

The Global Sectoral Approach

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IAI/OECD/IEA Energy Efficiency Workshop

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www.world-aluminium.org



The Global Forum of Aluminium Producers



- Chairman Mr Oscar Groeneveld, Rio Tinto Aluminium.
- 26 Member companies.
- More than 70% of world primary aluminium production.



Global distribution of bauxite mines () and aluminium smelters (●)

Primary aluminium production by region 1980-2004

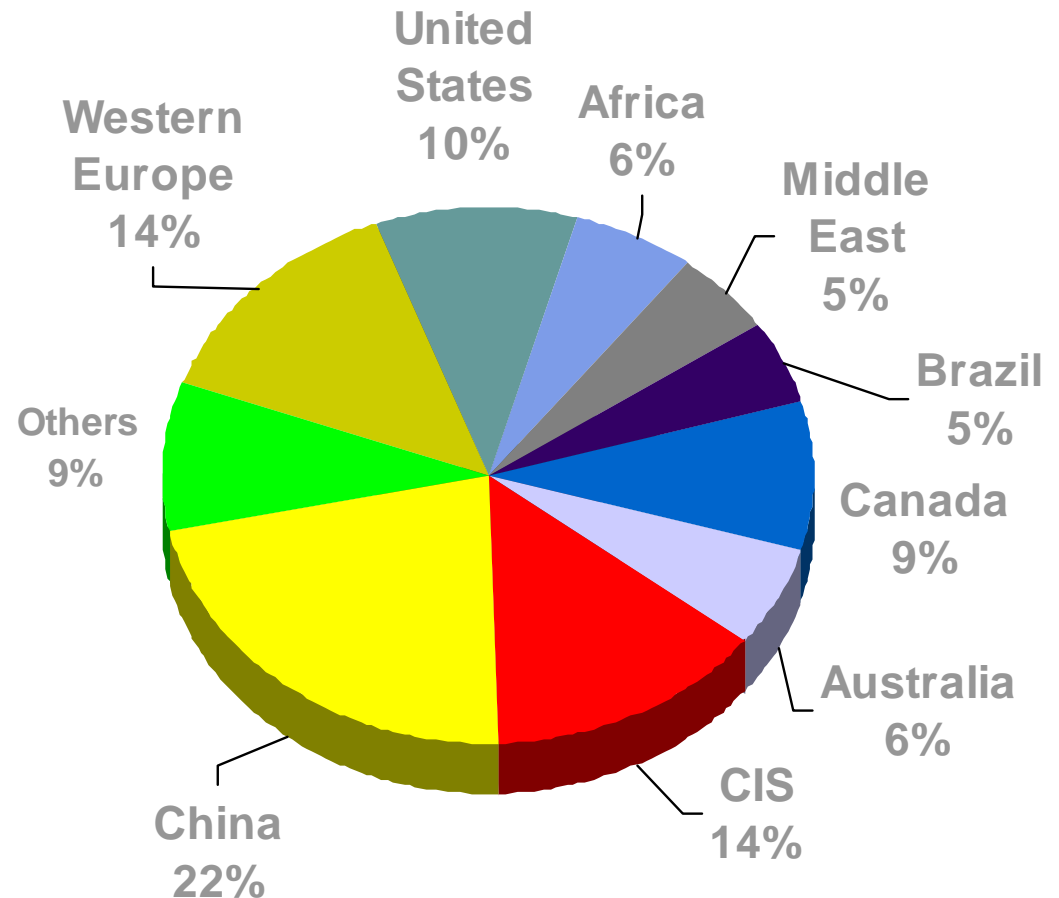
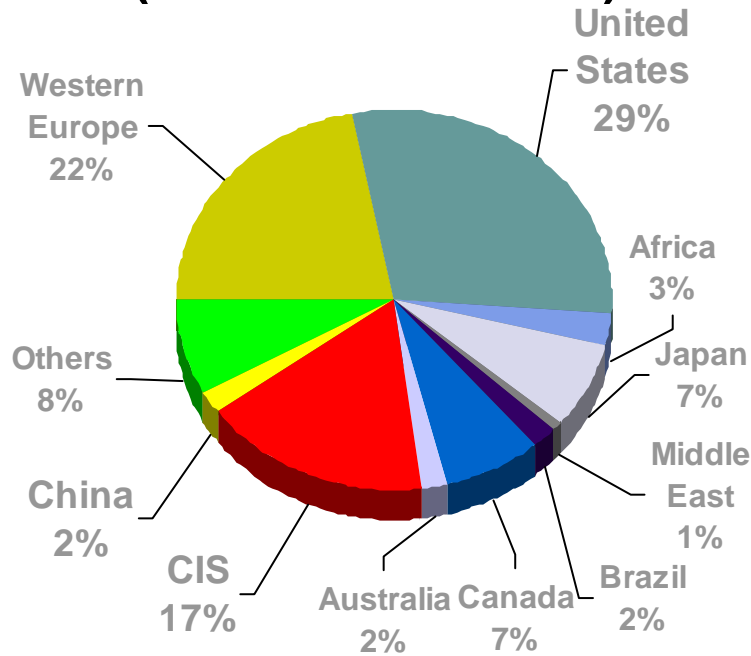


2004

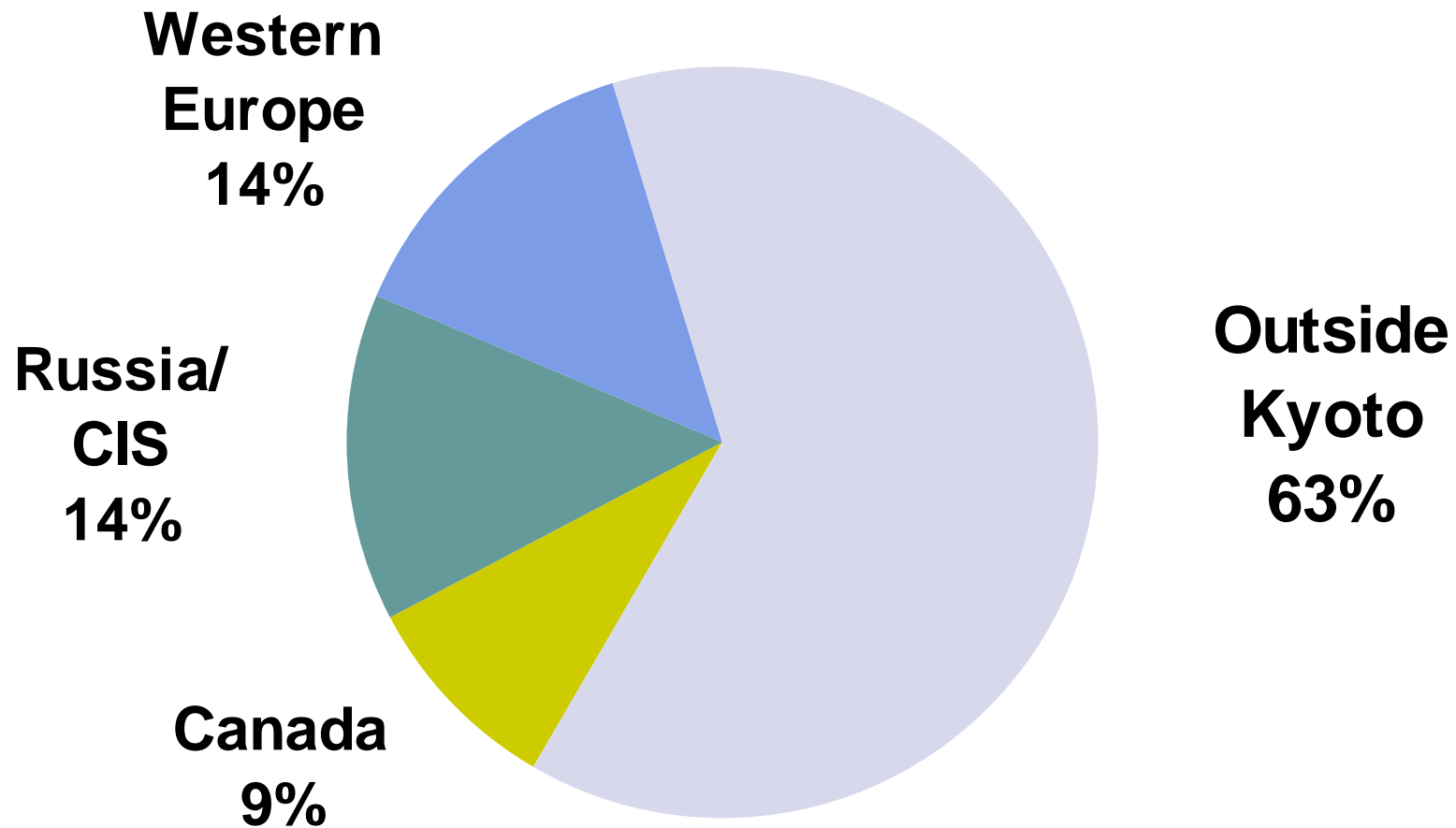
(29 million tonnes)

1980

(16 million tonnes)



Less than 40% of global aluminium production is covered by Kyoto

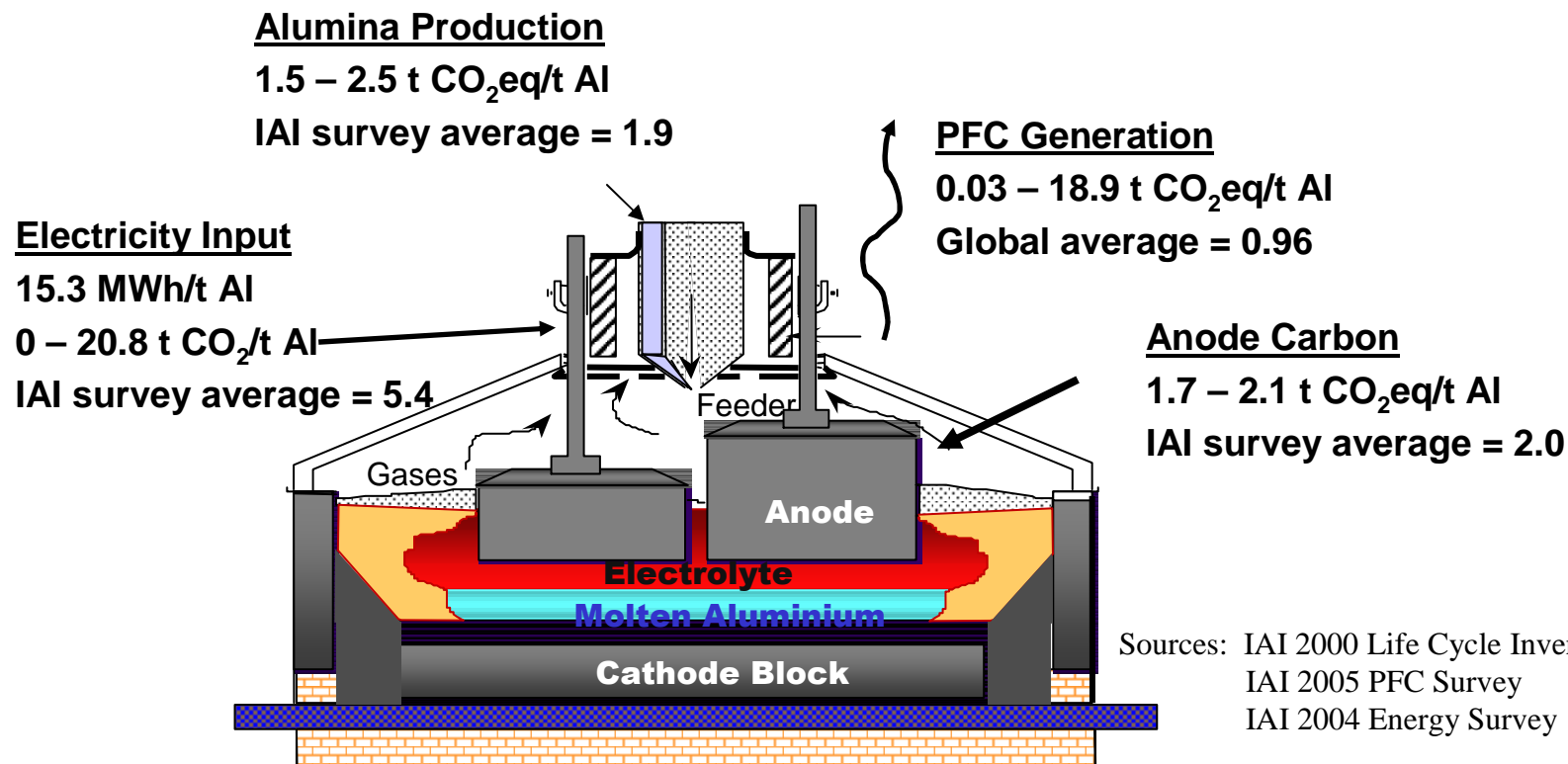


Aluminium for Future Generations Sustainable Development Programme - Voluntary Objectives



1. An 80% reduction in Perfluorocarbon (PFC) greenhouse gas emissions per tonne of aluminium produced for the Industry as a whole by 2010 vs 1990;
2. A 10% reduction in smelting energy usage by IAI Member Companies per tonne of aluminium produced by 2010 vs 1990;
3. The IAI has developed its Sustainability Material Flow Model to identify future recycling flows. The Model projects that global recycled metal supply (back to the industry) from post-consumer scrap will double by 2020 from today's (2005) level of 6.4 million tonnes. The Industry will report annually on its global recycling performance.
4. The Industry will monitor annually aluminium shipments for use in transport in order to track aluminium's contribution through light-weighting to reducing greenhouse gas (GHG) emissions from road, rail and sea transport;
5. The IAI Member Companies will seek to reduce GHG emissions from the production of alumina per tonne of alumina produced;
6. A minimum of a 33% reduction in fluoride emissions by IAI Member Companies per tonne of aluminium produced by 2010 vs 1990. This target figure to be reviewed after 3 years;
7. A 50% reduction in the Lost Time Accident Rate and Recordable Accident Rate by 2010 vs 2000 by IAI Member Companies, with a review of the 50% target in 2006;
8. Implementation of Management Systems for Environment (including ISO 14000 or equivalent certification) and for Health and Safety in 95% of IAI Member companies' plants by 2010;
9. Implementation of an Employee Exposure Assessment and Medical Surveillance Programme in 95% of IAI Member companies' plants by 2010;
10. The IAI Member Companies will seek to reduce their fresh water consumption (a) per tonne of aluminium and (b) per tonne of alumina produced and will report annually on progress;
11. The IAI Member Companies will seek to continue to increase the proportion of bauxite mining land rehabilitated annually; the IAI will report annually on the proportion of area rehabilitated to area mined.

GHGs from Primary Aluminium Production



- Two PFC (perfluorocarbon compounds - CF₄ and C₂F₆) contribute about 32% of direct primary aluminium GHG emissions
- Limits on GHG emissions performance set by genre of installed production technology

IAI PFC Emissions Reduction Programme

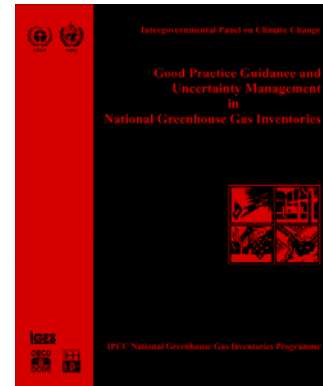


- Anode Survey of 63% of World Production for anode effect data;
- Annual published report and briefing of all IAI Directors/CEOs;
- De-identified Benchmarking Graphs;
- Paper on Benefits of Reducing Anode Effects;
- Greenhouse Gas Protocol to ensure common methodology;
- Best operating practice manual;
- IAI Consultant and equipment to carry out measurements and provide training;
- Cooperation with Industrial Bodies – IPCC; UNFCCC and WBCSD – and national regulatory agencies.

Transparent and Accurate GHG Inventory Data from Interlocking Standards

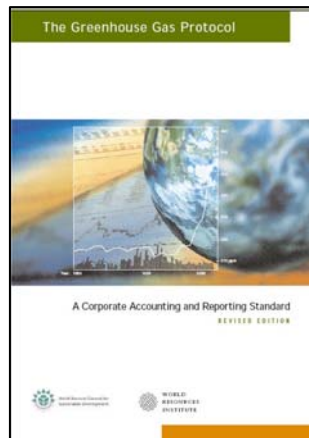


IPCC Good Practice
Guidance



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

WRI/WBCSD Corporate
Good Practice Standards



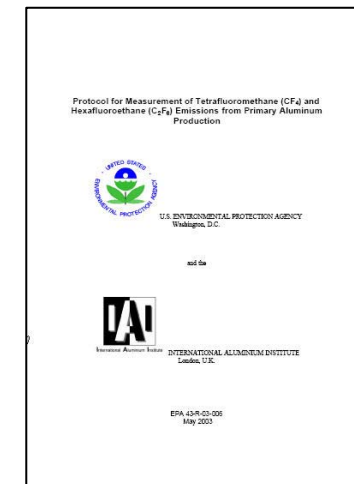
<http://www.ghgprotocol.org/>

IAI Industry GHG Protocol



http://www.world-aluminium.org/environment/climate/ghg_protocol.pdf

USEPA/IAI PFC
Measurement Protocol



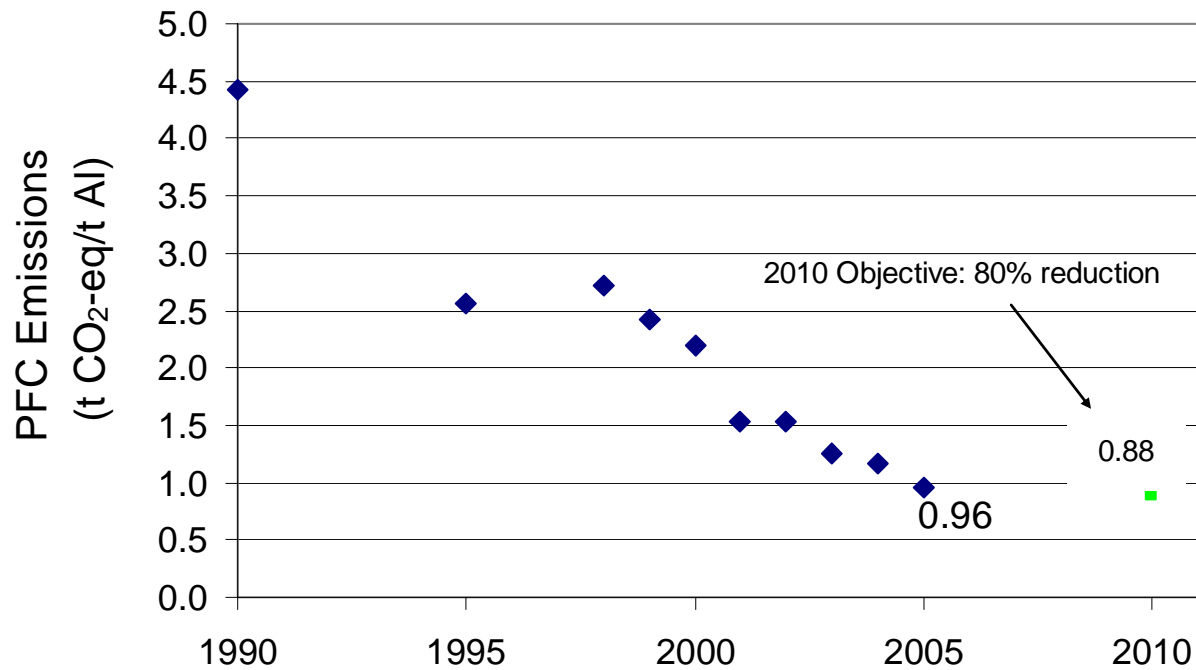
http://www.world-aluminium.org/environment/climate/pfc_measurement.pdf



New USEPA PFC Initiatives

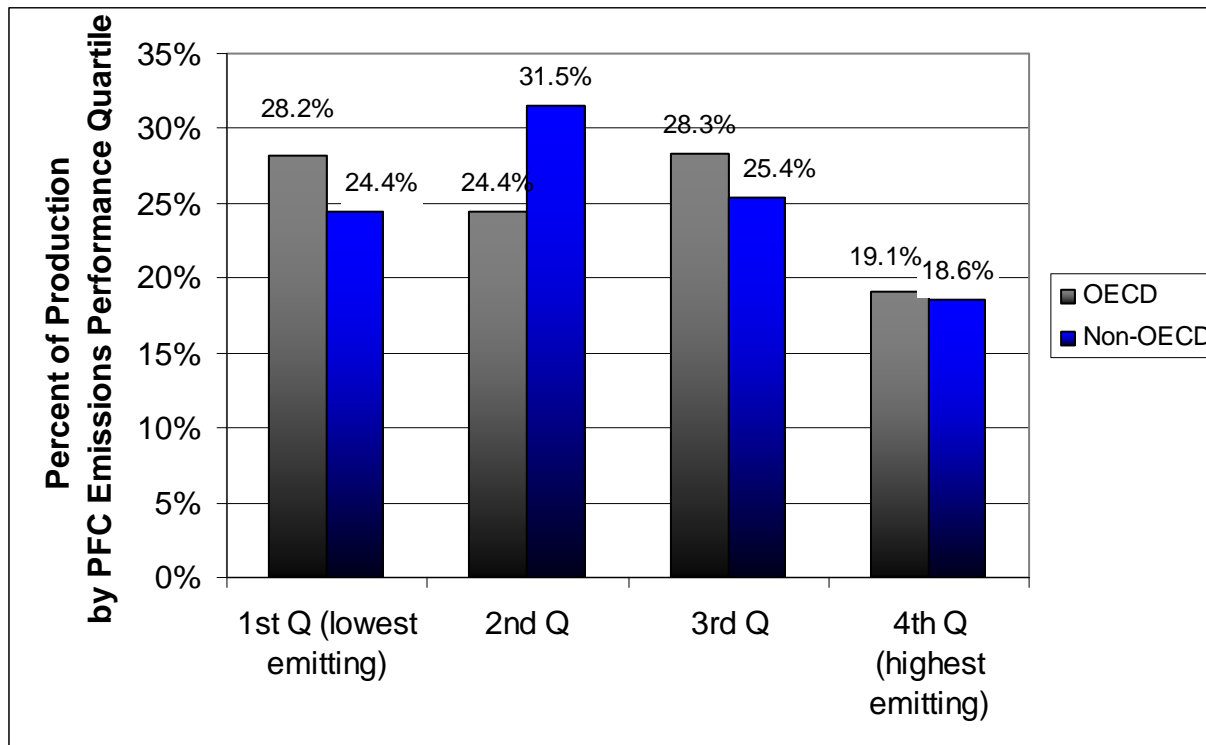
- PFC Emissions Reduction Training Program being Developed
 - Web based approach
 - Potroom floor personnel prime target
 - Modular approach for maximum flexibility
- AP6 Program Initiative
 - March 20 - 21 Beijing PFC Management Workshop
 - CHALCO, IAI, Alcoa, Rio Tinto
 - PFC Measurement Technology Transfer
- Measurement Protocol Update
 - Reflect new developments since Version 1.

Progress in Reducing PFC Emissions per Tonne Aluminium Produced

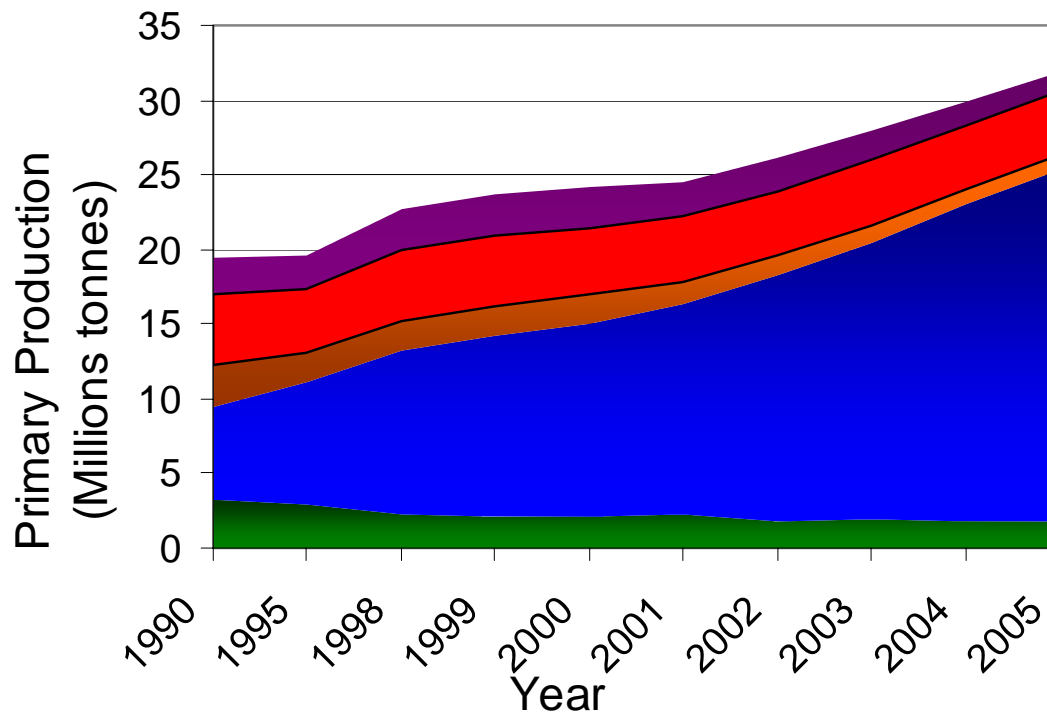


- ✓ **78% reduction in PFC emissions per tonne aluminium from 1990 baseline**
- ✓ **2010 goal is a 80% reduction in PFC emissions per tonne aluminium**

Comparison of 2005 PFC Emission Performance of OECD and non-OECD Producers by Production



Global Primary Aluminium Production by Technology Type



2005

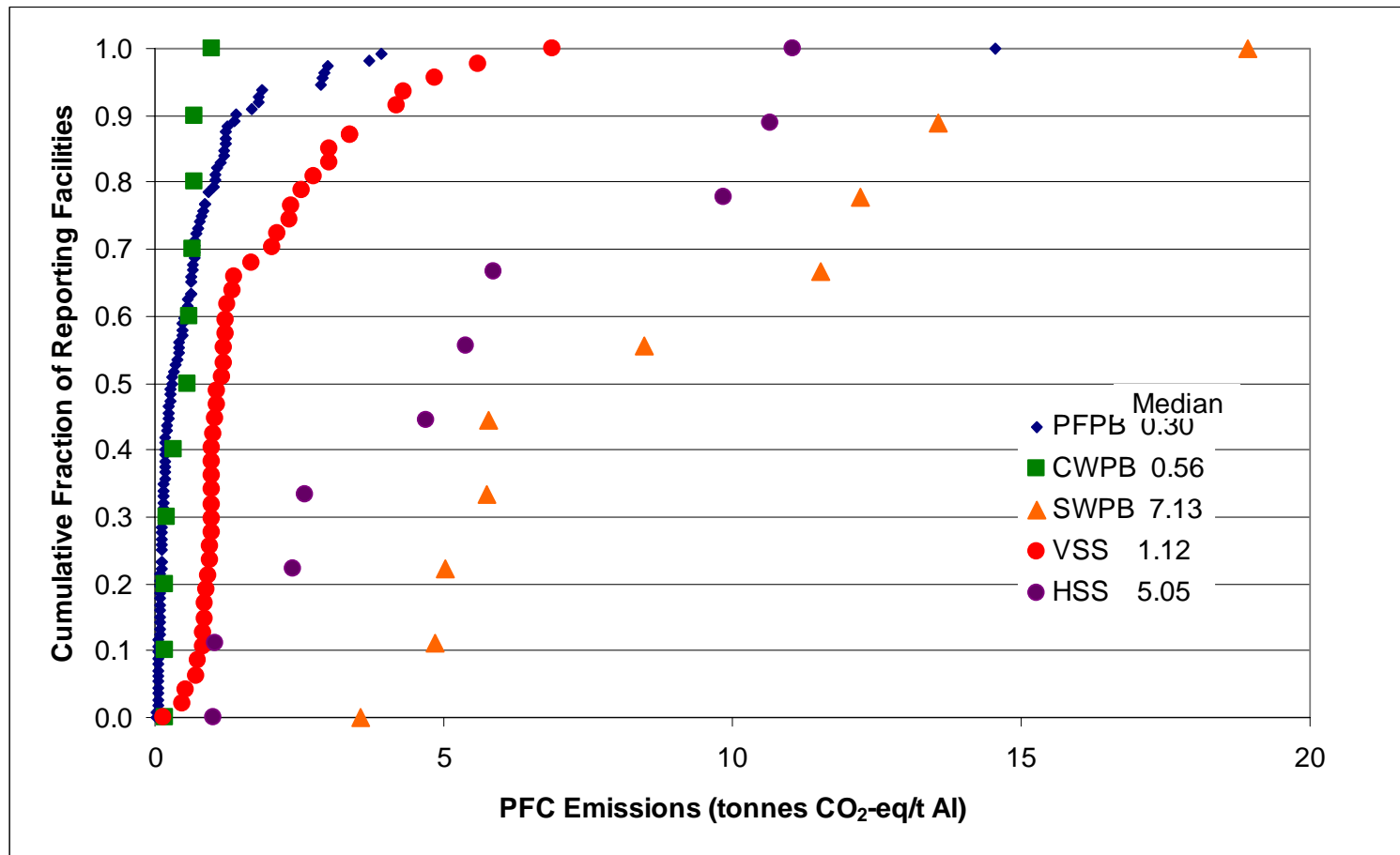
Tech	Tonnes
PFPB	23.5
CWPB	1.8
SWPB	1.0
VSS	4.4
HSS	1.2
Total	31.9

Incremental improvements in existing facilities



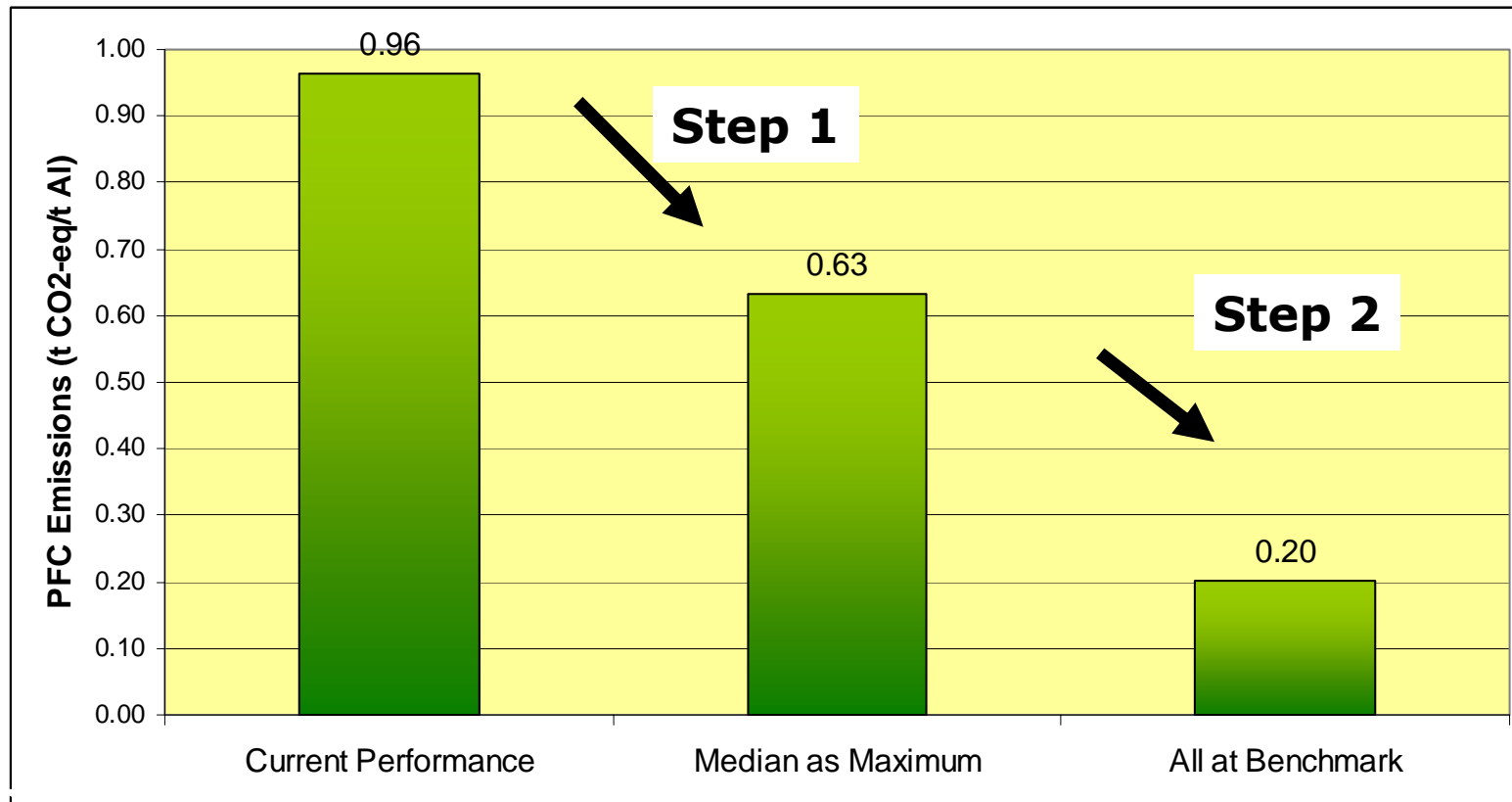
- Cell improvements, including
 - improved conductivity of anode materials, bottom heat recovery, improve electrolyte chemistry, and operation with a low AlF_3 ratio
- More efficient smelter fume systems
- improved compressed air systems
- improved anode plant operations
- improved casthouse operations

Benchmark Data on PFC Emissions per tonne Aluminium – An Opportunity for Improved Performance



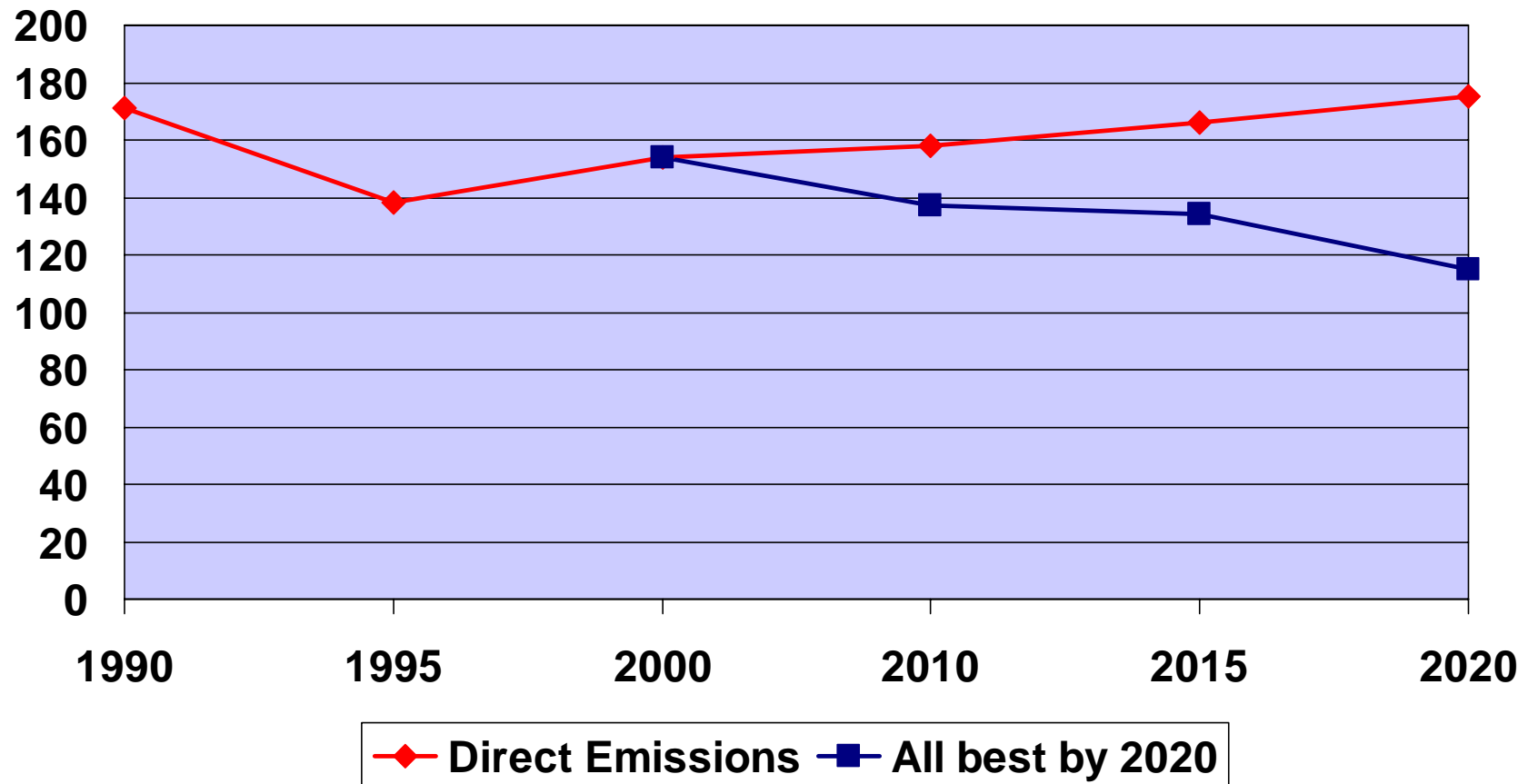
Source: 2005 IAI Anode Effect survey

What level of PFC Emissions Performance is Achievable through AE Performance Improvement?



Source: 2005 IAI Anode Effect Survey

Modeling “All the Best”

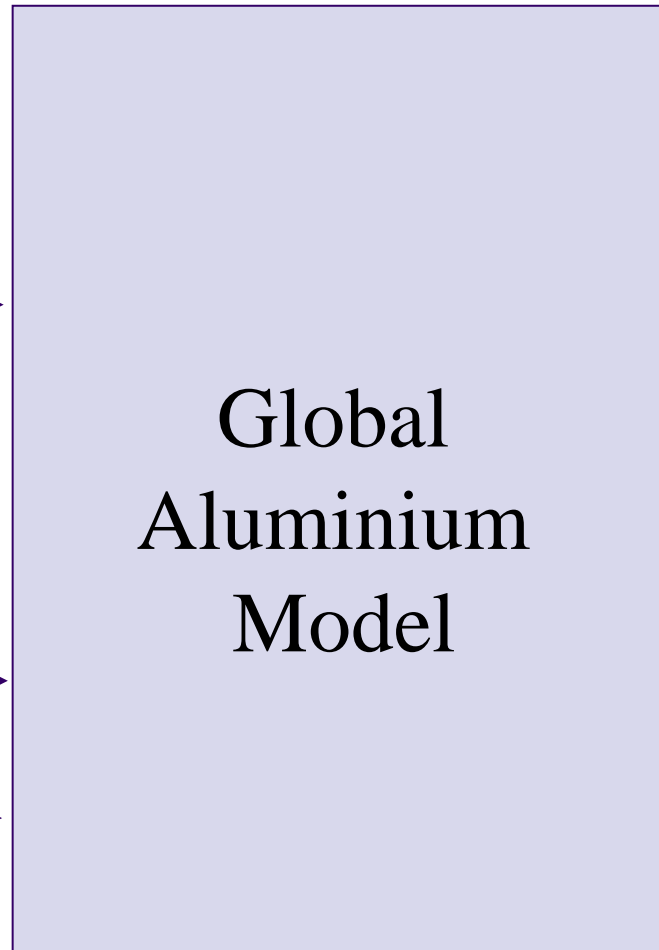
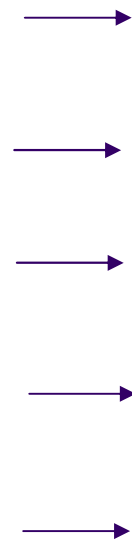


Global Mass Flow Model



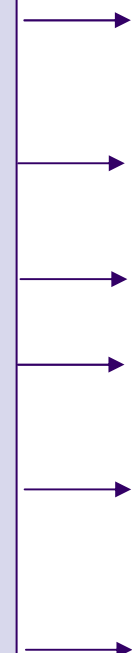
Annual Inputs

- Product Shipments by Market
- Primary Produced
- Anticipated Product Lifetimes
- Recycling Rates
- Market Growth Projections

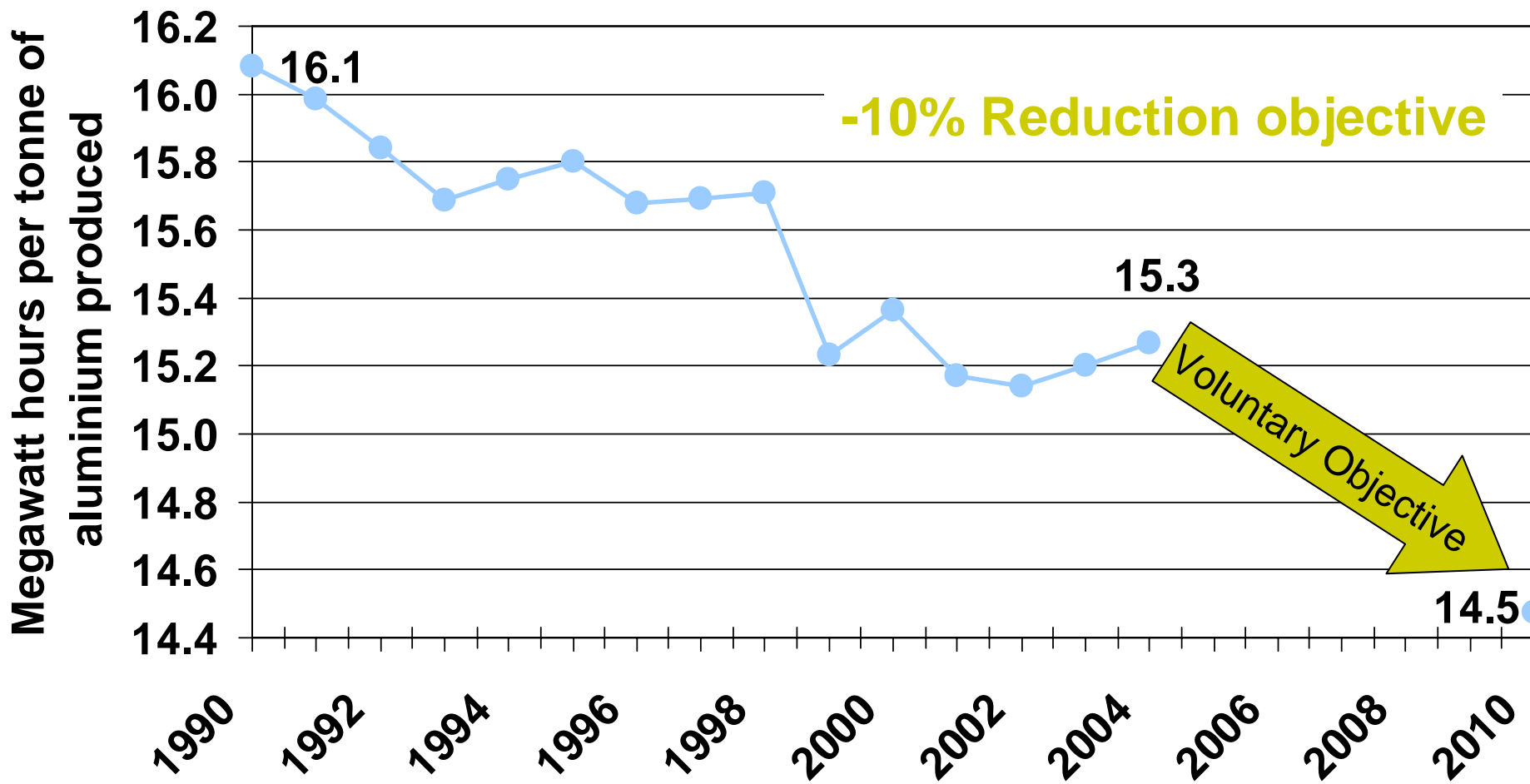


Annual Outputs

- **Post-Consumer Recycle**
- **Customer Recycle**
- Internal Runaround
- Un-recovered Aluminium
- **Emissions**
 - CO₂ eq



The electrical energy required to produce a tonne of aluminium has been reduced by 5% since 1990

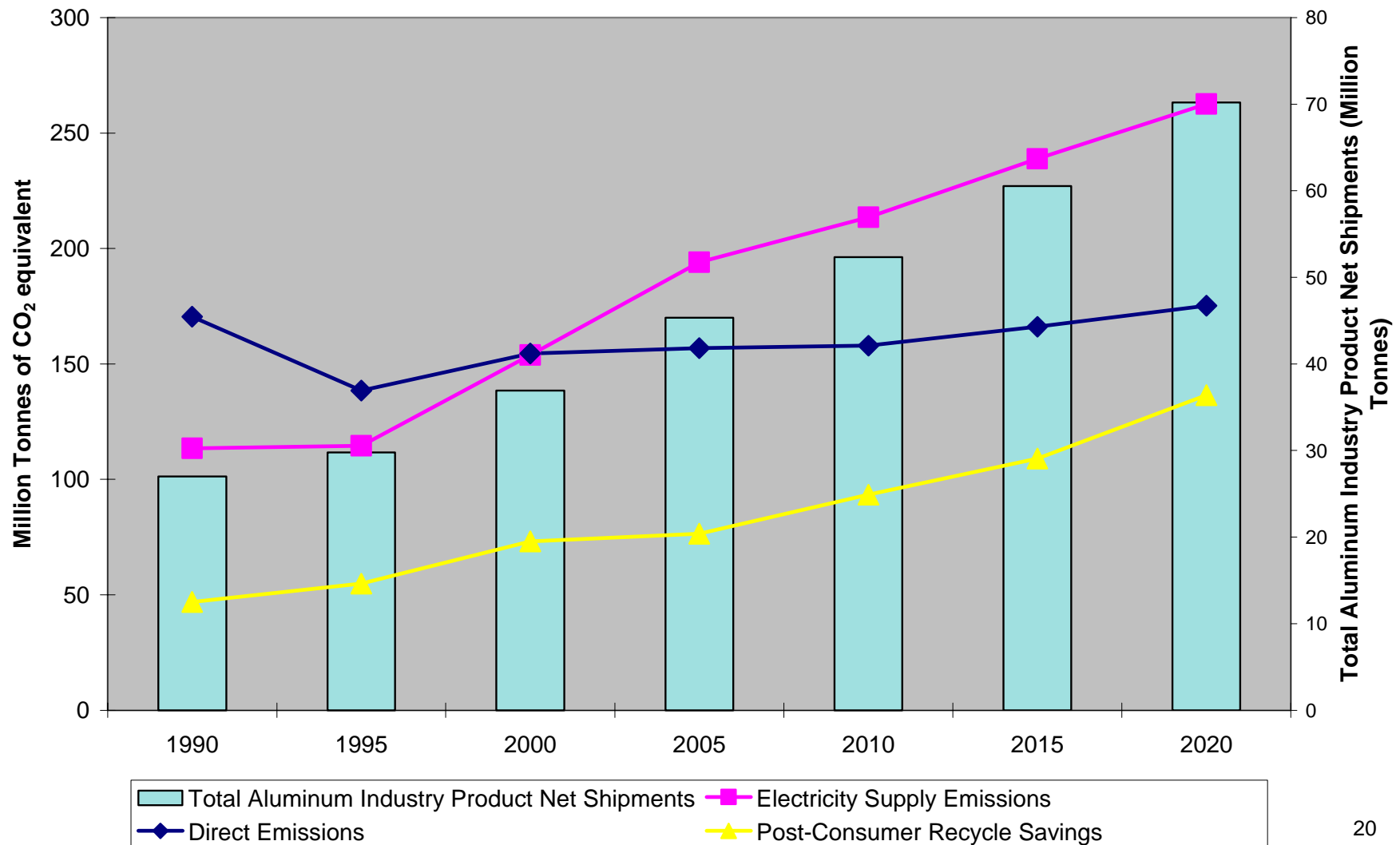




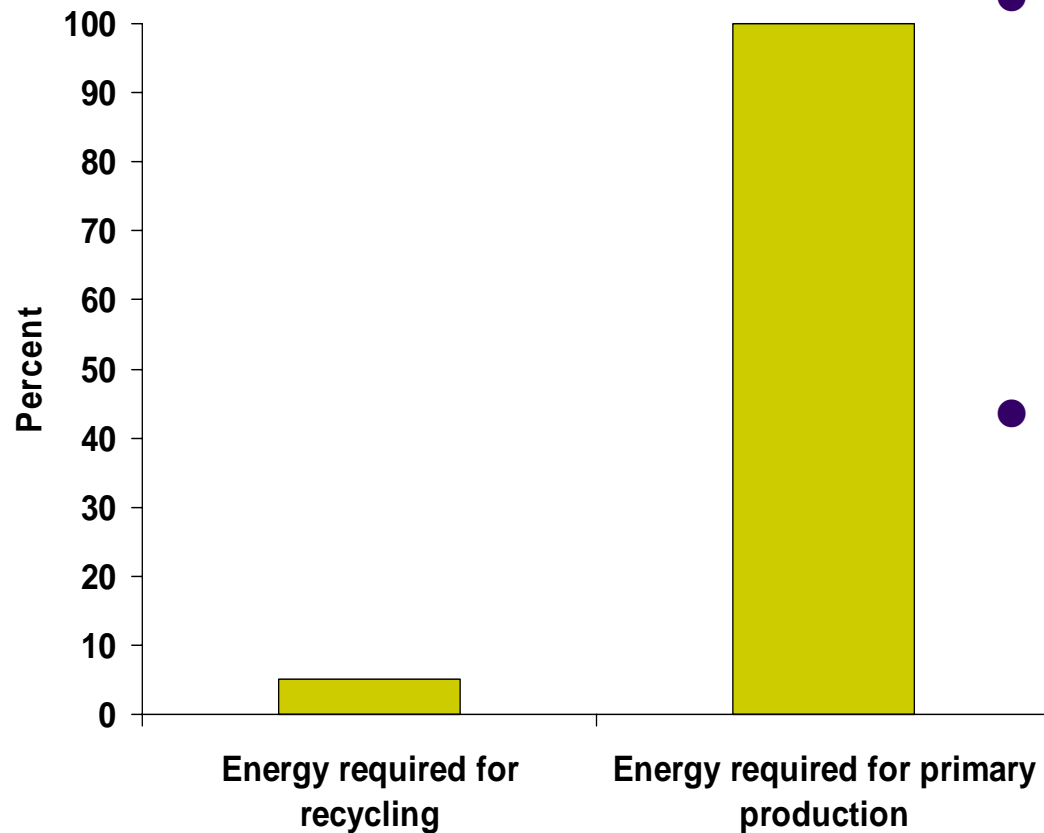
Smelter Energy Reduction

- Improved mix of production capital base
- Incremental improvements in existing facilities
- Retrofit Technology
 - Drained cathode technology might reduce the energy intensity of the smelting process by around 11%
- Breakthrough Technology
 - Aluminum Carbothermic Technology. Success might result in 23% energy saving and 32% in emissions reduction.

GHG Emissions: a summary of annual segmentation

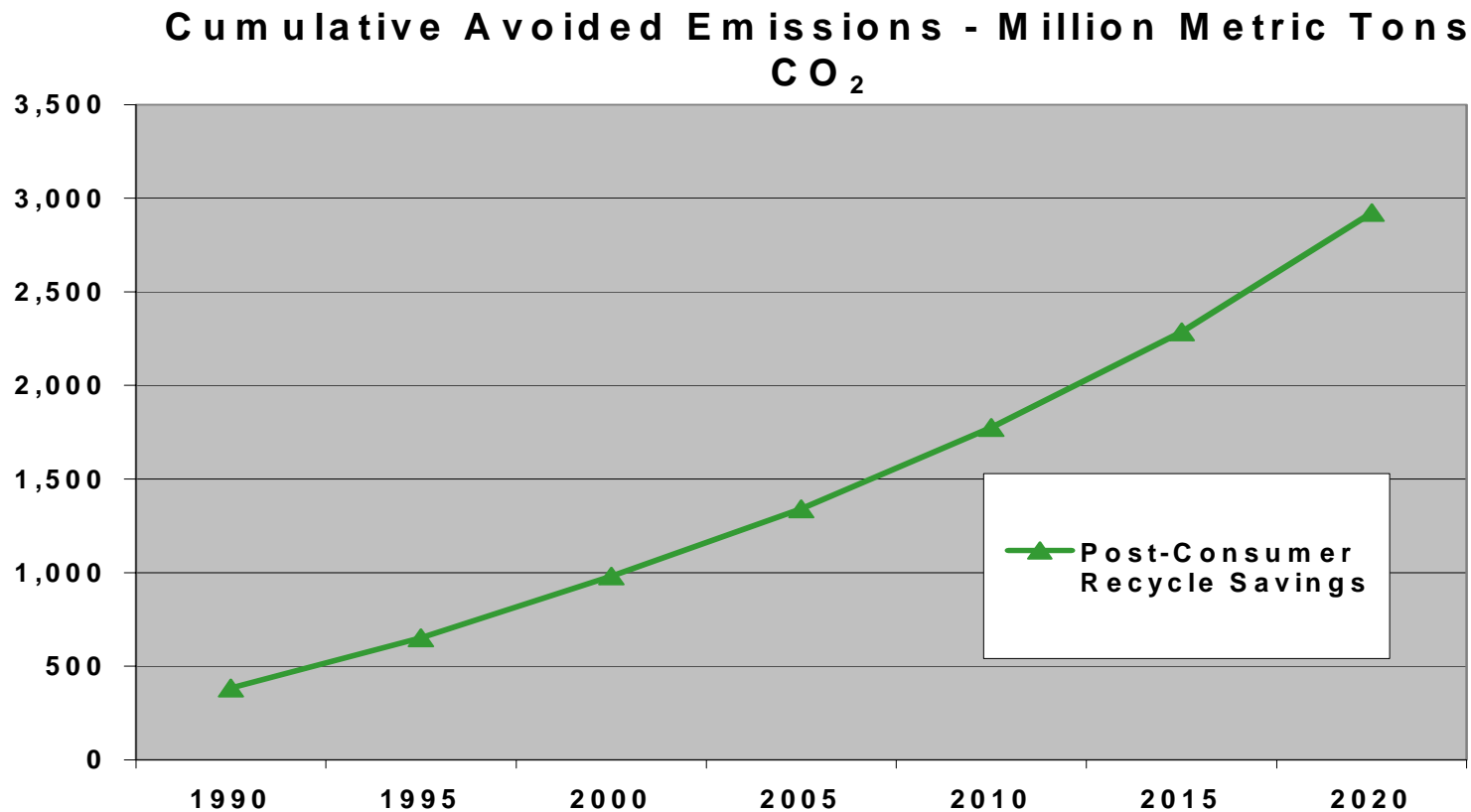


Recycling aluminium conserves energy



- 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.

‘Avoided Emissions’: Cumulative impact from post-consumer Aluminium recycling.



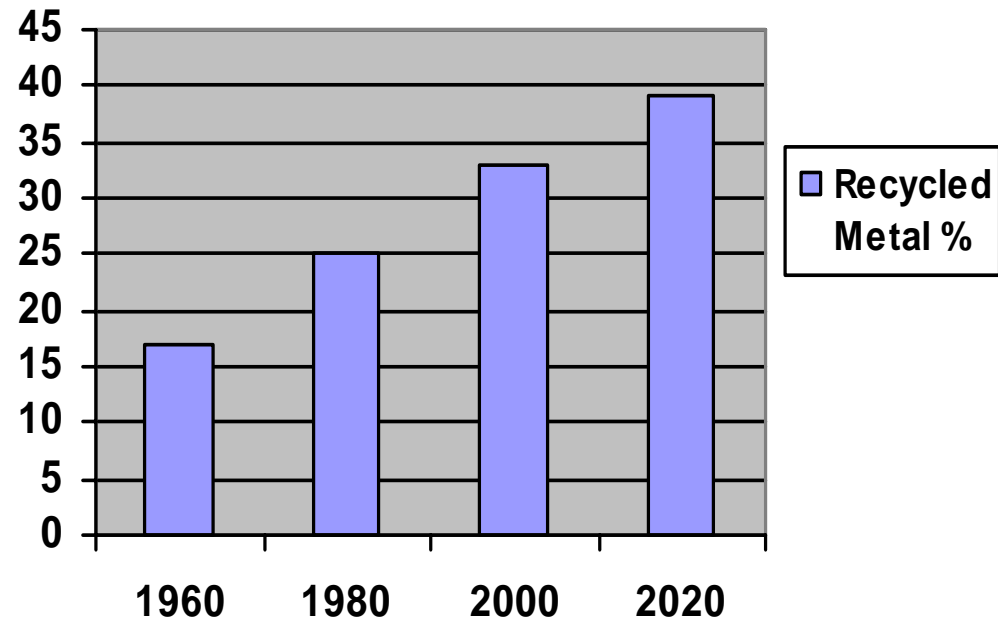
Since its inception, post consumer aluminium recycling has
already saved a billion metric tonnes CO₂

Modeling Past, Current and Future Global Aluminium Supply Mix

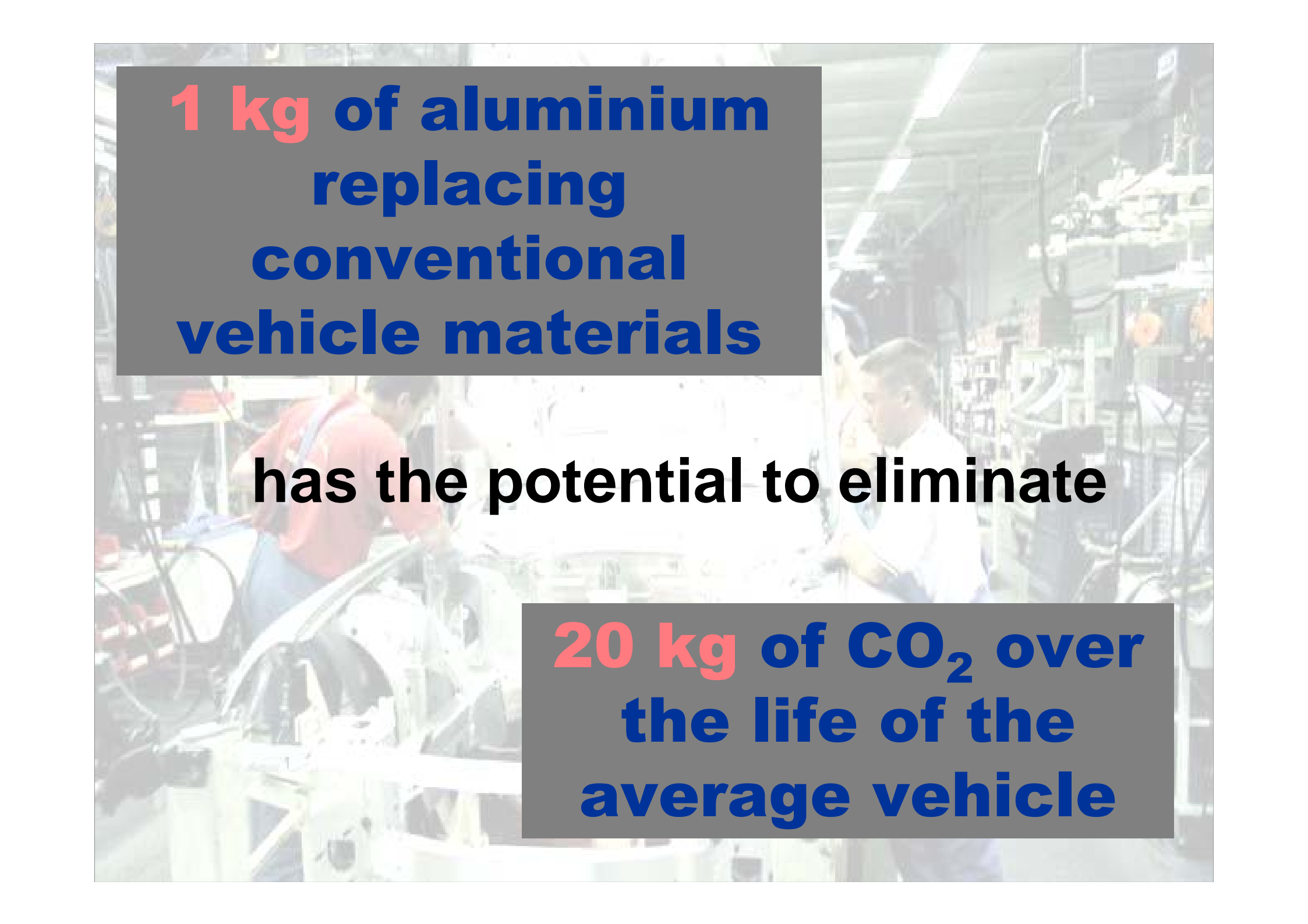


Modeling indicates that the industry's average recycle metal supply from outside our industry:

- has increased from 17% in 1960 to over 32% today;
- is predicted to increase to 37% by 2020.



**% Post Consumer and Customer Recycled Metal
to Total Metal Consumed**

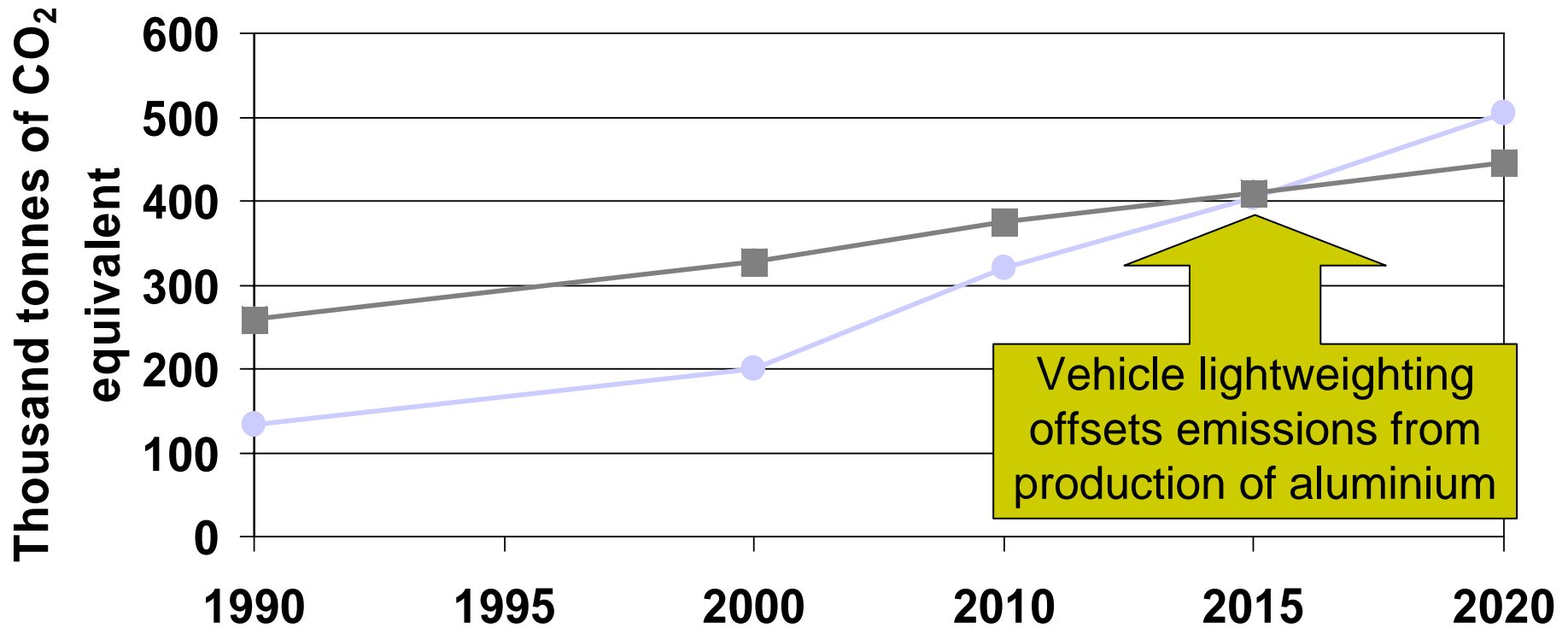
A photograph of an automotive assembly line. In the foreground, a worker in a red shirt is working on a car chassis. In the background, another worker in a white shirt is visible. The factory floor is filled with machinery, cables, and car parts. The lighting is bright, typical of an industrial setting.

**1 kg of aluminium
replacing
conventional
vehicle materials**

has the potential to eliminate

**20 kg of CO₂ over
the life of the
average vehicle**

Vehicle Lightweighting could offset emissions from the total production of aluminium worldwide



Any Potential Transnational Sectoral Agreement would need to:



- Avoid sectoral objectives adding to current Kyoto or regulatory requirements
- Be compatible with existing institutions and mechanisms such as the Kyoto Protocol, emissions trading and CDM, and in no way prejudice the negotiating position of countries under the UNFCCC.
- Assure a level playing field globally with respect to other sectors/materials and ensure that national policies are not distorting.

Key Questions

1. Who would be the parties to any sort of an agreement, and what would be the relative roles of governments and businesses?
2. What would be the incentive to take part in an agreement to reduce emissions intensity – particularly if you were a company in a developing country or if rival materials were not involved in an agreement with similar obligations?