made thinner without reducing the car's overall rigidity, whereas aluminium could be used without reducing thickness or causing the car's rigidity to suffer.

Also, the multi-material SuperLIGHT-Car project on "Sustainable Production Technologies of Emission Reduced Light weight Car concepts" (**) with 38 partners, including most European carmakers, resulted in a predominant role for aluminium in a mix of proven and state-of-the-art solutions ready to make an average midsize car body 100 kg or 35% lighter.

Aluminium reduces fuel consumption and CO_2 emissions from trucks

When carrying heavy goods, aluminium allows more goods to be carried per trip. One tonne saved on the dead weight of an articulated truck saves 1 500 litres of diesel fuel over 100 000 km because, to move the same amount of goods over the same distance, a standard vehicle would need extra trips representing a supplement of 3 800 kilometres.

When carrying voluminous goods, aluminium reduces the overall weight, lowering fuel consumption per kilometre. One tonne saved on the dead weight saves 600 litres of diesel over 100 000 km, as demonstrated by the study(***) "Energy savings by light-weighting for European articulated trucks".

From an environmental point of view, the EAA estimates that, over its whole lifecycle, 1 kg of aluminium introduced in a truck saves more than 20 kg of CO_2.

Alternative powertrains also call for lightweighting

Considering the significant cost of Li-ion batteries, it can be estimated that in electric vehicles, every kg saved in car body mass saves between 10 and 20 € on the cost of the battery pack. Hence, increased efforts should be made to introduce optimized lightweight design concepts for electric vehicles. Even if a significant cost reduction in battery packs can be expected in the coming years, the incentive of weight reduction should still be at around 5-10 € per kg saved according to predictions for 2020. Thus, in addition to improved energy efficiency, range and reduced operating costs, the aluminium-intensive lightweight structures will also reduce the initial cost of electric cars by limiting the size and the mass of the expensive Li-ion battery packs.

(*) "Stiffness and Crash Relevance of Car Body Components", ika-RWTH (Aachen University), 2009, http://www.eaa.net/en/applications/automotive/studies/
(**) "Advanced multi-material lightweight vehicle structures", 2009, http://www.superlightcar.com
(***) Energy savings by light-weighting for European articulated trucks - IFEU - Institüt für Energie- und Umweltforschung Heidelberg GmbH, 2005

Aluminium improves road safety

Aluminium systems make it possible to absorb significantly more crash energy per unit of weight than traditional systems. In average, the light-weighting potential exceeds 40%.
For this reason, aluminium has been used in about 9 million automotive crash management systems (i.e. bumpers combined with crash boxes) produced in Europe in 2008 in a total of 16 millions of cars produced that same year.

For trucks, aluminium elements can also be used to improve the energy absorbing potential of front and rear-end under-run protection devices, and may also be used to build soft deformable truck noses.
Last but not least, extra safety features always mean additional weight, which can be balanced by replacing heavy materials with aluminium.

Education

Conscious about the need to provide technical information to design and process engineers, the European Aluminium Association developed two online technical manuals.
The Aluminium Automotive Manual(*) presents the many and varied applications of aluminium in passenger cars, its material properties, its shaping, forming and joining technologies, and explains the unique aluminium design approach.
Similarly, the Aluminium in Commercial Vehicles Manual(**) is focused on the truck and trailer industries.

End-of-life Recycling

RWTH-Aachen University(***) analyzed the automotive aluminium recycling process and concluded that 95% of the aluminium contained in end-of-life cars can be recovered by mechanical processing in shredder and non-ferrous metal sorting plants using latest technologies.

For trucks, UTT-Troyes University(****) analysed the current end-of-life dismantling practices through four actual case studies. They processed one road tractor, one flatbed semi-trailer, one silo semi-trailer and a tipping body and demonstrated recycling rates exceeding 95%.

(*) Aluminium Automotive Manual - http://www.eaa.net/en/applications/automotive/aluminium-automotive-manual/
(**) Aluminium in Commercial Vehicles - http://www.eaa.net/en/applications/transport/manual---aluminium-in-commercial-vehicles/
(***) "Automotive Recycling - Aluminium Recovery from End-of-Life Vehicles", I.A.R.-RWTH (Aachen University), 2008
(****) "Recycling rates of aluminium from end-of-life commercial vehicles - Four case studies", Troyes University of Technology, 2009, http://www.eaa.net/en/applications/transport/truck-recycling/

PACKAGING

Aluminium packaging is part of the solution for more sustainability in production and consumption by delivering quality food, drinks and pharmaceuticals in pristine conditions to the consumer. Aluminium packaging is able to meet today's challenges of product safety, convenience, marketing and sustainability whereas the sustainability aspect is becoming increasingly important. And more than anything else this means preventing spoilage and waste. The ecological performance of aluminium packaging should be discussed against this background and should be put in the right perspective. In a world with a rapidly growing population living mainly in cities, less packaging doesn't necessarily mean less food wastage. On the other hand resource efficiency can also be met by increasing the recycling and recovery performances of used aluminium packaging.

Increasing market share

The market for aluminium packaging has increased between 2005 and 2008 by 3 to 5% annually and in particular the growth of the aluminium beverage can has been remarkable, as pictured beside. In 2008, 65% of all metal beverage cans consumed in EU27, EFTA countries and Turkey were made of aluminium. The foil markets also demonstrated an upward trend, although progress should not only be measured by the amount of material put on the market for end-use as, due to further downgauging, it is more meaningful for very thin foil based applications to measure growth by 'square metres'.

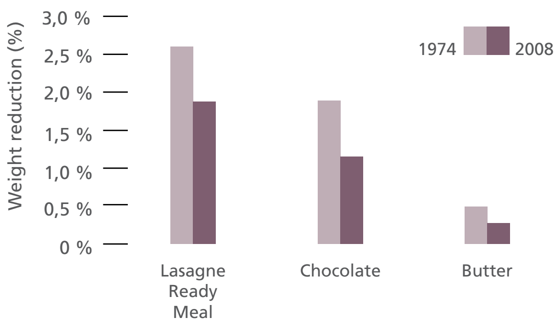
	1997	2002	2005	2008
Aluminium beverage cans Market share %	45	50	56	65

Material further optimised

The package to product ratio is an indicator to measure the resource efficiency of packed products. In all stages of a product life cycle, and in particular in the use phase, transportation and storage efficiency is determined by this ratio. Indeed the optimization of aluminium foil to improve this ratio, while maintaining the functionality, is an important contribution to increasing overall resource efficiency. This is also reached by downgauging, which for example means for a butter wrap that the thickness of the aluminium foil has been reduced from a fifth of the thickness of the human hair to a tenth.

Improvement of package to product ratio

Package to product ratio for aluminium foil-based packaging applications on a kg per kg basis in view of material optimization



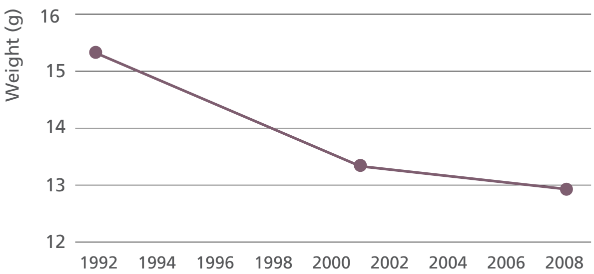
Reference products:

- 400 gr frozen lasagne ready meal
- 100 gr chocolate bar with additional 3,6 gr paper
- 250 gr butter slab with 1,8 gr additional paper and wax

Source: EAFA

The industry managed to further reduce the weight of the beverage can over the past 16 years by more than 15% and is still keen to reduce its weight further. However, it should be stressed that due to technical limitations the progress in the near future will be less spectacular than in the past. The example of the 33cl aluminium beverage can, shown in the following graph (data provided by BCME - Beverage Can Makers Europe), clearly demonstrates that during the period of 1992- 2000 the weight reduction was more significant than for the period 2001-2008. Additionally it should be noted that end-of-life recycling of used beverage cans remains by far the most important contribution for reducing their environmental footprint. The combination of downgauging and recycling helps to reduce the need for primary metal.

DOWNGAUGING TREND - 33 cl can

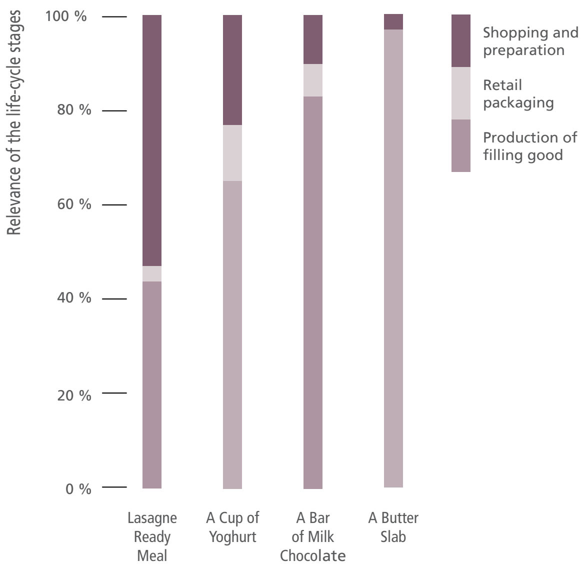


Better food protection and less spoilage

The protection of products throughout the life cycle of food and drink products is one of the core functionalities of packaging also during the use phase. Due to its unique properties aluminium packaging plays an essential role to deliver and keep a variety of products in perfect condition. For example aluminium foil acts as an absolute barrier to light, gases and moisture and therefore provides perfect preservation of aroma and product characteristics. Foil is also sterile – it does not harbour or promote bacteria – thanks to high-temperature annealing. This makes it safe for use with foodstuffs and an ideal protection against tampering. In the case of butter not only is it the perfect barrier, but its deadfold properties allow resealing of an opened pack.

It is difficult to measure this variety of unique functions, however the contribution of packaging to the overall environmental footprint of a product can be measured by life cycle assessment (LCA). When looking at the impact on climate change measured in greenhouse gas emissions it becomes obvious that aluminium-based packaging has a comparably small share of the greenhouse gases associated with producing, transporting and preparing food.

LIFE CYCLE GREENHOUSE GAS EMISSIONS
associated with the production and consumption of food



Greenhousegas emissions along the life cycle of food products.
Figures from ESU Services.

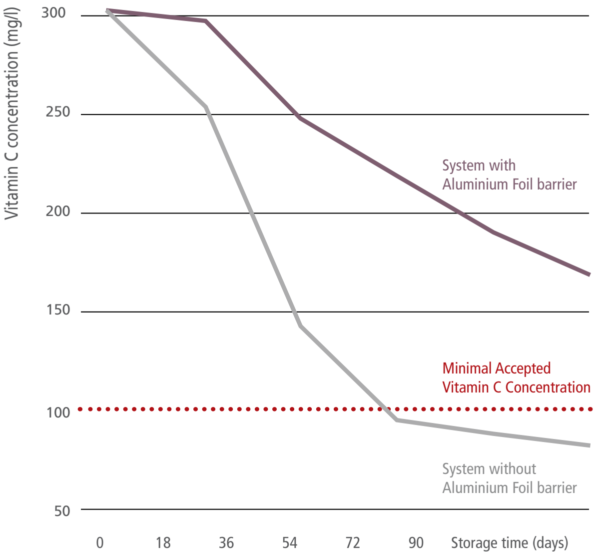
a) Longer shelf-life

'Shelf life', i.e. the period in which the packed good is available in the desired condition and quality, is commonly used to measure the efficiency in preserving the nutritional value and quality of the product. Aluminium packaging is effective in protecting food and drinks against the quality-reducing effects of oxygen, light, moisture, micro-organisms or unwanted aromas.

The barrier properties of the packaging system are significant factors in determining the storage requirements, e.g. refrigeration, and can reduce the need for additives. With thicknesses of only six one-thousandths of a millimetre aluminium foil achieves a shelf-life of months and even years which is also essential for nutrients-rich products like milk or juice. The figure illustrates a key function of using aluminium foil in packing and storing fresh orange juice and maintaining the vitamin C concentration above the minimum level for more than 90 days.

Longer Shelf Life

Aluminium foil maintains the key charactistics of fresh mandarin juice for more than 90 days



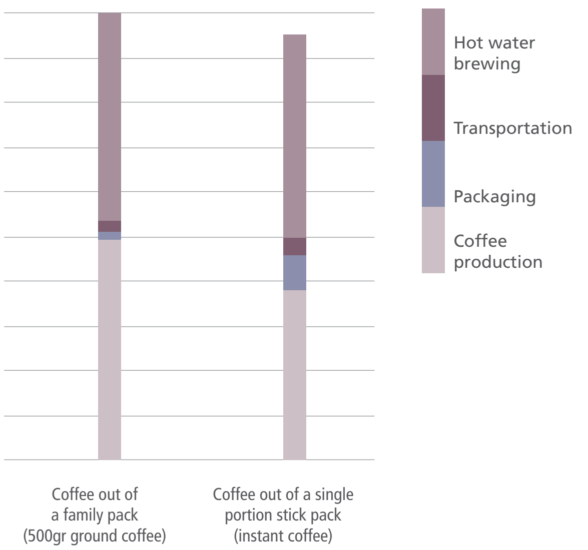
Redrafted after Beltran-Gonzales F. et. Al (2008): Effect of Packaging Material on Color, vitamin C and Sensory Quality of Refrigerated mandarin Juice; J of Food Quality

b) Prevention of food waste

The prevention of product waste is another core functionality of packaging as it helps not only to keep products in the desired condition but allow their convenient consumption. Portioned packs, for example, allow a tailored consumption while effectively preventing wastage from over consumption and excessive preparation.

In comparing a cup of coffee from ground coffee produced from a 500gr pouch with a cup out of a single serving pack, the share of packaging is slightly larger for the portioned pack. However this additional amount is more than compensated for in the cases where too much coffee is prepared e.g. in a coffee machine, which results not only in pouring valuable coffee away, but also in the waste of resources involved in hot water brewing. In conclusion, a cup of coffee out of a single serving does not show higher overall impacts but compares rather favourably to ground coffee as production efficiencies are different.

Life cycle greenhousegas emissions associated with a cup of coffee from ground coffee and portioned packs (indexed)



Greenhouse gas emissions along the life cycle of a cup of coffee. Figures from ESU Services 2008

End-of-life Recycling

The average aluminium beverage can recycling rate stands at 63%. It can even be even assumed that with informal non-registered collection activities included, about 7 out of 10 cans are being recycled.

	1997	2002	2005	2008
Beverage can recycling rate %	40	46	52	63

Based on industry estimates and official reports, up to 55% or more of all aluminium packaging put on the European markets for final consumption is recycled, with additional energy recovery of mainly small thin foil based aluminium packaging. Collection, separation and recycling activities are continually improving and further increase can be expected by using the latest innovative sorting techniques.

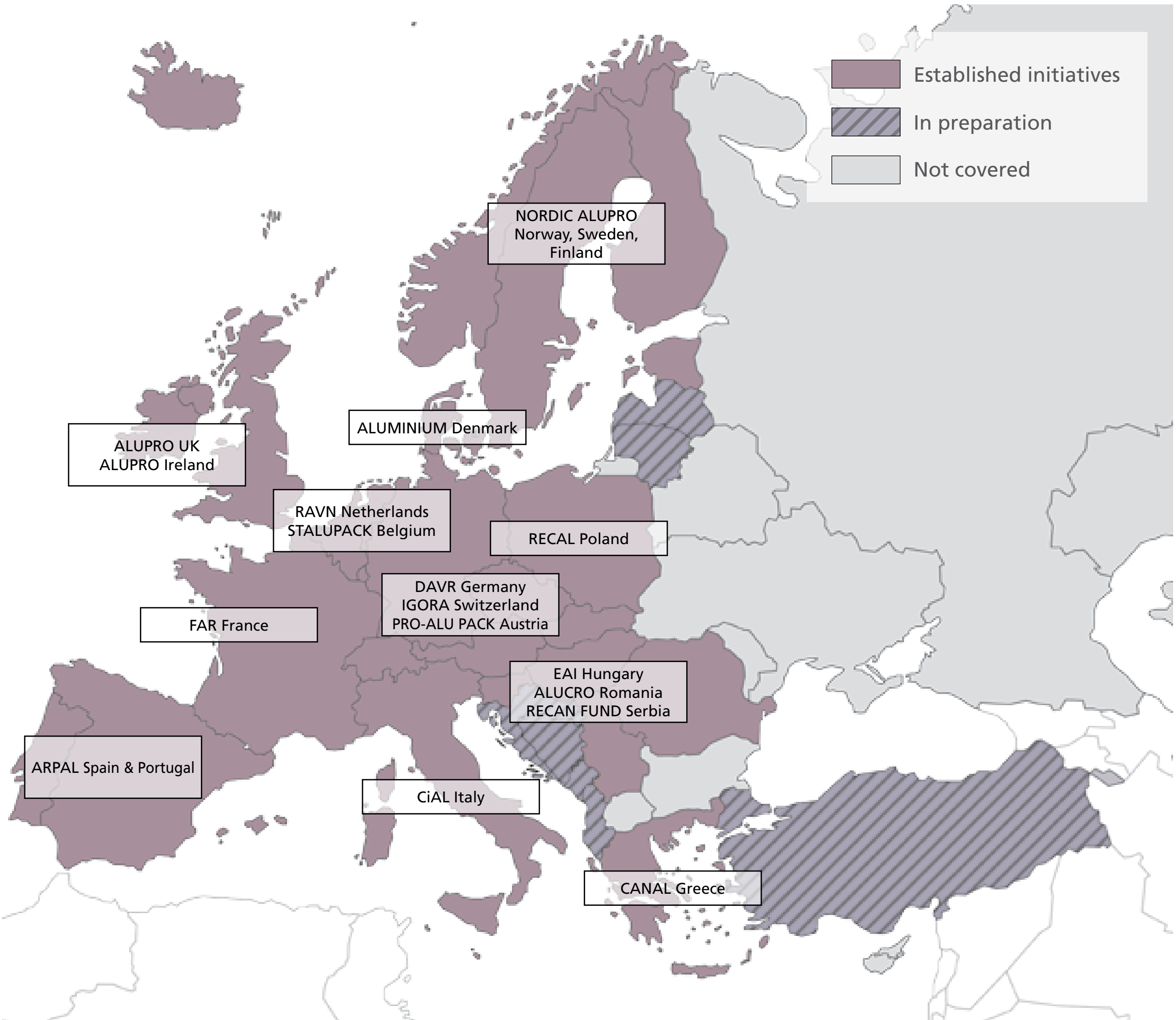
For example, in countries like Denmark, Germany, the Netherlands, Belgium, Switzerland and Italy the bottom ashes from incinerators are being treated with advanced eddy current-based technology, resulting in additional recycled quantities of aluminium and other non-ferrous metals.

For used aluminium beverage cans EAA, together with the beverage can manufacturers, are aiming at a 75% recycling target Europe-wide, within the next 5 years starting from 2010. Initiatives like 'Every Can Counts' in the United Kingdom to address the particular challenge of collecting and recycling of 'out of home' used beverage cans should help to generate additional quantities. The initiative is now implemented in France ('Chaque Canette Compte') and Austria ('Jede Dose zaehlt) and will be extended to other European countries.
Currently in the United Kingdom and France particular attention is being paid to the collection of used foil containers (in the UK together with aerosol cans) and with the support of the main manufacturers other countries will most likely follow.

All these initiatives together will make a significant contribution to further reducing the environmental footprint of aluminium packaging.

Towards a 'recycling society' – community projects to stimulate recycling and resource efficiency

Over the past 20 years the industry has developed a European-wide network of national aluminium packaging recycling and promotional initiatives covering more than 20 countries. EAA in close partnership with customers (canmakers, food and beverage companies, etc.), national and local authorities, the waste management sector and NGOs helps stimulating, through these initiatives, the separate collection and recycling of aluminium packaging in general and the beverage can in particular. By direct representation and/or assisting others in promoting recycling the industry has improved its resource efficiency, thus contributing to a more sustainable environment.



Many of these national recycling initiatives are focusing on education and have developed initiatives with primary, secondary schools and with universities to stimulate the next generations to make their contribution to a better environment. The examples outlined below have proven to be very successful.

Spotlight on recycling educational activities

EAI (Hungary)

- Classes for secondary schools, combining art with the recycling of beverage cans.
- Environmental classes offered to hundreds of schools every year over the past 10 years, with can collection school competitions and charity projects.
- 'Alu-go' program: workshops for pupils and students, at schools, summer camps and other educational contexts.
- Design and construction of a 15 meter high copy of the Eiffel Tower, entirely covered of used beverage cans, by university professors and students.

ALUPRO Ireland (Ireland)

- About 30% of Irish schools take active part in the 'Spring Clean and can collection activities', and the 'Recycling aluminium and the environment' fact sheet is widely distributed.

RECAL (Poland)

- Theatre project with professional actors explaining to very young children the need to collect used beverage packaging.
- Recycling projects with the active involvement of children at summer camps.
- Annual 'Green School' competition, whose winner is offered a trip to another EU country, including the introduction to a local beverage can recycling programme.

ALUCRO (Romania)

- Can collection activities with the participation of 35 schools and about 20 000 pupils, with distribution of educational material on the need for aluminium beverage can recycling.

RECAN Fund (Serbia)

- Anti-littering campaign 'Basketball for the Clean City' at sport events in 5 important cities, involving teams from 41 schools and with the support of local authorities.

ARPAL (Spain)

- Local educational programme involving 68 schools and 35 800 pupils in several cities.

IGORA (Switzerland)

- Support to PUSCH, a Swiss non-profit environmental foundation, in organising recycling lessons for children up the 8th grade. For over 20 years more than 50 000 pupils have been reached each year.
- Yearly 'Alu Creative' competition for school classes, and the group game 'Re-Tour' is offered to pupils.
- More than 5 000 posters distributed to schools by the anti-littering organisation IGSU.

ALUPRO (United Kingdom)

- 'Love Where you Live' photographic competition, to encourage children aged 7-16 to explore their local surroundings and enjoy the natural world.
- 'Recycle for Africa' project to encourage children to recycling, connected to the Alupro's 'Fruit Trees for Malawi' programme, aimed at growing a fruit tree for every tonne of aluminium cans and foil recycled in the UK.

Similar educational projects are being organised in other countries. A full overview can be obtained at the new aluminium packaging recycling network website www.alurecycling.eu.

BUILDING

In the EU, buildings account for about 36% of greenhouse gas emissions and more than 40% of primary energy consumption. For these reasons, the Energy Performance of Buildings Directive has recently been strengthened, and the Sustainable Consumption and Production Action Plan led to the extension of the scope of the Ecodesign and Energy Labelling Directives to cover all energy-related products.

However, it is quite difficult to measure the environmental performance of a construction material independently from the construction work where it will be installed and used. For this reason it has not been possible to derive quantified SDIs for aluminium in buildings so far.

The following sections summarize the main qualitative aspects related to the sustainability of aluminium in buildings.

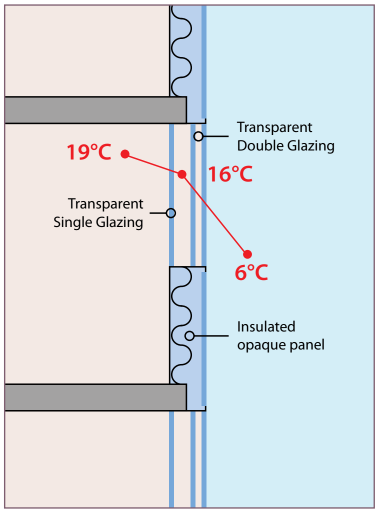
Today aluminium is utilised for a host of applications in building and construction and is the material of choice for curtain walling window frames and other glazed structures. It is extensively used for rolling blinds, doors, exterior cladding and roofing, suspended ceilings, wall panels and partitions, heating and ventilation equipment, solar shading devices, light reflectors and complete prefabricated buildings. Structures like offshore living quarters, helicopter decks, balustrades, scaffolding and ladders, are also commonly made in aluminium.

For further details, readers are invited to refer to the separate EAA brochure "Sustainability of Aluminium in Buildings (*)."

Aluminium in Buildings saves energy

a) during the winter season

In cold periods, heat losses need to be reduced, while solar gains have to be maximised. In this case, a large insulated glazing surface with a high solar gain will be used in the sunniest position, in the same way as it is frequently used in passive and energy-efficient buildings. Maximising the transparent areas of windows through the use of slender aluminium frames can also help to optimise such solar gains. The use of aluminium shutters in cold periods will also limit heat losses at night.
Buffer zone concepts such as double skin glazed facades further reduce energy losses.



Double skin glazed façade

(*) Available at http://www.eaa.net/en/applications/building/aluminium-in-buildings-brochure/

Ventilated cladding systems made of aluminium sheets protect the outer side of insulation materials against rain, which would cause their heat-saving properties to deteriorate. Furthermore, the air gap serves as an additional retainer of warmth. Ventilated façade systems make it possible to prevent considerable loss of energy.
Aluminium foils also protect insulation materials from the inner side, offering an impermeable barrier to moisture, gas and light. In addition, aluminium foil reflects infrared heat into the building, thereby improving insulation performance.

b) during the summer season

In hot seasons, solar gains need to be minimised in order to optimise the occupants' thermal comfort and to reduce air conditioning needs. As a result, in warm regions, low solar gain glass should be used with associated shading devices like solar blades or shutters often made with aluminium. In regions where winter and summer temperatures vary significantly, it is then crucial to design shading devices capable of optimising the window's solar gains according to the seasons.
A double skin glazed façade can also be designed to reduce solar gains, using its external layer and/or shading devices installed between its two skins.
Ventilated cladding systems made of aluminium sheets partially reflect solar radiation and ensure natural ventilation, which reduces the amount of heat that buildings absorb in hot weather.

Low maintenance and long service life

Apart from routine cleaning, neither bare nor painted aluminium requires any maintenance, which translates into a major cost and ecological advantage over the lifetime of a product.
Aluminium building products are made from alloys that are weatherproof, corrosion-resistant and immune to the harmful effects of UV rays, ensuring optimal performance over a very long period of time.
In 1898, the dome of San Gioacchino's Church in Rome was clad in aluminium sheets, which are still in pristine condition today, more than 100 years later.

Aluminium allows for efficient renovation

Aluminium enables "energy monsters" to be transformed into energy-efficient buildings.
For example, the Torenflat (high-rise apartment block) in the Netherlands contains 484 apartments on central corridors on 19 residential levels. One of the important objectives of this renovation, which was carried out entirely whilst people were living in the building, was to eliminate all the thermal bridges of the complex. This was achieved by enclosing the entire building in a 'warm jacket', a light

thermal skin comprised of fully prefabricated aluminium façade units that could be fixed onto the existing structure. Each apartment was given a new skin in one working day. By enclosing the building in this way, the thermal performance of the building was dramatically improved: the energy performance of the building has been improved by three categories according to the Dutch energy labelling system. This project combined minimal investment with the maximum social economic impact.

Life Cycle Assessment and Environmental Product Declarations

EAA is developing Environmental Product Declarations (EPDs) for aluminium building products in line with international ISO standards. An EPD is the most comprehensive and transparent type of environmental labelling, destined for business-to-business communication. It takes into account the entire product life cycle and computes a vast quantity of environmental information into a set of internationally recognised indicators, such as "use of primary energy", "water consumption", "greenhouse gas emissions", etc. in well known units as CO_2-equivalents. It is, moreover, verified by an independent third party.
Manufacturers' software generating EPDs is available for aluminium products.

End-of-life Recycling

A study by Delft University of Technology (*) revealed aluminium's considerable end-of-life recovery rate in the building sector. Aluminium collection rates taken from a large sample of commercial and residential buildings in 6 European countries were found to be in excess of 92% (on average 96%), demonstrating the value and preservation of the material at the end of the aluminium product life cycle. Collected aluminium products are subsequently reused or recycled.
In many instances, aluminium is combined with other materials such as steel or plastics, which are most frequently mechanically separated from aluminium before being recycled.

(*) "Collection of aluminium from buildings in Europe", Delft University of Technology (2004), http://www.eaa.net/en/applications/building/recycling/

Sustainable Development Indicators

ANNEX

ANNEX

This annex reports the response rates for each of the indicators of the production phase.

Notes:

- The data collection in this report relates to the EU27+EFTA countries, unless specified otherwise.
- n.a. = not available   L.D.= Limited Data
- % resp. is the rate of production generated by companies who answered the questionnaire in relation to the total production in the defined geographic area.

PLANT CERTIFICATION (page 15)

		ISO	OSHAS	%resp.
Alumina and Metal	1997	15%	4%	73%
	2002	60%	5%	82%
	2005	83%	41%	81%
	2008	94%	67%	81%
	2009	96%	68%	81%
Semi-fabrication	1997	14%	0%	56%
	2002	62%	5%	69%
	2005	79%	31%	71%
	2008	85%	82%	73%
	2009	88%	84%	73%
Aluminium Industry	1997	15%	2%	68%
	2002	61%	5%	78%
	2005	80%	35%	78%
	2008	88%	76%	79%
	2009	91%	78%	79%

'Alumina and metal production' includes alumina, primary smelting and recycling.

'Semi-fabrication' includes rolling and extrusion production.

'Aluminium industry' combines the two previous categories.

REVENUES AND INVESTMENTS (pages 15-16-17)

		TOTAL REVENUES		VALUE ADDED		CAPITAL INVESTMENTS		R&D EXPENDITURE		R&D PEOPLE EMPLOYED	
		M€	%resp	M€	%resp	M€	%resp	M€	%resp	Persons	%resp
Alumina and Metal	1997	12 265,1	37%	L.D.	24%	na	na	L.D.	22%	L.D.	27%
	2002	15 463,8	71%	3 670,8	70%	na	na	107,1	78%	622	76%
	2005	15 972,9	77%	4 477,8	73%	589,4	76%	148,7	69%	959	58%
	2008	17 378,9	78%	4 676,5	79%	708,4	76%	147,1	63%	741	47%
	2009	10 538,9	79%	2 288,8	76%	328,9	76%	142,7	68%	688	55%
Semi-fabrication	1997	16 687,5	36%	L.D.	29%	na	na	L.D.	24%	L.D.	26%
	2002	19 731,2	66%	5 219,4	58%	na	na	159,3	61%	974	55%
	2005	19 676,3	71%	6 746,1	71%	693,1	71%	98,3	71%	678	71%
	2008	22 572,9	65%	8 414,7	64%	926,4	70%	102,7	64%	679	67%
	2009	15 658,9	64%	6 242,5	65%	549,0	66%	104,0	62%	645	66%
Aluminium Industry	1997	28 952,6	37%	L.D.	27%	na	na	L.D.	23%	L.D.	27%
	2002	35 195,1	68%	8 890,2	63%	na	na	266,4	68%	1 595	63%
	2005	35 649,2	73%	11 223,9	72%	1 282,4	73%	247,0	70%	1 637	63%
	2008	39 951,8	70%	13 091,2	69%	1 634,9	73%	249,8	63%	1 420	56%
	2009	26 197,8	70%	8 531,2	68%	877,8	70%	246,7	65%	1 334	61%

EMPLOYEE DEVELOPMENT AND RELATIONS (pages 18-19)

		TOTAL NUMBER OF EMPLOYEES		TRAINING PERFORMANCE		WAGE LEVEL	
		Number	%resp	Hours	%resp	%	%resp
Alumina and Metal	1997	32 450	70%	19,9	34%	L.D.	20%
	2002	31 051	79%	35,9	73%	L.D.	27%
	2005	29 614	81%	31,7	66%	112,8%	49%
	2008	28 235	77%	28,5	75%	108,1%	49%
	2009	25 932	77%	28,7	75%	106,4%	46%
Semi-fabrication	1997	57 101	48%	13,5	40%	L.D.	22%
	2002	60 901	58%	19,3	55%	109,9%	49%
	2005	57 960	70%	28,0	57%	109,3%	54%
	2008	67 367	72%	33,4	37%	L.D.	32%
	2009	62 534	73%	29,4	36%	L.D.	23%
Aluminium Industry	1997	89 551	56%	15,8	38%	L.D.	21%
	2002	91 952	65%	24,9	61%	L.D.	33%
	2005	87 574	74%	29,2	60%	111,8%	50%
	2008	95 602	74%	32,0	48%	L.D.	45%
	2009	88 466	74%	29,2	47%	L.D.	40%

HEALTH AND SAFETY (pages 19-20-21)

		TOTAL RECORDABLE INCIDENT RATE		LOST TIME INCIDENT RATE		FATALITIES		EMPLOYEE EXPOSURE AND HEALTH ASSESSMENT	
		(*)	%resp	(*)	%resp	#	%resp	%penetr.	%resp
Alumina and Metal	1997	33,4	60%	11,7	60%	L.D.	L.D.	52%	73%
	2002	27,4	81%	12,4	81%	0	81%	90%	82%
	2005	9,4	81%	3,1	81%	1	81%	97%	81%
	2008	9,0	74%	4,6	74%	3	74%	98%	76%
	2009	8,3	77%	3,9	77%	2	77%	98%	74%
Semi-fabrication	1997	34,1	44%	18,3	44%	L.D.	L.D.	75%	56%
	2002	18,9	59%	10,7	59%	1	59%	89%	69%
	2005	12,4	59%	5,7	59%	2	59%	95%	71%
	2008	6,0	54%	2,8	54%	0	54%	89%	73%
	2009	5,0	51%	2,4	51%	1	51%	89%	68%
Aluminium Industry	1997	33,8	49%	15,4	49%	L.D.	L.D.	65%	68%
	2002	22,0	65%	11,3	65%	1	65%	89%	78%
	2005	11,3	65%	4,8	65%	3	65%	96%	78%
	2008	7,2	61%	3,5	61%	3	61%	92%	75%
	2009	6,2	58%	3,0	58%	3	58%	93%	73%

Note: the response rates of the indicators 6.1, 6.2, 6.3 and 6.4 all refer to the same EAA accident reporting.

(*) Number of accidents / 10^6 hours worked
(**) # days lost / 10^6 hours worked
L.D.= limited data, some sectors missing

COMMUNITY DEVELOPMENT AND RELATIONS (pages 22-23)

		COMMUNITY EXPENDITURE		COMMUNITY DIALOGUE		COMMUNITY HEALTH INITIATIVES	
		M€	%resp	%penetr.	%resp	%penetr.	%resp
Alumina and Metal	1997	L.D	33%	26%	73%	19%	73%
	2002	15,1	52%	53%	82%	29%	82%
	2005	7,8	66%	83%	81%	76%	81%
	2008	7,0	65%	77%	75%	72%	72%
	2009	3,4	67%	78%	67%	72%	69%
Semi-fabrication	1997	L.D.	28%	27%	56%	27%	56%
	2002	10,7	43%	42%	69%	41%	69%
	2005	13,0	58%	76%	71%	63%	71%
	2008	6,0	40%	78%	73%	65%	73%
	2009	L.D.	30%	81%	73%	66%	73%
Aluminium Industry	1997	L.D.	32%	27%	68%	23%	68%
	2002	25,8	50%	46%	78%	36%	78%
	2005	20,8	64%	79%	78%	68%	78%
	2008	13,0	59%	78%	74%	68%	72%
	2009	L.D.	57%	80%	69%	68%	70%

EMISSIONS AND SOLID WASTES (pages 23-24-25-26)

		GREENHOUSE GAS EMISSIONS	
		kgCO_2eq/t	%resp.
Alumina	1997	723	89%
	2002	757	89%
	2005	652	86%
	2008	638	96%
	2009	688	95%
Primary	1997	3 634	87%
	2002	2 703	85%
	2005	2 465	90%
	2008	1 993	96%
	2009	1 941	90%
Recycling	1997	411	40%
	2002	265	71%
	2005	214	67%
	2008	205	60%
	2009	197	63%
Rolling	1997	120	78%
	2002	115	85%
	2005	117	81%
	2008	111	93%
	2009	117	93%
Extrusion	1997	L.D.	27%
	2002	146	38%
	2005	162	34%
	2008	148	38%
	2009	164	35%

		BAUXITE RESIDUE DEPOSITED	
		kg/t	%resp
Primary	1997	673,0	89%
	2002	713,4	89%
	2005	706,0	86%
	2008	667,2	96%
	2009	530,3	95%

		HAZARDOUS WASTE DEPOSITED	
		kg/t	%resp
Semi-fabrication	1997	n.a.	n.a.
	2002	n.a.	n.a.
	2005	3,25	62%
	2008	3,10	68%
	2009	2,82	70%

		FLUORIDE EMISSIONS		BAP EMISSIONS		SPENT POT LINING	
		kg/t	%resp	g/t	%resp	kg/t	%resp
Primary	1997	1,24	87%	3,20	87%	22,90	87%
	2002	0,98	93%	1,44	92%	19,77	93%
	2005	0,96	90%	1,11	69%	14,78	90%
	2008	0,62	86%	0,65	51%	17,83	77%
	2009	0,56	87%	0,69	48%	24,76	79%

RESOURCE USE AT GLOBAL LEVEL (pages 26-27)

		BAUXITE AREA MINED
		km²
Bauxite/ Alumina industry	1997	16
	2002	20
	2005	25
	2006	30

		MINE REHABILITATION RATE	
		Mined area	Rehabilitated area
		m²/t	m²/t
Bauxite/ Alumina industry	1997	0,20	0,15
	2002	0,18	0,14
	2005	0,20	0,16
	2006	0,16	0,16

RESOURCE USE AT EUROPEAN LEVEL (pages 27-28-29)

		ELECTRICAL ENERGY CONSUMPTION	
		kWh/t	%resp
Primary	1997	15 630	87%
	2002	15 434	85%
	2005	14 869	90%
	2008	14 999	96%
	2009	15 055	90%
Rolling	1997	547	78%
	2002	526	85%
	2005	662	81%
	2008	503	93%
	2009	526	93%
Extrusion	1997	L.D.	27%
	2002	792	43%
	2005	736	34%
	2008	737	38%
	2009	795	35%

		OTHER ENERGY CONSUMPTION	
		MJ/t	%resp.
Alumina	1997	10 509	89%
	2002	10 583	89%
	2005	9 227	86%
	2008	9 061	96%
	2009	10 413	95%
Primary production	1997	16 226	87%
	2002	15 128	85%
	2005	14 672	90%
	2008	14 702	96%
	2009	14 748	90%
Recycling	1997	6 645	40%
	2002	4 404	71%
	2005	3 715	67%
	2008	3 668	63%
	2009	3 490	61%
Rolling	1997	2 153	78%
	2002	2 034	85%
	2005	2 083	81%
	2008	2 020	93%
	2009	2 141	93%
Extrusion	1997	L.D.	27%
	2002	2 491	43%
	2005	2 874	34%
	2008	2 603	38%
	2009	2 926	35%

		RENEWABLE ELECTRICAL ENERGY	
		%	%resp
Primary	1997	41%	74%
	2002	45%	83%
	2005	46%	80%
	2008	45%	70%
	2009	48%	67%

		FRESH WATER USE	
		m³/t	%resp.
Metal Production	1997	28,1	74%
	2002	12,6	80%
	2005	12,9	70%
	2008	7,4	71%
	2009	7,7	71%
Semi- fabrication	1997	10,1	59%
	2002	6,0	64%
	2005	4,1	56%
	2008	2,5	63%
	2009	2,4	64%

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Aluminium for Future Generations