

The Aluminium Industry's Global Approach to Climate Change: *Theory, Method & Practice*

ICC Workshop on
Sectoral Approaches

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Key Elements of the Aluminium Industry's Voluntary Sectoral Approach



Global coverage

- IAI membership 80% of world production
- Data from over 60% of primary production
- Lifecycle approach to climate change mitigation

Common methodologies

- Alu Sector GHG Protocol (2006)
- IPCC National GHG Inventories Guidance (2006)
- IAI / USEPA PFC Measurement Methodology (update due in 2008)
- ISO14064 GHG M'ment (2006)
- ISO14044 LCA (2006)

Voluntary objectives

- Common global quantitative goals
- PFCs per tonne aluminium reduction of 80% by 2010 compared to 1990
- Energy efficiency improvement of 10% by 2010 compared to 1990

Over 80% reduction in PFCs (as CO₂eq) per tonne of aluminium produced between 1990 & 2006

75% reduction in TOTAL PFC emissions between 1990 & 2006 despite 80% growth in production

14% reduction in TOTAL direct GHG emissions between 2000 & 2005 despite a 20% growth in production

Reporting & Verification

- PFC data from 1990 to 2006
- Life Cycle Inventories in 2000 and 2005
- Database of **ALL** GHG emissions from Al production
- Data published annually – www.world-aluminium.org
- External verification

Performance drivers

- Benchmarking within technologies and over time
- Best practice sharing
- Expertise & equipment to conduct GHG measurements for accurate Tier 3 accounting

“Aluminium for Future Generations” Global Sustainability Initiative

13 voluntary objectives covering key indicators, including:



Voluntary Objective 1

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

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

Voluntary Objective 7

- 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.

Voluntary Objective 8

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

Voluntary Objective 11

- A 10% reduction in alumina refinery energy usage per tonne of alumina produced for the industry as a whole by 2020 versus 2006

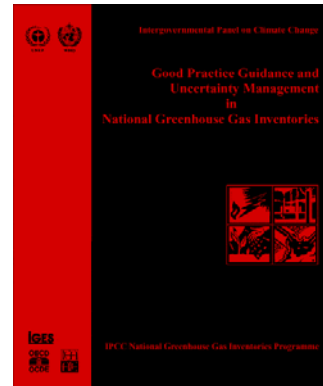


ANNUAL DATA REPORTING & BENCHMARKING

Transparent and Accurate GHG Inventory Data from Interlocking Standards

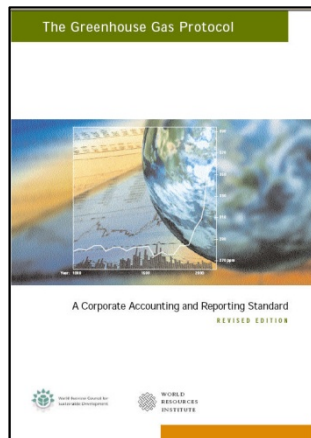


IPCC Good Practice
Guidance



<http://www.ipcc-nggip.iges.or.jp>

WRI/WBCSD Corporate
Good Practice Standards



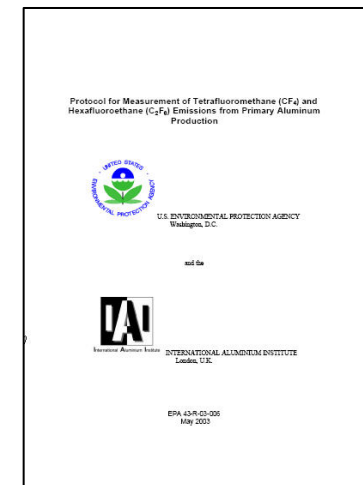
<http://www.ghgprotocol.org/>

IAI Industry GHG Protocol



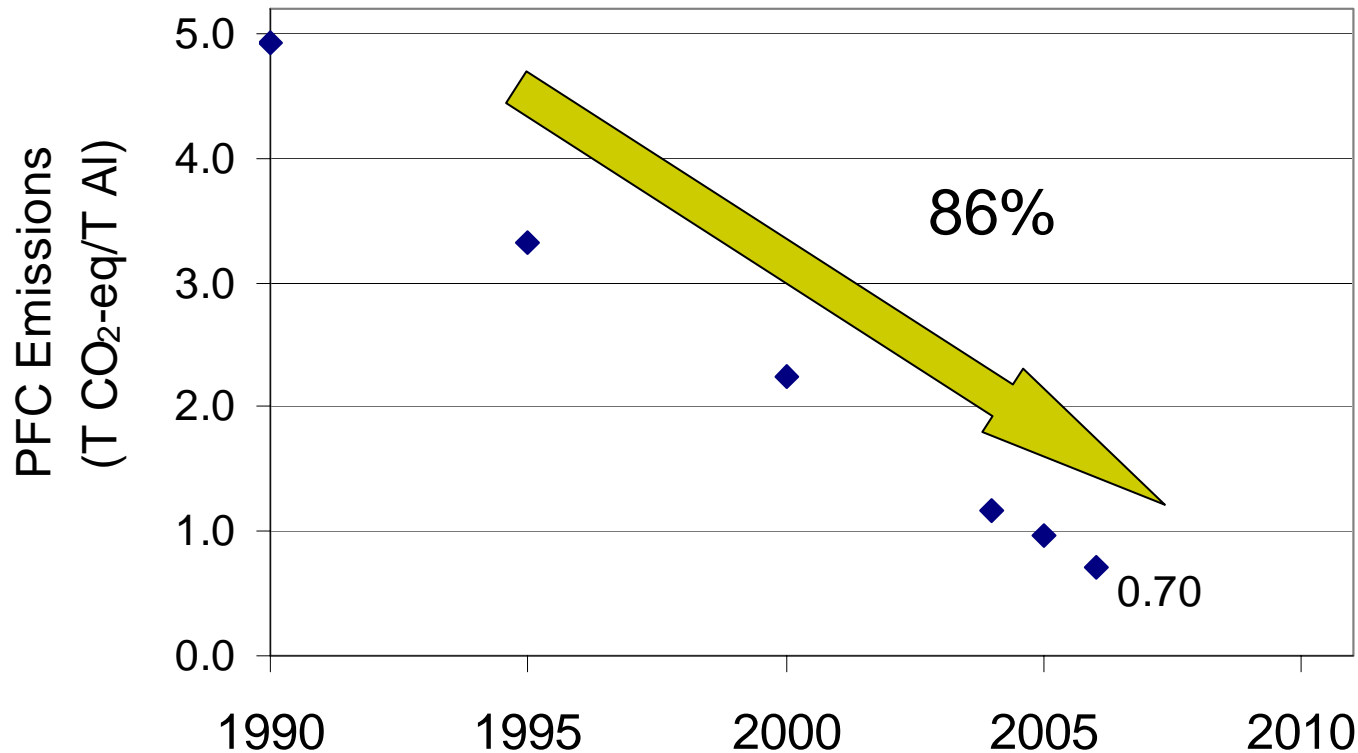
<http://www.world-aluminium.org/cache/fl0000127.pdf>

USEPA/IAI PFC
Measurement Protocol



<http://www.epa.gov/highgwp/aluminum-pfc/pdf/measureprotocol.pdf>

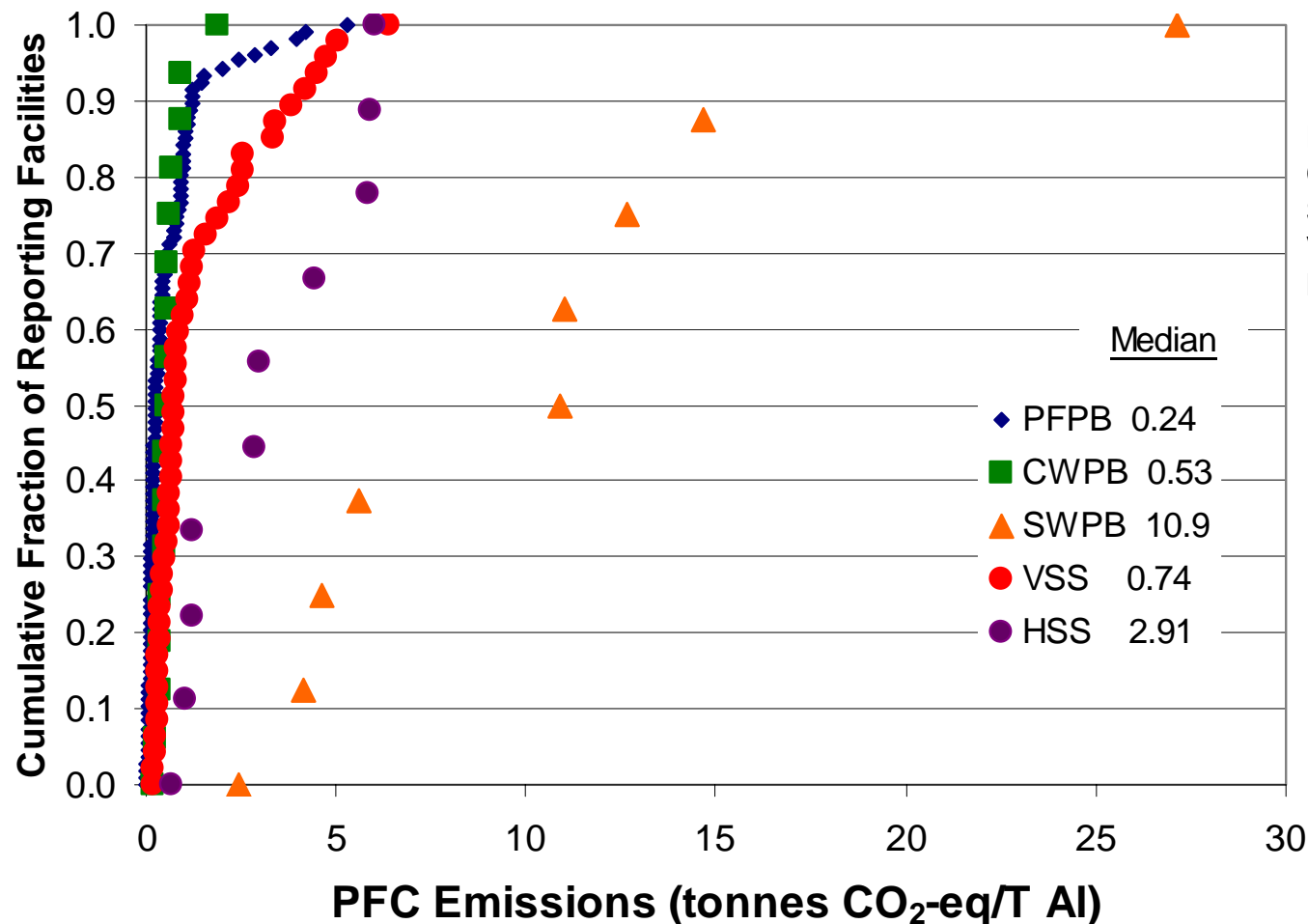
While primary aluminium production increased by 80% between 1990 and 2006, from 20 to 36 million tonnes pa Total direct greenhouse gas emissions from the global aluminium industry were reduced by over 30%



- Perfluorocarbon (PFC) emissions were reduced by 86% per tonne of aluminium between 1990 and 2006.
- This equates to a reduction in total PFC emissions of 75%, despite increasing demand for aluminium.

Benchmark Data on PFC Emissions per tonne of Aluminium Production

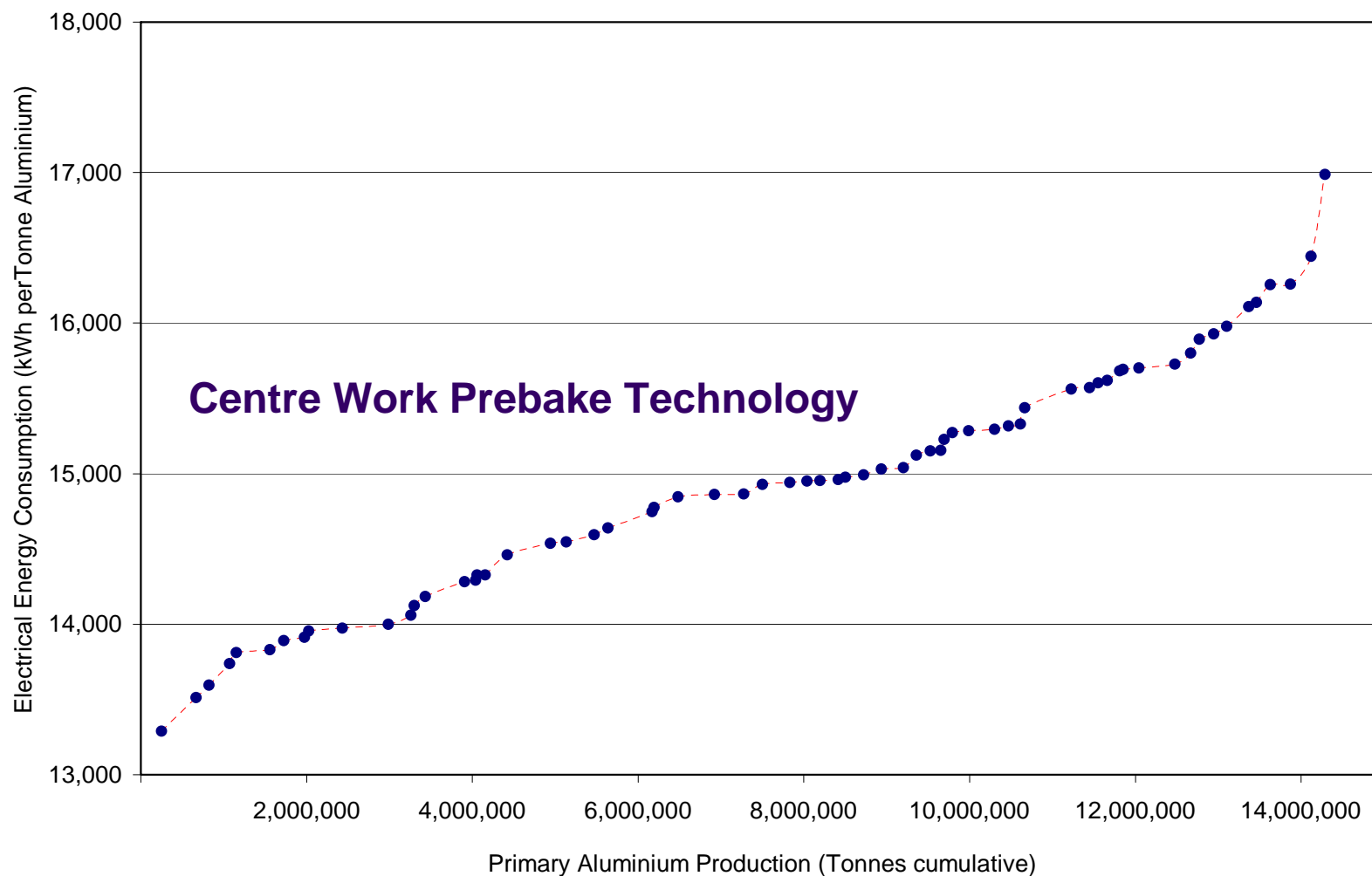
An Opportunity for Improved Performance



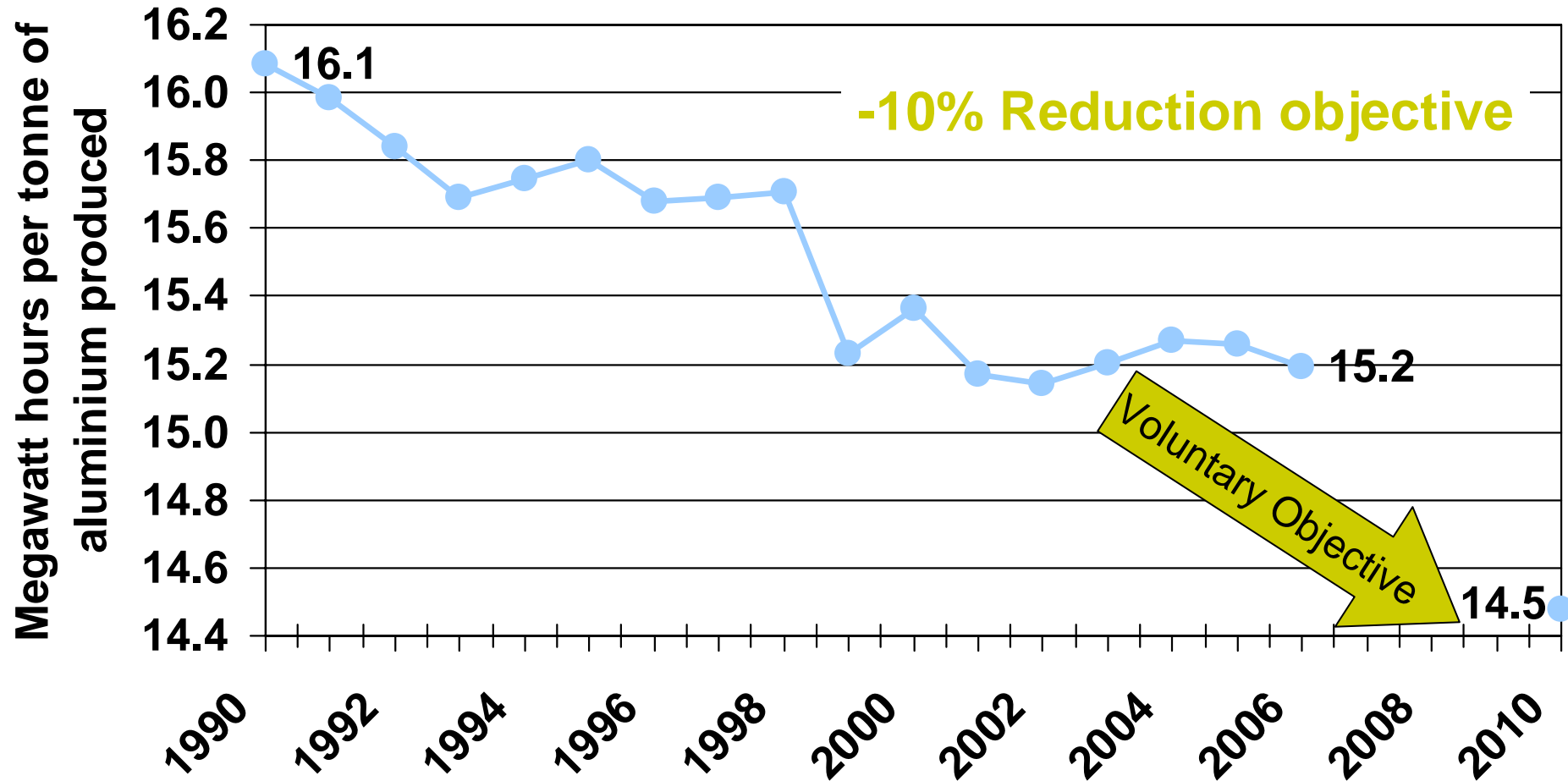
PFPB – Point Fed Prebake
CWPB – Centre Work Prebake
SWPB – Side Work Prebake
VSS – Vertical Stud Søderberg
HSS – Horizontal Stud Søderberg

Source: IAI 2006 Anode Effect Survey

BENCHMARKING: Primary Aluminium Smelting - Electrical (AC) Energy Consumption

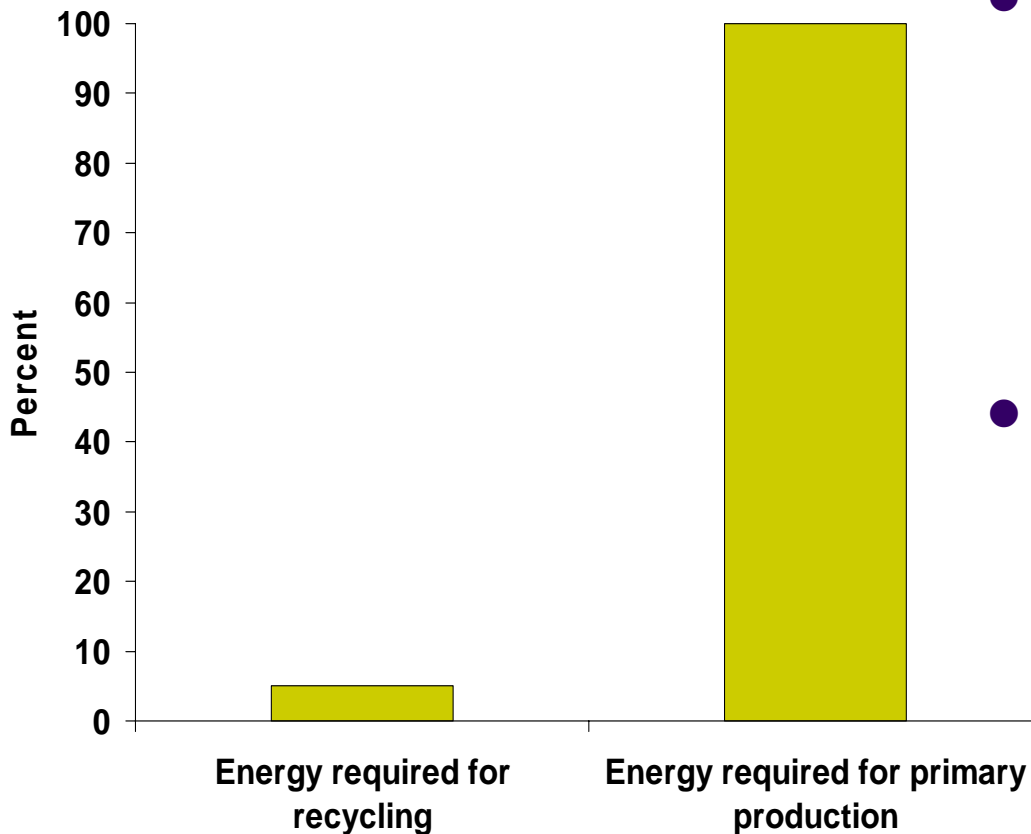


The electrical energy required to produce a tonne of aluminium has been reduced by 6% since 1990



Source: IAI 2006 Energy Survey

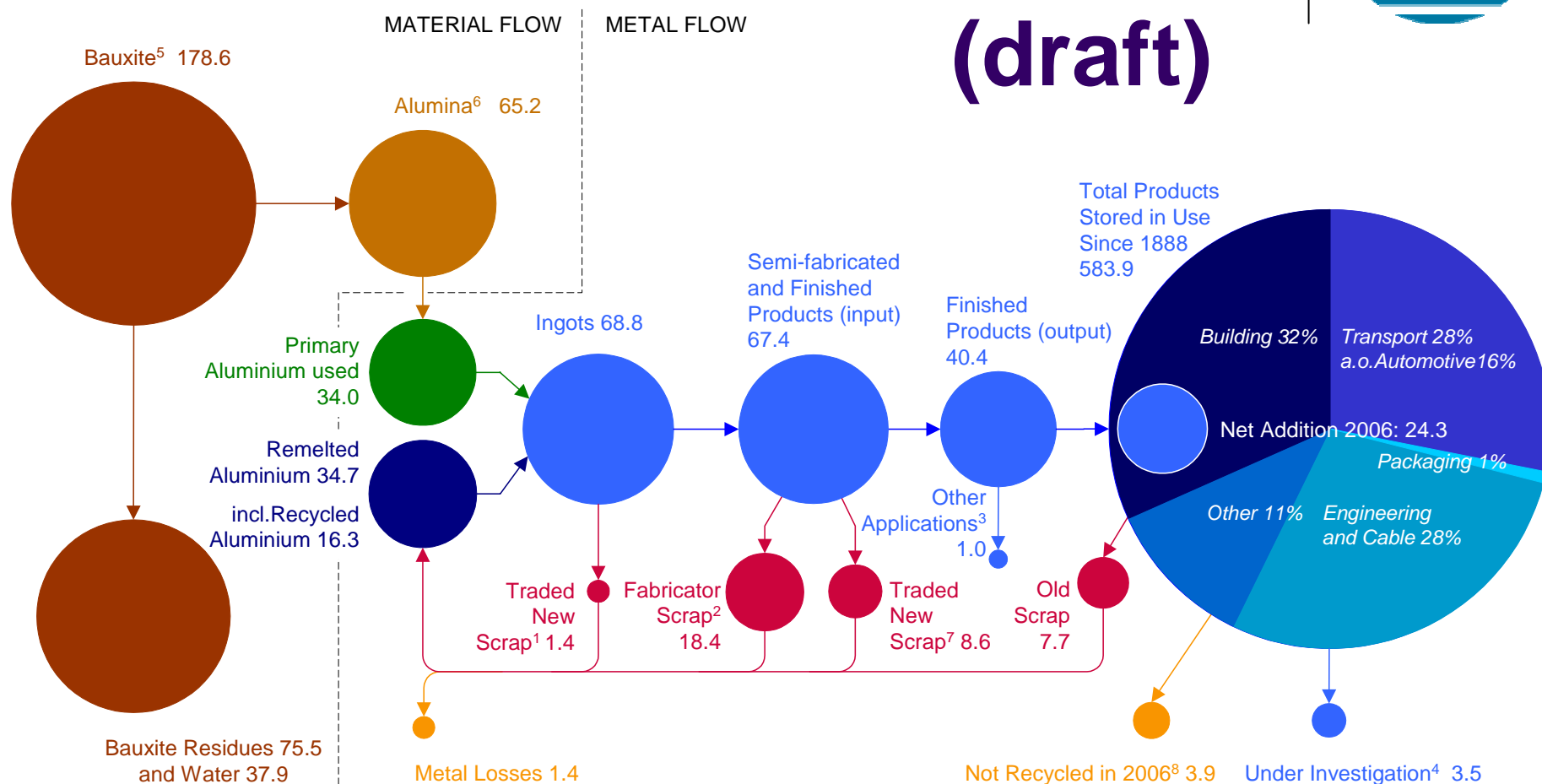
Recycling aluminium conserves energy



- The recycling of aluminium requires up to 95% less energy than that required for primary aluminium production.
- Recycling aluminium from used products saves an estimated 84 million tonnes of greenhouse gas emissions per year.

Global aluminium flow 2007

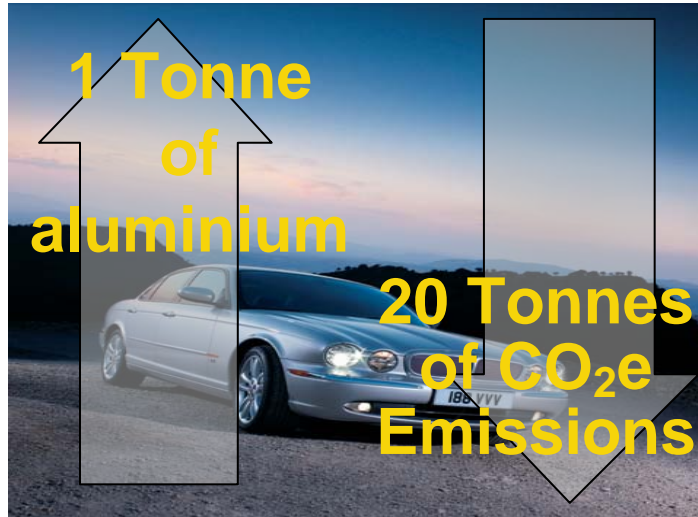
(draft)



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 Landfilled, dissipated into other recycling streams, incinerated, incinerated with energy recovery.

Serving our customers in a carbon- constrained world



Cars for today & tomorrow



Sustainable trains

Globally, the use of aluminium in cars & light trucks produced in 2006 will lead to potential savings, over the lifecycle of the vehicles of:

- around 140 million tonnes of CO₂ equivalent greenhouse gases;
- primary energy equivalent to over 50 billion litres of crude oil.

Realisation of the Aluminium Industry's Voluntary Global Approach to Climate Change



- Clear criteria for the sector and outside stakeholders to evaluate the performance of the global industry, individual corporations and facilities
- Transparent objectives, clearly defined performance indicators and annual reporting by majority of industry (>60% production)
- Global programme, equally applicable to operations in developed, emerging and developing economies
 - Data indicates comparable performance between OECD and non-OECD country-based primary aluminium production facilities
- The IAI Directors – CEOs of Member Companies – exert pressure on their peers on the Board to improve performance towards VOLUNTARY objectives
- Facility benchmarking stimulates improved performance and raises awareness among management and operators
- Efficient spread of good practice and raised awareness of possible technological and operational improvement
- Data enables IAI to model direct & indirect GHG emissions associated with aluminium production in the future and savings from recycling and use of aluminium in energy-saving applications

AND, MOST SIGNIFICANTLY...

...significant reductions in GHG emissions whilst managing growth



86% reduction in perfluorocarbon (PFC) emissions per tonne of production between 1990 & 2006 despite 80% growth in production

75% reduction in TOTAL PFC emissions between 1990 & 2006

14% reduction in TOTAL direct greenhouse gas emissions between 2000 & 2005 despite a 20% growth in production

17% reduction in greenhouse gas emissions from both direct and indirect sources per tonne of production between 2000 & 2005

Thank You

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Backup



GHG Emissions & Al Production



Alumina Production

1.0 – 2.5 t CO₂eq/t Al

IAI survey average = 1.5

Electricity Input

15.3 MWh/t Al

0 – 20.8 t CO₂/t Al

IAI survey average = 5.5

PFC Generation

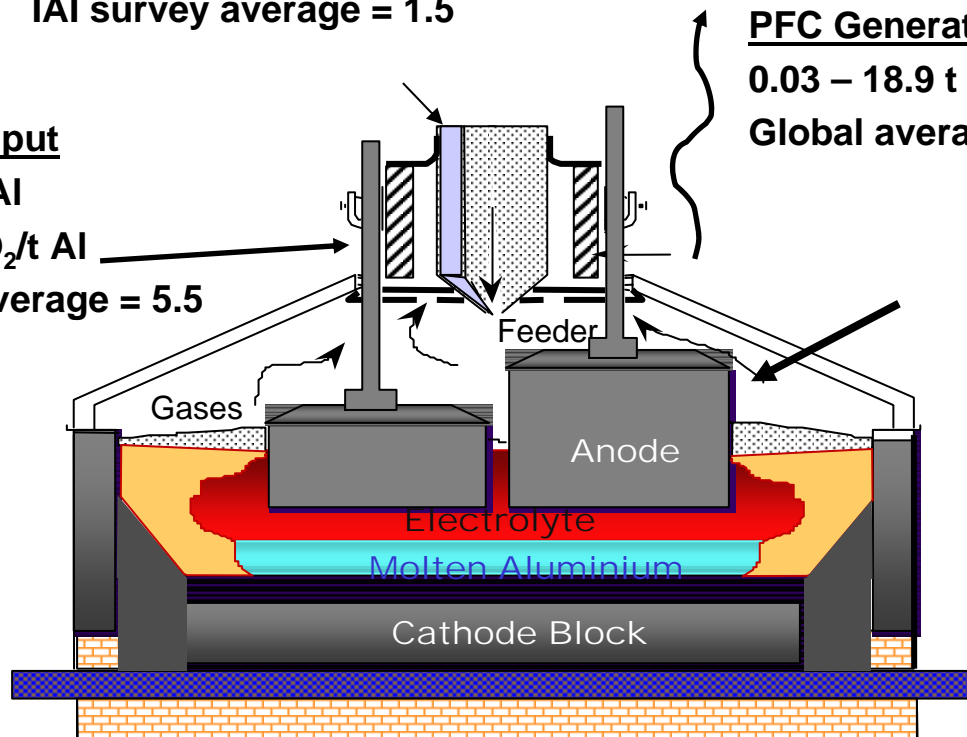
0.03 – 18.9 t CO₂eq/t Al

Global average = 0.7

Anode Carbon

1.7 – 2.1 t CO₂eq/t Al

IAI survey average = 1.8



Source: IAI 2005 Life Cycle Inventory
IAI 2006 Anode Effect Survey
IAI 2006 Energy Survey

- Two perfluorocarbon compounds (CF₄ and C₂F₆) contribute about 23% of direct primary aluminium greenhouse gas emissions
- Around ten tonnes of CO₂ equivalent are produced for each tonne of primary aluminium (from mining, refining, electrolysis and casting)

GHG Emissions: a summary of annual segmentation

