

Present Progress and Scope for further GHG Emissions Reduction during Production

Energy Efficiency and GHG Emission Reduction Workshop

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IAI Global Sustainability Initiative

12 Voluntary objectives covering key environmental, social, and economic indicators



- **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 average smelting energy usage by IAI Member Companies per tonne of aluminium produced by 2010 versus 1990.

- **Voluntary Objective 7**

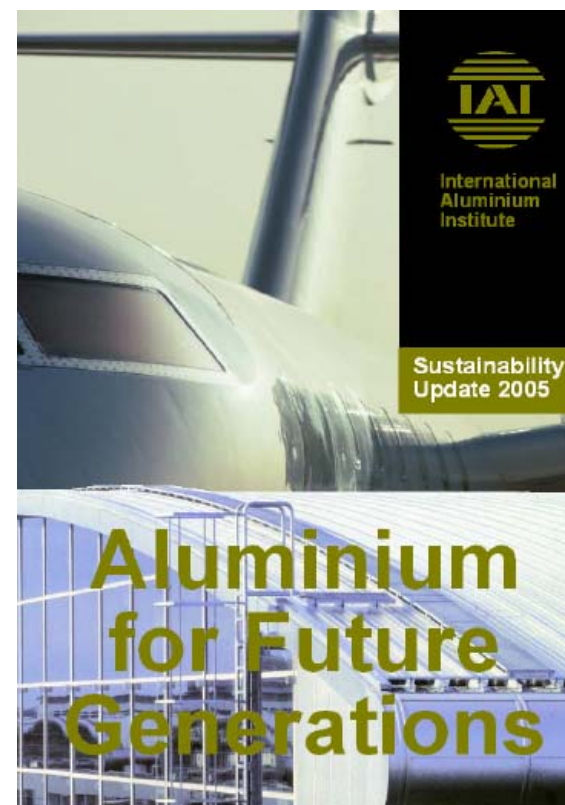
The industry will monitor annually aluminium shipments for use in transport in order to track aluminium's contribution through light-weighting to reducing greenhouse gas (GHG) emissions from road, rail and sea transport.

- **Voluntary Objective 8**

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

- **Voluntary Objective 11** *New*

The IAI Member Companies will seek to reduce GHG emissions from the production of alumina per tonne of alumina produced.

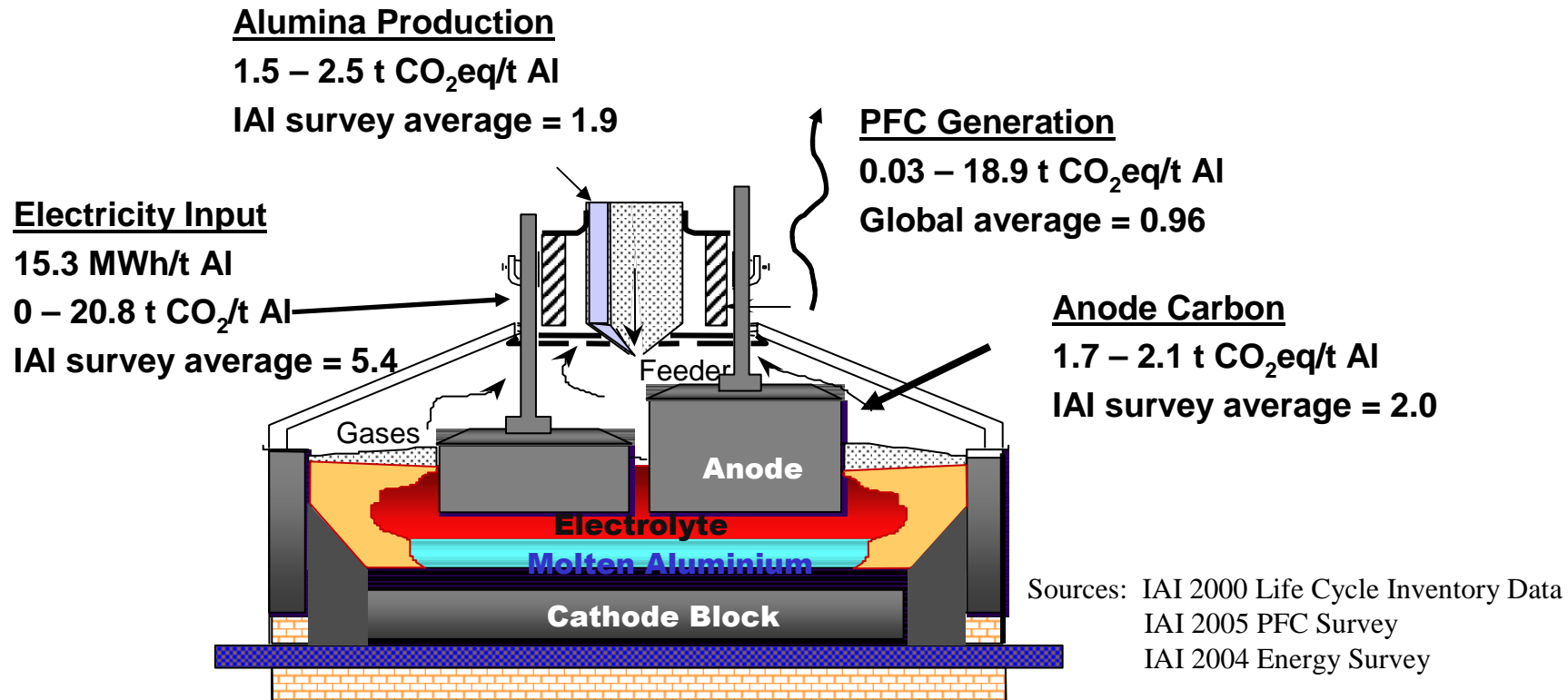


IAI Initiatives to Reduce GHG Emissions



- What's being done
 - Benchmarking on industry performance on key performance criteria (Anode effects for PFCs, Energy utilization, carbon consumption)
 - Annual published progress reports and briefings of all IAI Directors/CEOs;
 - Coded Benchmarking Graphs;
 - Technical papers on anode effects and PFC emissions;
 - Greenhouse Gas Protocol to ensure common methodology;
 - Sharing best operating practices;
 - IAI Consultant and equipment to carry out measurements and provide training;
 - Cooperation with international bodies – OECD, IPCC; UNFCCC and WBCSD – and national regulatory agencies.
- Where are we going
 - Expand data collection and benchmarking to additional areas
 - Expand process areas for additional energy and emissions savings

GHG Emissions and 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



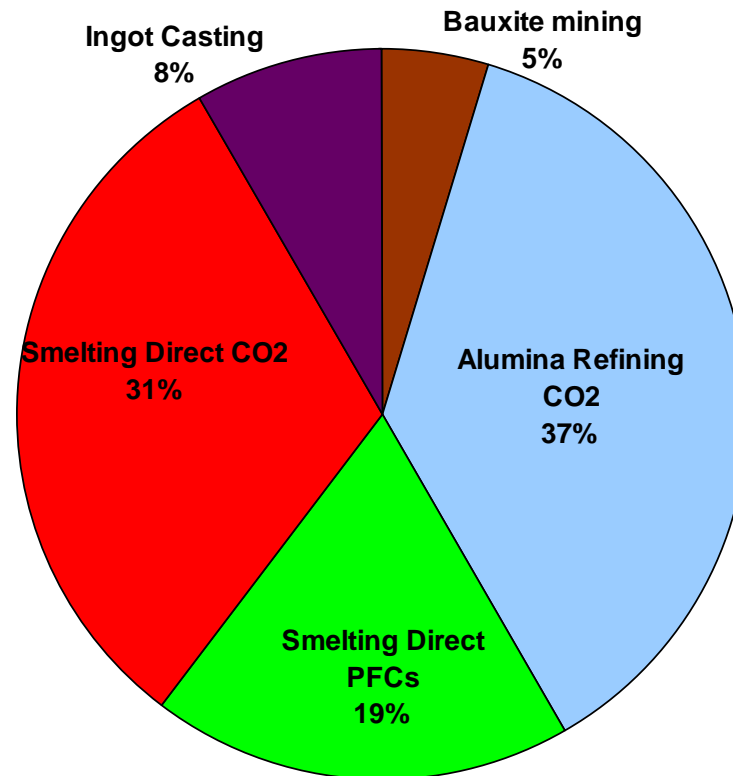
Fraction of Total Global GHG Emissions Resulting from Primary Aluminium Production

<u>Worldwide CO2-eq Emissions excluding LU and forestry</u>	millions Gg
Total Annex 1 countries, yr 2002	17.29
non-Annex 1	11.73
Total worldwide GHG Emissions (CO2-eq) =	29.02

<u>Primary Aluminium Production Emissions, 2005</u>	millions Gg
Bauxite mining	0.0079
Alumina Refining CO ₂	0.0609
Smelting Direct PFCs	0.0306
Smelting Direct CO ₂	0.0519
Ingot Casting	0.0136
Total PFCs and CO₂ (CO2-eq)	0.16
Smelting Electricity Contribution	0.24
<u>Percent Contribution (Excluding electricity)</u>	0.6%
<u>Percent Contribution (Including electricity)</u>	1.4%

- Compare with 5% for iron & steel and 4% for cement

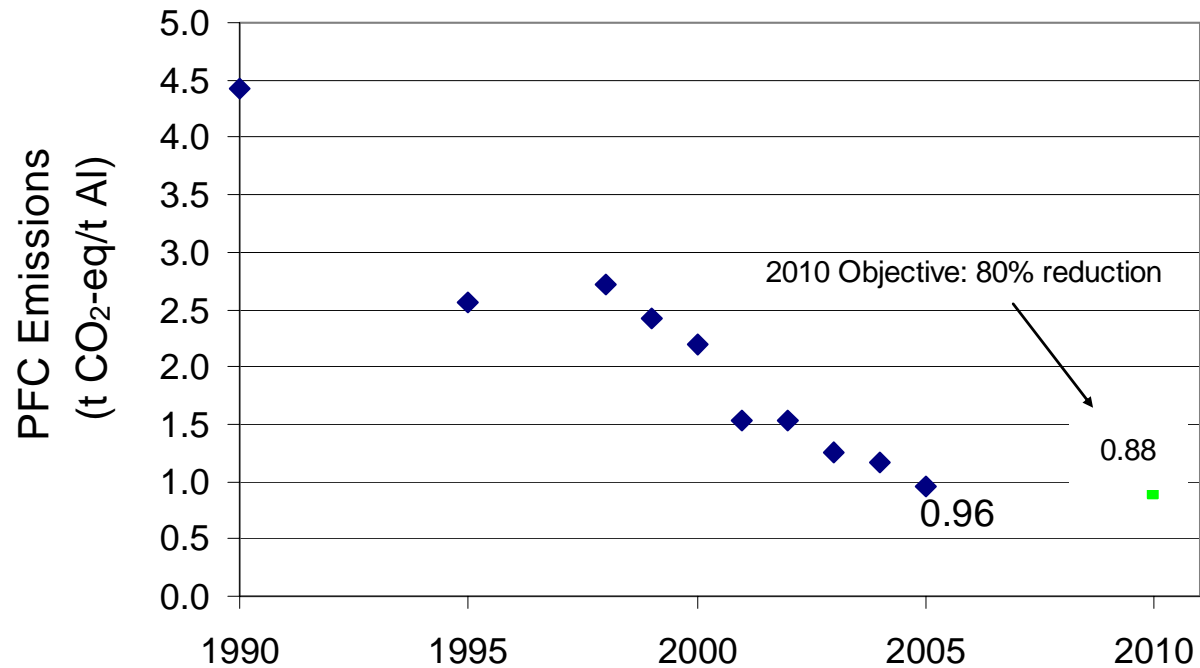
Percent Contribution to GHG Emissions by Process



- ✓ Smelting accounts for 50% of GHGs from primary aluminium production in direct emissions and 80% when indirect GHGs from electricity production is considered
- ✓ Alumina refining is the next biggest contributor at 37% of total GHG emissions

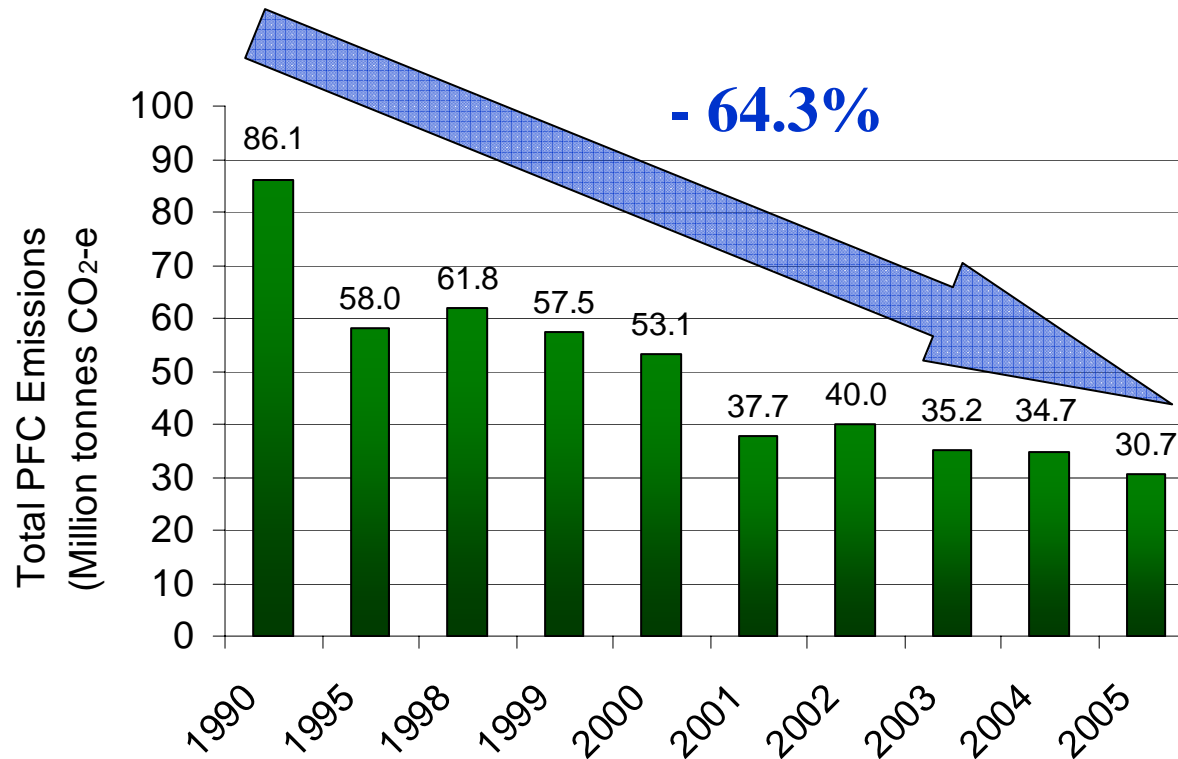
PFC Emissions Trends

t CO₂-e/t Al



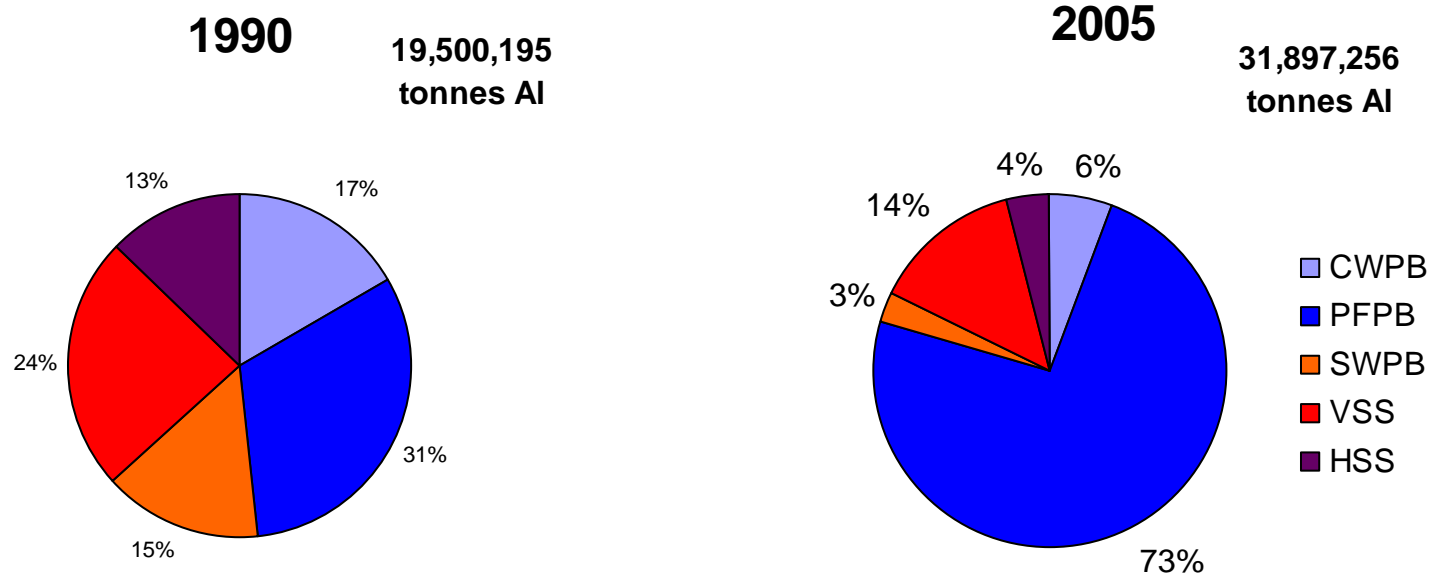
- ✓ 78.6% reduction in PFC emissions per tonne aluminium produced relative to 1990 baseline

Total PFC Emissions to Atmosphere Decreasing



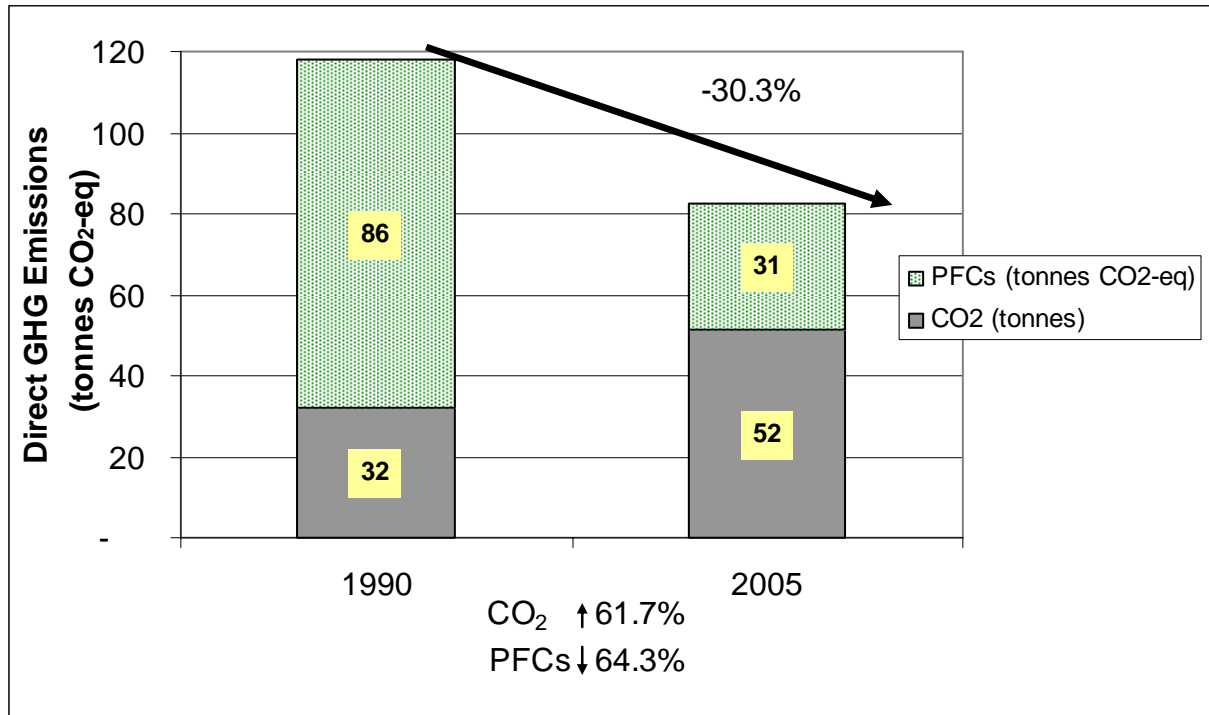
✓ Total PFC emissions reduced by 55.4 million tonnes or 64.3% from 1990 to 2005

Change in Technology Mix from 1990 to 2005



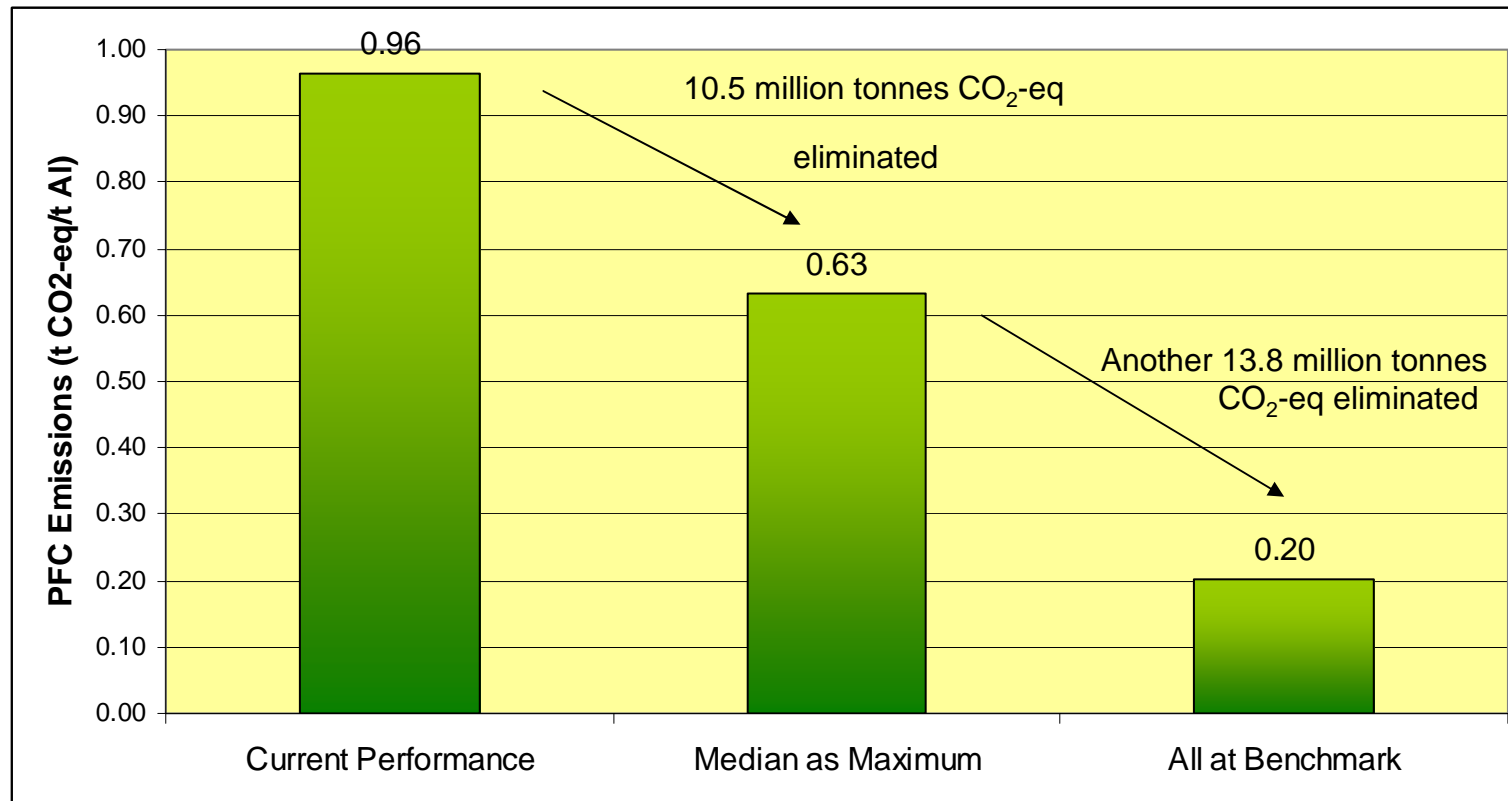
✓The large increase in PFPB production has been an enabler for PFC reduction

Total Direct GHGs from Primary Aluminium Electrolysis



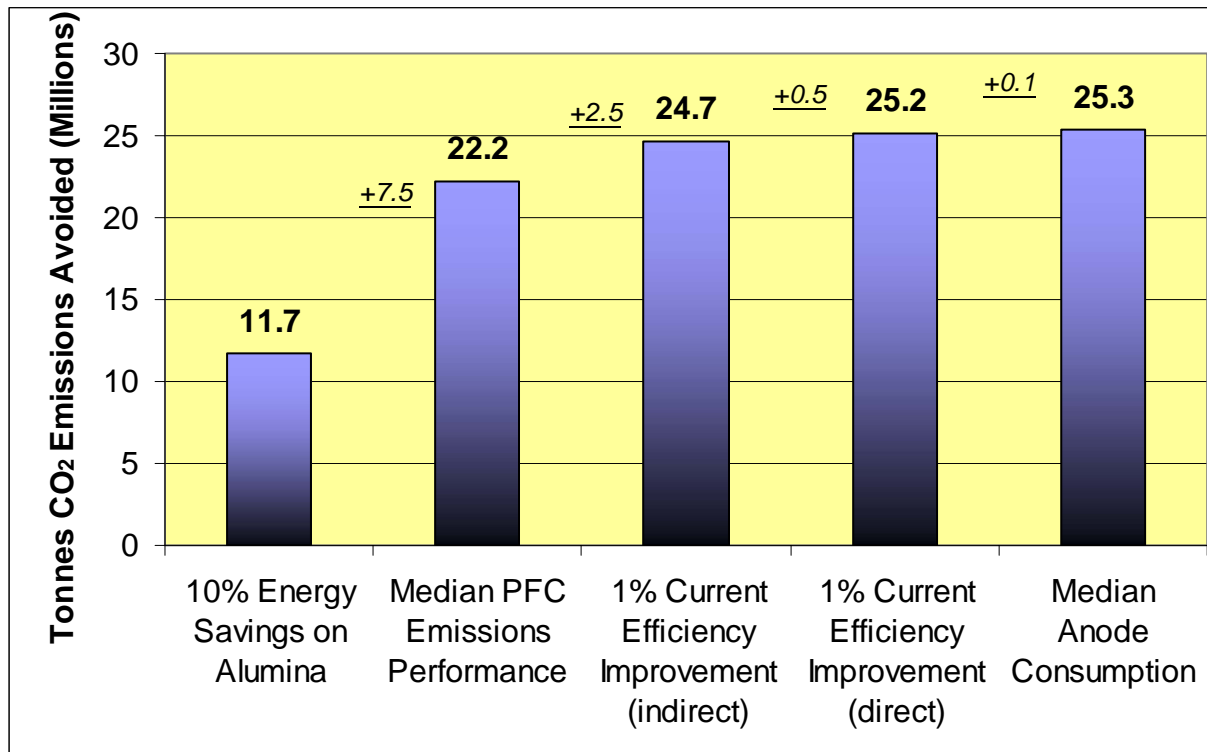
- ✓ CO₂ up
- ✓ PFCs down
- ✓ Total GHGs down by 30%

PFC Emissions Improvement Potential



- ✓ Moving those smelters that operate with PFC emission rates higher than the median to the median emission rate would more than meet the IAI PFC emission goal for 2010

Overall Potential for GHG Savings



✓ Potential to save about 25 million tonnes CO₂ and CO₂ equivalent emissions with current technology

Summing Up



- Strong track record of progress in GHG emissions reductions has been established
- Industry will achieve further reductions as new capacity is commissioned
- New technology may offer future breakthrough opportunity



Thank you

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