Aluminium for Future Generations/2008 update

The *Aluminium for Future Generations* initiative is a programme of continuous improvement on the part of the global aluminium industry, overseen by the *International Aluminium Institute* (IAI). It comprises voluntary objectives for improvements in the sector's social, economic and environmental performance all across the key phases of aluminium's life cycle. There are currently thirteen voluntary objectives, agreed by the IAI's Board of Directors – chief executives of the Institute's twenty three member companies – and the number is increasing year by year. The industry's performance is measured annually against quantitative performance indicators.

This update reports on the survey results for 2007 performance of IAI member companies, which are collectively responsible for up to 80% of global primary aluminium production and around 20% of recycled metal production. For further information on IAI members and activities visit www.world-aluminium.org.

Year 2007 performance data was collected from:

- Smelters producing 24 million tonnes of primary aluminium, equivalent to over 60% of total global production;
- Refineries producing 50 million tonnes of smelter grade alumina, equivalent to almost 70% of total global production;
- Mines producing over 120 million tonnes of bauxite, equivalent to almost 70% of total global production.

Overarching Objective

The industry aims to increase continuously facility participation in the IAI's global surveys.

2007 Sustainability Performance

Voluntary Objective 1

New Objective: Following an 86% reduction in its PFC emissions per tonne of primary aluminium produced between 1990 and 2006, the global aluminium industry will further reduce emissions of PFCs per tonne of aluminium by at least 50% by 2020 as compared to 2006, equivalent to a reduction of 93% compared to 1990.

- The primary aluminium industry seeks to achieve the long term elimination of perfluorocarbon (PFC) emissions.
- Coverage of the annual Survey of PFC emissions from IAI member and non-member aluminium producers has doubled from a global aluminium production of 12 Mt in 1990 to 24 Mt (64% of the industry's production) in 2007. Through the efforts of its member companies, the IAI is striving to increase the global aluminium production coverage of its annual Surveys to over 80%.
- Based on IAI annual Survey results, by 2020 IAI member companies commit to operate with PFC emissions per tonne of production no higher than the 2006 global median level for their technology type.
- Progress will be monitored and reported annually and reviewed periodically by a recognised and independent third party. There will be interim reviews to ensure progress towards achievement of the 2020 objective

Old Objective: An 80% reduction in PFC (perfluorocarbon) greenhouse gas emissions per tonne of aluminium produced for the industry as a whole by 2010 versus 1990 levels.

A further improvement in the aluminium industry's perfluorocarbon (PFC) emissions performance was reported in 2007. These results continue the global aluminium industry's trend of significant reductions in PFC emissions (CF_4 and C_2F_6), on a total as well as per tonne of production basis. The 2007 data, which for the first time includes all Russian facilities and almost 100% of the higher PFC emitting Side Worked Prebake and Søderberg technology categories, confirm the 2006 achievement of the global industry's voluntary objective to reduce PFC emissions by 80% per tonne of aluminium produced on a 1990 baseline.

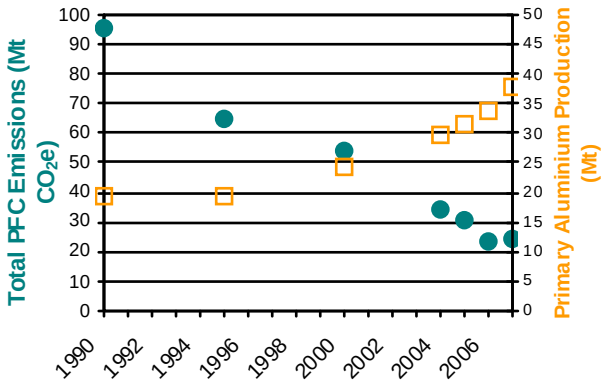
The 2007 dataset covers around 80% of the industry's PFC emissions and 64% of global aluminium production (up from 60% in 2006) and indicates that the global aluminium industry (including both survey participants and non-participants) has reduced per tonne of production emissions of PFCs by 87% since 1990, from 4.93 to 0.65 t CO_2e/t Al.

Anode Effects & Perfluorocarbons

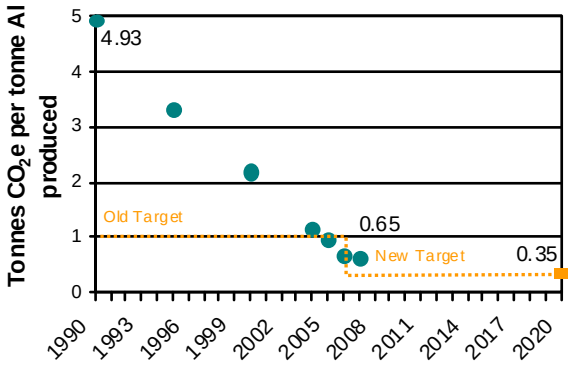
Perfluorocarbons, or PFCs, are a group of potent greenhouse gases with long atmospheric lifetimes (in the thousands of years), of which the greatest volume is emitted from industrial processes. PFCs are occasionally produced in the primary aluminium electrochemical smelting process during events known as "anode effects".

An anode effect is a process upset condition where an insufficient amount of alumina (Al_2O_3), the raw material for primary aluminium production, is dissolved in the electrolyte bath, contained in the electrolytic cells within a smelter reduction line, causing voltage to be elevated above the normal operating range and resulting in the emission of gases containing the PFCs tetrafluoroethane (CF_4) and hexafluoroethane (C_2F_6).

Total PFC emissions to the atmosphere in 2007 from primary aluminium production were less than 25 Mt of CO_2e, a reduction of 74% from 1990 levels, despite a doubling in aluminium production over the same period.



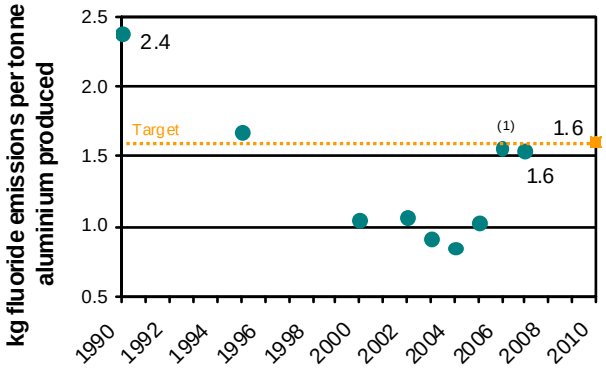
There is still a considerable range of anode effect performance seen in the benchmark data for facilities operating with similar reduction technologies. This indicates that there is still the opportunity to make further progress in reducing anode effects and the resulting PFC emissions from a greater achievement of industry best practice.



Having met its voluntary objective to reduce emissions by 80% per tonne between 1990 and 2010 four years ahead of schedule, the global aluminium industry has set itself a further PFC emissions reduction voluntary objective that will drive the industry toward further PFC emissions performance improvement to 2020:

Voluntary Objective 2

A minimum 33% reduction in fluoride emissions by IAI member companies per tonne of aluminium produced by 2010 versus 1990.

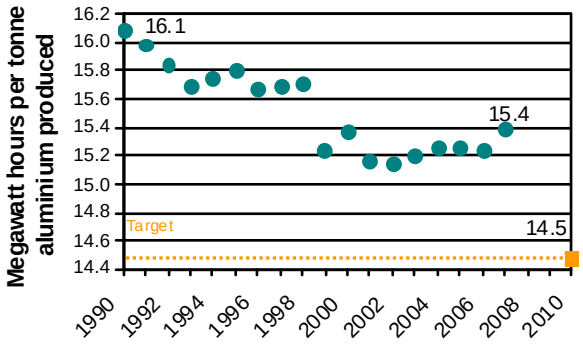


Total fluoride emissions (gaseous and particulate) were reduced by over 35% per tonne of aluminium produced between 1990 and 2007, exceeding the 2010 voluntary objective. The 2006 and 2007 data include for the first time all Russian facilities.

(1) Revision of 2006 data.

Voluntary Objective 3

A 10% reduction in smelter electrical energy usage by IAI member and reporting companies per tonne of aluminium produced by 2010 versus 1990.

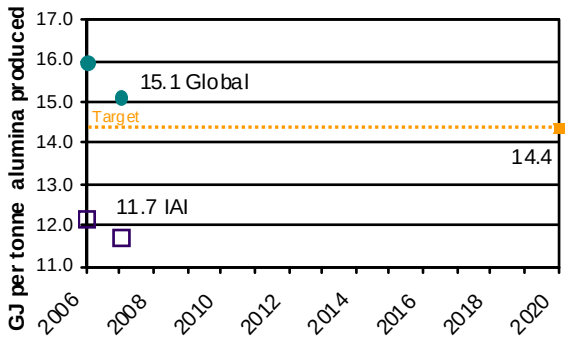


The average electrical energy required by the smelting process to produce one tonne of aluminium from alumina was cut by 4% between 1990 and 2007, mainly through investment in new production capacity. The 2007 survey results show an increase in average electrical energy consumption compared with the previous six years.

Voluntary Objective 4

New Objective: a 10% reduction in energy use per tonne of alumina produced for the industry as a whole by 2020 versus 2006 levels.

Old Objective: The IAI member companies will seek to reduce GHG emissions from the production of alumina per tonne of alumina produced.



On the global average (90% of global production), 15 GJ energy are used in Low Temperature, High Temperature and Bayer Sinter processes to produce one tonne of alumina in 2007. This equals a reduction of 5% compared to 2006. Data are based on 39 IAI reporting companies supplemented with CRU data for 16 companies. IAI surveyed plants reported 11.7 GJ energy consumption per tonne of alumina produced in 2007, compared to 12.2 GJ in 2006.

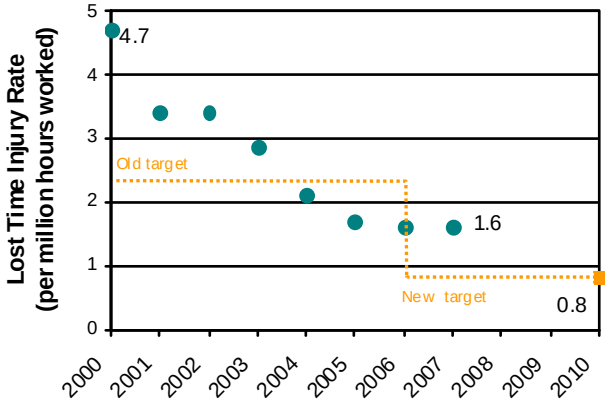
Voluntary Objective 5

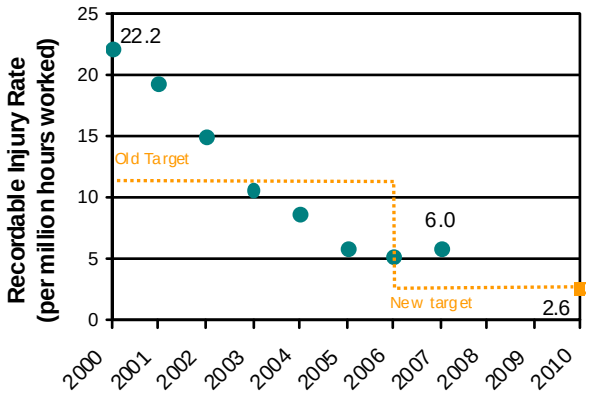
New Objective: A 50% reduction in the lost time injury frequency rate and total recordable injury frequency rate by 2010 versus 2006 by IAI member and reporting companies.

Old Objective: A 50% reduction in the lost time injury frequency rate and total recordable injury frequency rate by 2010 versus 2000 by IAI member companies.

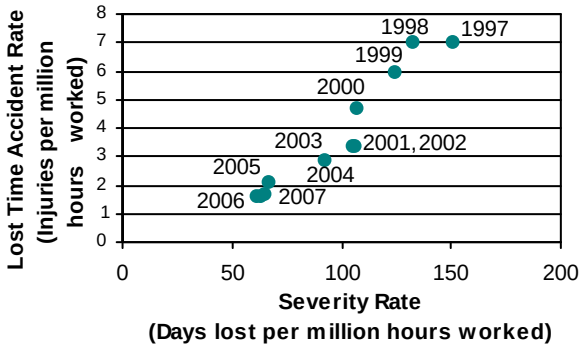
Safety performance data is collected in a survey with a wider reporting base than IAI membership. The survey was initiated in 1997, with a coverage of 107 million working hours. In 2007 the number of working hours surveyed had risen to 412 million. The survey now covers 101 aluminium smelters, 37 alumina refineries and 19 bauxite mines.

The old objective was reached in 2003 and 2004 respectively. In light of this achievement a new target was developed in 2006.





The total recordable injury frequency rate has increased by 15% between 2006 and 2007. The lost time injury frequency rate has remained constant during the same period. A focus on improving injury rates has also seen the number of days lost per injury (the severity rate) decrease by 58% between 1997 and 2006.



Improvement in the industry's injury rates is being driven by factors including increased top management attention and commitment to safety, a more systematic approach to the analysis and follow up of accidents and higher levels of involvement of the workforce, as well as mechanization and automation as a means of reducing hazards and safety risks.

Voluntary Objective 6

Implementation of Management Systems for Environment (including ISO 14000 or equivalent certification) and/or Health and Safety in 95% of IAI member companies' plants by 2010.

In 2007 the industry achieved this objective, with 99% of surveyed plants having EHS management systems in place. Of the surveyed facilities 97% had achieved ISO 14000 certification, while 52% were OHSAS 18000 certified.

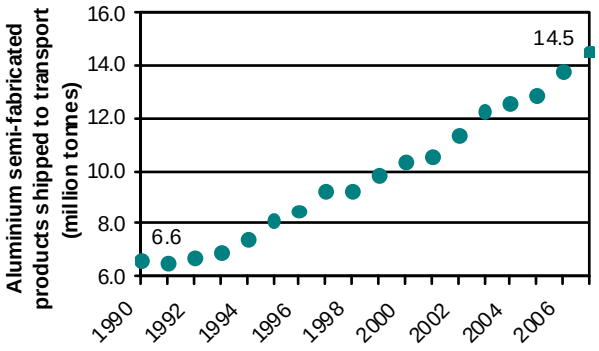
Voluntary Objective 7

Implementation of an Employee Exposure Assessment and Medical Surveillance Programme in 95% of IAI member companies' plants by 2010.

In 2007, 100% of the surveyed plants had employee exposure assessment and medical surveillance programmes in place, as defined in IAI published guidelines.

Voluntary Objective 8

The industry will monitor annually aluminium semis shipments for use in transport in order to track aluminium's contribution through light-weighting to reducing greenhouse gas (GHG) emissions from road, rail, air and sea transport.



Aluminium semi-fabricated products shipped to the transport sector increased by approximately 27% in the five years from 2002. Global greenhouse gas savings from the use of aluminium for lightweighting vehicles have the potential to double between 2005 and 2020 to 500 million tonnes of CO_2 per year.

Voluntary Objective 9

The IAI has developed a mass flow model to identify future recycling flows. The industry will report regularly on its global recycling performance.

The aluminium industry is a pioneer in tracking the global flows of its products through the full value chain from mining, through use, to recycling and reuse. To do so it has developed a comprehensive mass flow model based on "Material Flow

Analysis" methodology. The industry illustrates the model's output in a flow chart, which is made available to the public on an annual basis. The IAI has published annual mass flow charts since 2003.

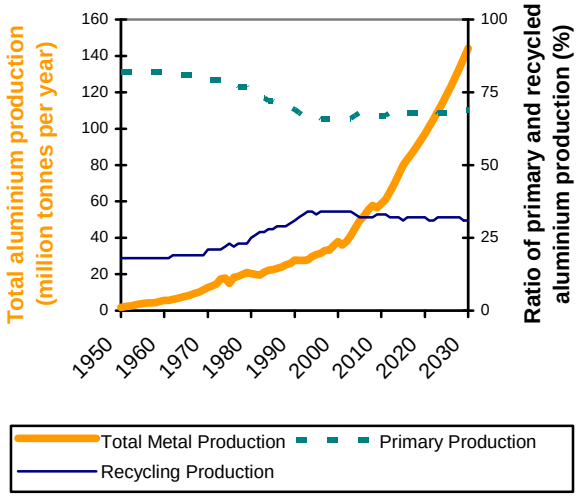
The industry is continuously improving the model, with more accurate statistics and with the help of research centres and universities. Due to uncertainties in the data on product life times and recycling rates for some products in certain regions, the IAI is conducting additional research on the 3.5 million tonnes of scrap which has been identified as possibly available for recycling or stored in use.

Around 44 million tonnes of aluminium, from primary and recycled sources, ended up in finished products in 2007.

In the same year, approximately one-third of the metal in products available on the market is sourced from recycled (18 million tonnes) and two-thirds from primary metal (38 million tonnes). Projected growth rates in the demand for aluminium products, combined with the long lifetimes of most products, suggest that this ratio of recycled to primary sourced metal is unlikely to change in the short to medium term.

Around 8.3 million tonnes of scrap from used products (old scrap) were recovered globally in 2007.

Three quarters of all the aluminium ever produced (since the 1880s) is still in productive use. In 2007 this stock had grown to more than 610 million tonnes. Of the aluminium currently stored in productive use, equally one third is in buildings (windows, roofing, cladding etc), transport (automotive, public transport etc.) and engineering & cable (overland cable, machinery) applications.



The global stock of aluminium in productive use is growing every year, in 2007 by 27 million tonnes.

The results of the mass flow model in 2007 are shown in the diagram on page seven.

Voluntary Objectives 10 & 11

The IAI member companies will seek to reduce their fresh water consumption per tonne of (10) aluminium and (11) alumina produced.

IAI member companies will concentrate efforts to minimise fresh water consumption where there are limited available fresh water resources.

Fresh water is a significant issue to the industry and The Institute continues to collect data on fresh water consumption. There are some smelters that operate with very low water usage and progress is being made in reducing water use in many refineries. Due to differences between regions and facilities in the definitions of fresh water consumption and in the level of fresh water stress, further analysis and development of indicators is required before full quantification of the industry's environmental impact can be assessed.

Voluntary Objective 12

The IAI member companies will seek to increase the proportion of bauxite mining land rehabilitated annually.

Globally, bauxite mining disturbed around 30 km^2 in 2006, an area equivalent in size to one half of Manhattan Island, NY. In the same year, an equivalent area of mined land was rehabilitated. Bauxite mining has therefore reached a steady state in which newly mined areas are offset by rehabilitation of existing mining areas.

Voluntary Objective 13

The Aluminium Industry recognises that spent pot-lining has properties that makes it a valuable material for use in other processes and will therefore strive to convert all spent pot-lining into feedstocks for other industries, which include cement, steel, mineral wool and construction aggregate companies or to re-use and or process all SPL in its own facilities.

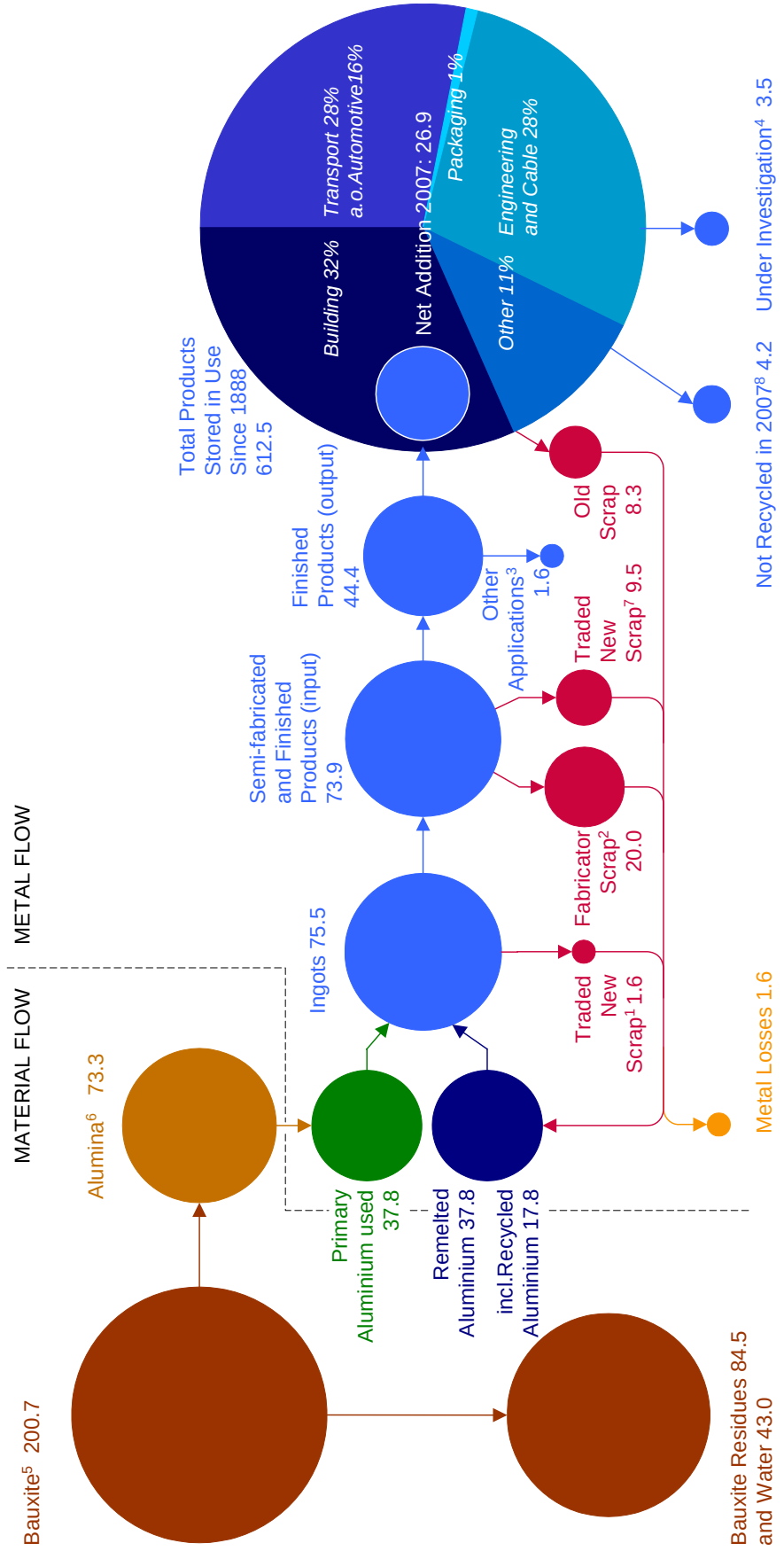
Pending final deposition, the industry will endeavour to store all spent pot-lining in secure, waterproof, ventilated buildings/containers that will maintain the spent pot-lining in a dry state with no potential for the build up of noxious gases.

Spent pot lining (SPL) is an unavoidable by-product of the aluminium smelting process. On average, 15-35 kg of SPL is produced per tonne of aluminium. Reporting plants have increased from 51 to 73 plants increasing the reported production from 13 to 16 million tonnes. In 2007, 27% of SPL output was recycled externally out of a total reported output of 406 thousand tonnes of SPL. About 58% of the SPL output was deposited in form of treated deposition or stored pending final deposition or recycling.

The industry has systematically worked to minimize the amount of SPL produced, by extending the lifetime of the lining in the smelter pots. Since the 1970s, SPL has been recognised as a valuable resource for other industries, including as a feedstock in the cement, mineral wool and steel production processes. However, the main barrier to supply of SPL as a feedstock has been economics. Individual smelters do not produce enough SPL to provide a continuous supply of feedstock for a cement plant to justify their conversion to receiving this material. Through collaboration with potential customers, and between companies to increase regional supply, the recycling of this material has become more viable and widespread.

International Aluminium Institute
New Zealand House,
80 Haymarket,
London,
SW1Y 4TE
UK

Tel: +44 (0) 20 7930 0528
Email: iai@world-aluminium.org
Website: www.world-aluminium.org



Values in millions of metric tonnes. Values might not add up due to rounding. Production stocks not shown
1 Aluminium in skimmings; 2 Scrap generated by foundries, rolling mills and extruders. Most is internal scrap and not taken into account in statistics; 3 Such as powder, paste and deoxidation aluminium (metal property is lost) 4 Area of current research to identify final aluminium destination (reuse, recycling or landfilling); 5 Calculated based on IAI LCI report - update 2005. Includes, depending on the ore, between 30% and 50% alumina; 6 Calculated. Includes on a global average 52% aluminium; 7 Scrap generated during the production of finished products from semis; 8 Incinerated with/without energy recovery, dissipated into other recycling streams or landfilled.