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*Measuring, Reporting and
Verifying
Greenhouse Gas Emissions*

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Outline of Presentation

“Implementation of An Inventory Management Plan”

- ☰ Inventory Development
 - Boundary Conditions and Rules****
- ☰ Measuring-Data Collection & Processing – Alcoa Inc.**
- ☰ Reporting – Emissions & Key Performance Indicators**
- ☰ Verification**

Why – GHG Measurement, Reporting and Verification ?

- **Environmental Stewardship & Sustainability**
 - **Alcoa Global Commitments to Reducing Environmental Impacts**
 - **What gets measured gets managed ...**
 - **Voluntary Aluminum Industrial Partnership with USEPA and with other national agencies related to perfluorocarbon emissions (persistent GHG) from aluminum smelting**

Why – GHG Measurement, Reporting and Verification ?

Risk Management

- **Climate measures may in the future significantly impact aluminum reduction costs & capital flows.**
- **Potential variance in country measures related to:**
 - ✓ **Carbon-based taxes,**
 - ✓ **Requirements to purchase allowances,**
 - ✓ **Effects of renewable & other requirements on electricity supply prices**

Why – GHG Measurement, Reporting and Verification ?

☰ Consistency and Credibility

- Requirements will become more rigorous as we progress from voluntary reporting toward regulatory compliance and/or emissions trading

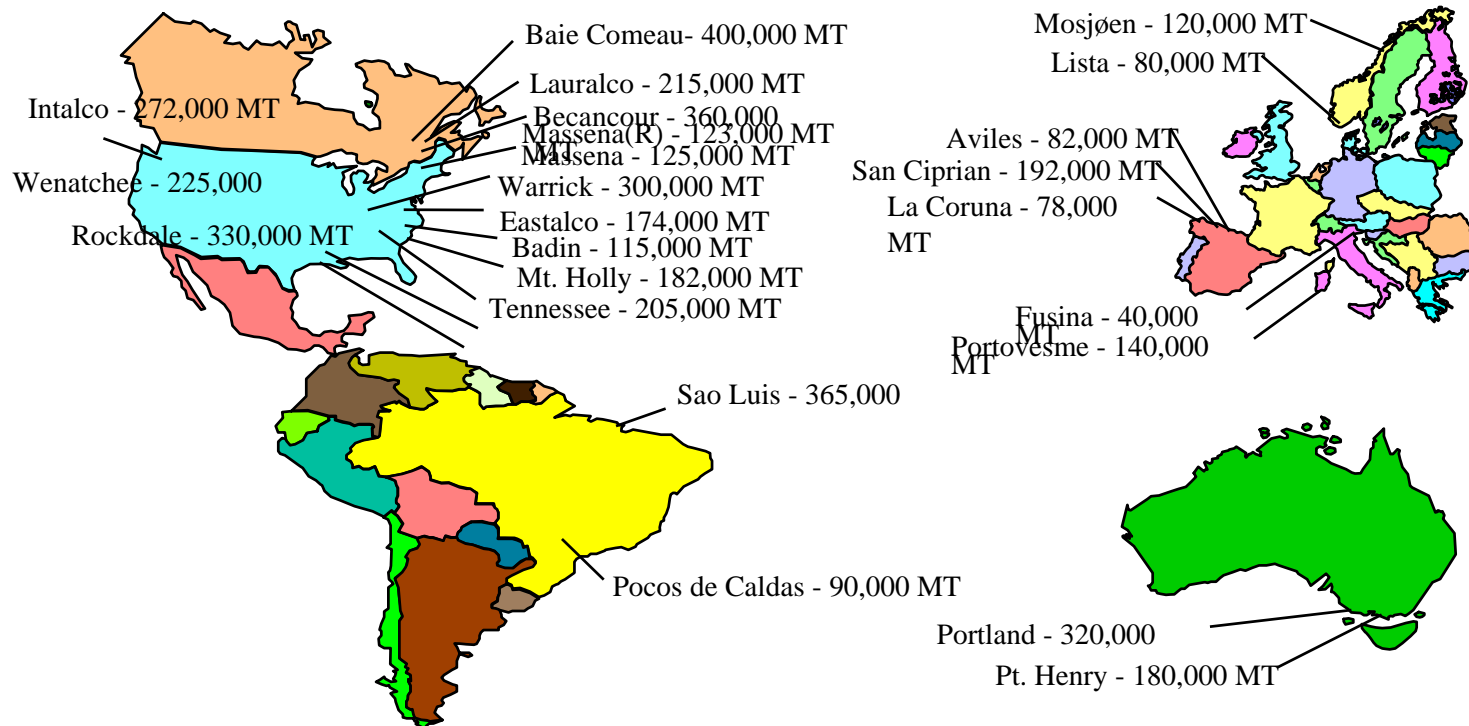
- Need for accuracy and consistency to minimize duplication of efforts

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Inventory Development

Alcoa Inc. Boundary Conditions

- *Global – +400 locations in 41 countries*
- *Equity share and management control*
- *All six Kyoto GHG gases*
- *Direct & indirect emissions related to electricity supply*



Boundary Conditions

☰ What Were the Rules ?

- Rules Originally Established for National Level Inventories
 - IPCC “Good Practice Guidance & Uncertainty Management in National Greenhouse Gas Inventories”
 - Chapter 3– Industrial Processes
Perfluorocarbon (PFC) Emissions from Aluminum Production

- No Official International Rules for Corporations or Facility Level Reporting

“The Greenhouse Gas Protocol”

⇒ **World Resources Institute and World Business Council for Sustainable Development**

⇒ **Voluntary Corporate Accounting and Reporting Standard**

⊗ **Multi-stakeholder Development Process**

⊗ **Basis for Current Alcoa GHG Emissions Inventory**

⊗ **Organizational Boundaries (acquisitions, equity share ...)**

⊗ **Operational Boundaries (Facility & Indirect emissions)**

⊗ **Reporting on Six Kyoto GHGs including PFC emissions**

“Aluminium Sector Greenhouse Gas Protocol”

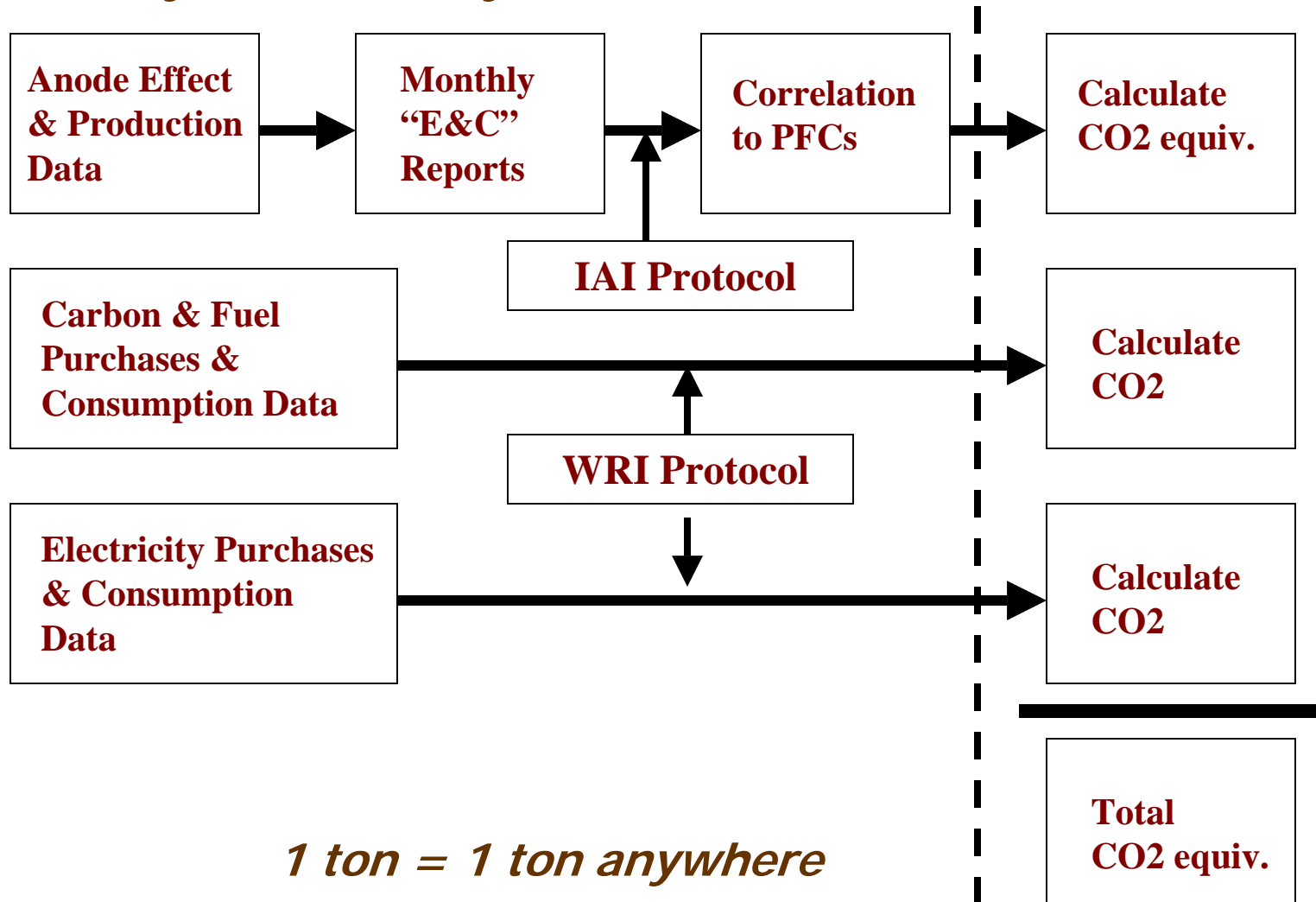
- **Developed by industry reps via the International Aluminium Institute**
- **Adopted General Principles of WRI/ WBCSD GHG Protocol**
- **More Complete Aluminum Industry Specific Appendices**
 - ⊗ **Calculation Methods for PFC Emissions and Direct Carbon Dioxide Emissions Resulting From Aluminium Reduction and Supporting Processes.**

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*Measurement –
Data Collection & Processing
Alcoa Inc.*

Alcoa GHG Data Management System

For Every Alcoa Facility



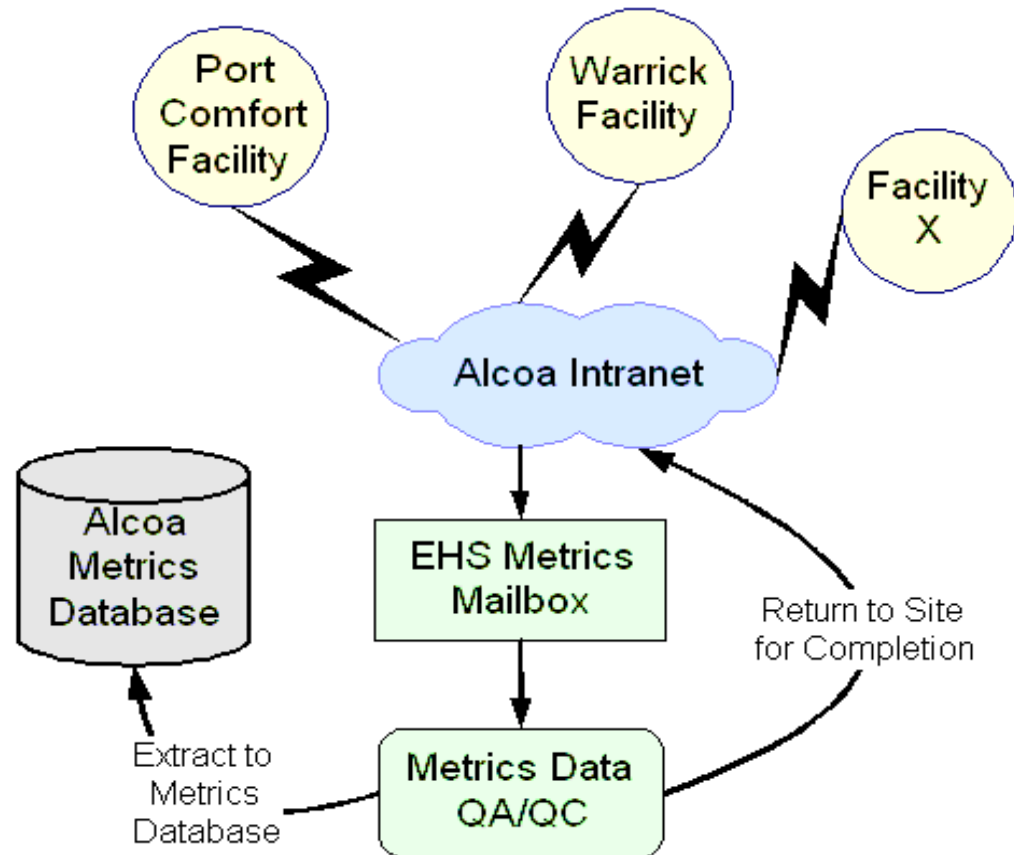
Alcoa GHG Data Management Mechanics

Alcoa facilities compile data on a quarterly basis.

Designated coordinator at each site submits the data to the Company's intranet system.

Automated process within the system performs a high-level QA/QC review of the data submission and notifies the coordinator if further action is required.

After further QC, national and business specific reports generated.



Alcoa's GHG Measurement Mechanics

- ▣ **Quantification Methods – PFC emission measurement campaign & methods development in conjunction with US EPA Voluntary Aluminum Industrial Partnership**
- ▣ **Activity Data – Linked to Production and Purchasing Systems**
- ▣ **Baseline Adjustments – Significant M&A Activity**
- ▣ **Emission Factors**
 - ✓ **Smelting “anode effects”**
 - ✓ **Purchased electricity**

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Reporting GHG Emissions

Reporting

United States

- ⊠ **Voluntary Aluminum Industry Partnership” - EPA**
- ⊠ **“Climate Leaders” - EPA**
- ⊠ **GHG “1605b Registry” – Department of Energy**
- ⊠ **Emerging State Government Reporting**

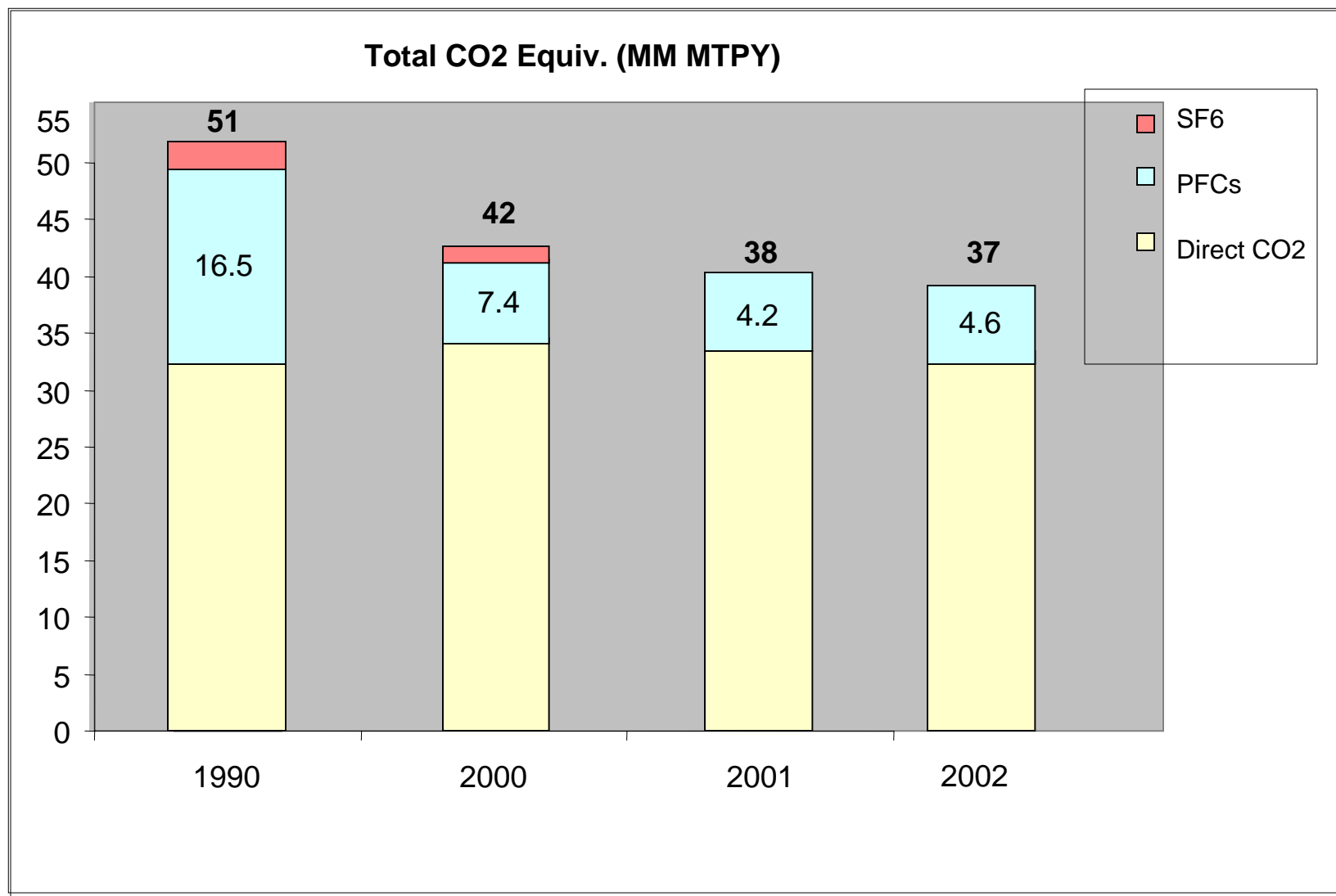
 **Province of Quebec/ Canada Large Final Emitters**

 **Australian “Greenhouse Gas Challenge”**

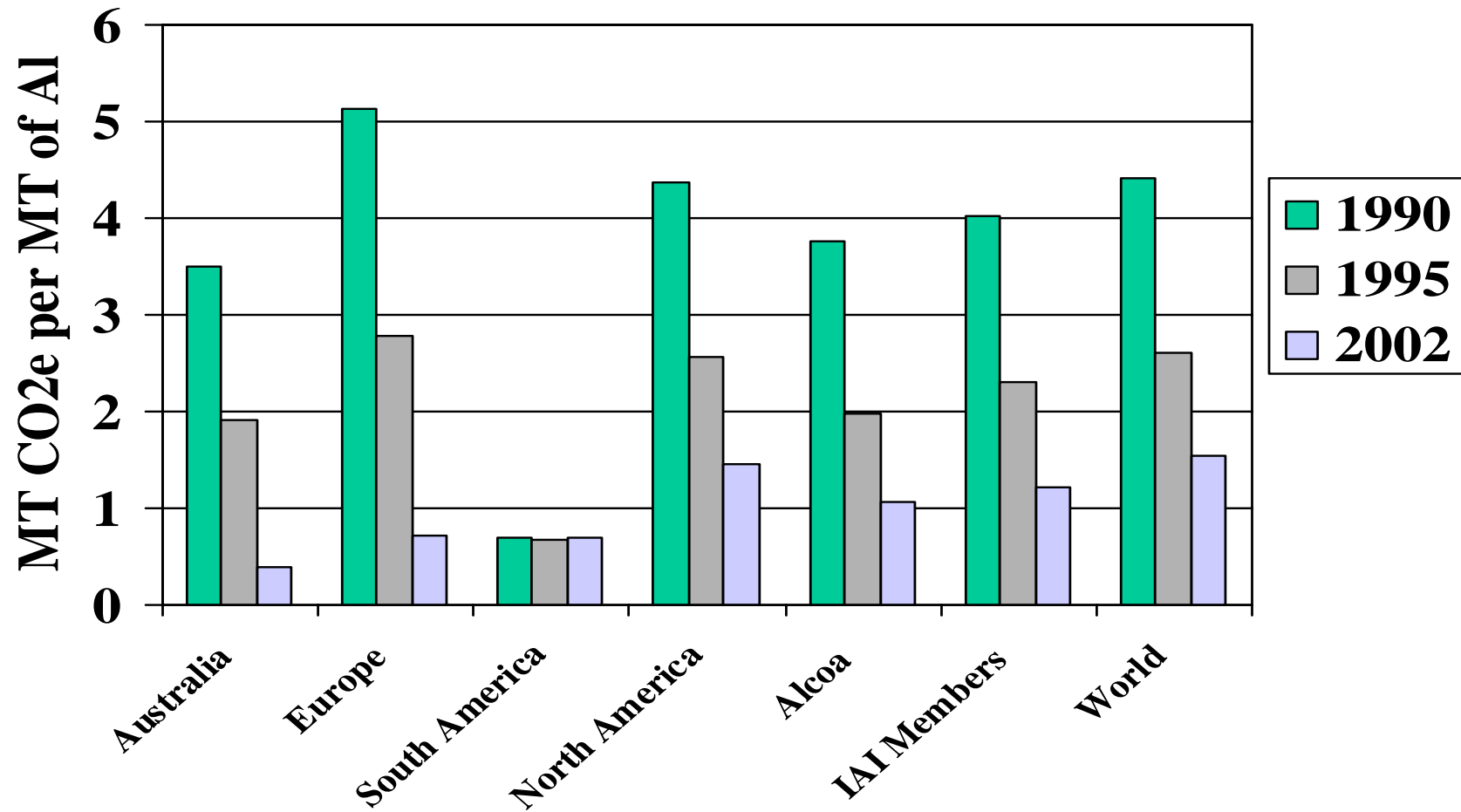
 **European Union Emissions Trading Scheme**

 **etc.**

Alcoa Global GHG Emissions

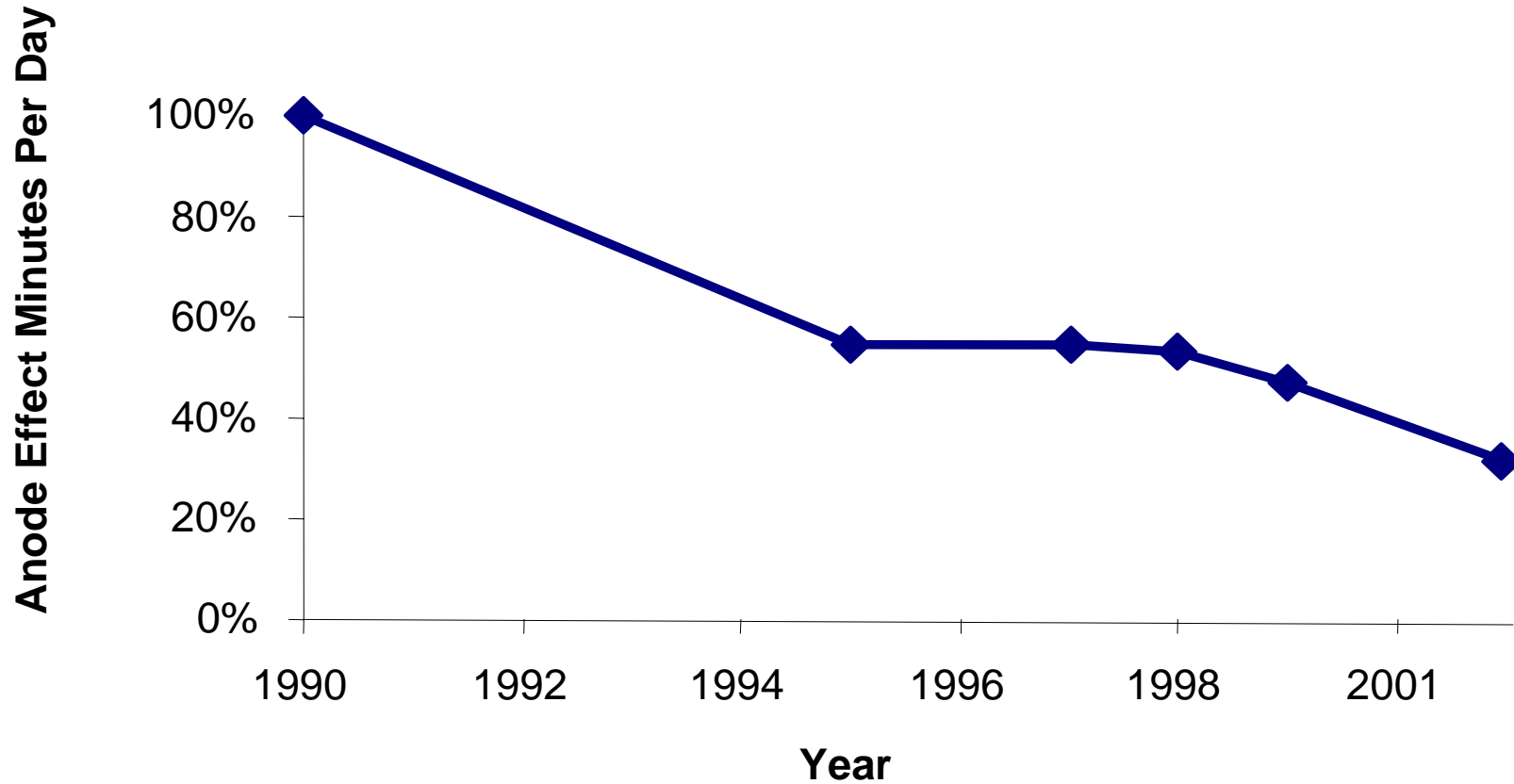


Perfluorocarbon Emissions Reductions – Alcoa and Industry



Key Performance Indicator

-Worldwide “Anode Effect” Reductions



60% Reduction Since 1990

Reporting - Worldwide GHG Emission Reductions

- **Significant Reduction in Annual CO2 equivalents**
 - 14 million metric tons (1990 to 2002)
- **Reductions Despite Significant Acquisitions and Integration**
 - About 50% of primary production facilities were not owned by Alcoa in 1990
- **Reductions Despite Overall Growth in Aluminum Production**



Auditing and Verification

Are We Following the Rules ?

- ▣ **Third Party Verification of GHG Emissions**
- ▣ **Pilot Verification**
 - **Engaged PriceWaterhouseCoopers (PwC)**
 - **Scope: Alcoa GHG Data Management System**
 - **Scope : Representative Alcoa Facilities**
 - ❖ **Point Comfort, Texas Bauxite Refinery**
 - ❖ **Evansville, IN Aluminum Smelter & Self-Generation Power Plant**

Informal Objectives

- **Does the Alcoa GHG Data Management System Follow Emerging Rules ?**
- **Is the System Adequate to Check and Uncover Errors ?**
- **Are Instructions to Facilities Clear and Useful ?**
- **Were Facilities Gathering and Entering Credible Data ?**
- **Where Are Gaps Warranting Enhancements & Improvement Prior to Verifying Other Facilities ?**

Pilot Verification Process – Corporate

- Reviewed mechanics, calculations, procedures and documentation
- Reviewed Internal Control System
 - ✓ Roles and responsibilities
 - ✓ Guidance documents, scope, definitions
 - ✓ “Materiality”
 - ✓ Data gathering and compilation
 - ✓ Data recording, monitoring & review process
 - ✓ Error checking and correction
- Audit Trail
 - ✓ Traced selected data points and verified accuracy of calculations and aggregations

Pilot Verification – Smelter & Refinery

- **Internal Control System**
Reviewed control aspects similar to Corporate
- **Audit Trail**
Requested supporting documentation for the following GHG emissions inputs:
 - ✓ **Purchased and self generated electricity**
 - ✓ **Natural gas**
 - ✓ **Diesel and Distillates (gasoline)**
 - ✓ **Coal, Pitch & Petroleum coke**
 - ✓ **Anode effect minutes**
- **Data Testing and Verification Evidence**
 - Tested data in the above audit trail documentation to confirm the accuracy of data input

Formal Conclusions

- “ The overall conclusion resulting from the pilot verification is that Alcoa has a robust and coherent system to manage the GHG inventory for its operations.”
 - **Completeness** – Alcoa has designed its inventory to include direct site emissions. Emissions from offices, R&D facilities and certain other sources are not included because they are assumed to be immaterial. Alcoa should quantify and document the basis for this assumption.
 - **Accuracy** – Much of the data tested at the sites was derived from third-party supplier data – generally a relatively accurate source because it is the basis of transactions. The inventory data at these sites appears to reasonably accurate.
 - **Valuation** – The methodology applied across the Company appears to be consistent and emissions data is calculated using a common method at the corporate level. There is some need for site guidelines to ensure that facilities are collecting input data consistently.

Some Lessons Learned

- Natural gas consumption data were traced to records of gas meter measurements
 - The review uncovered some transcription errors for the metrics the numbers provided on the metrics spreadsheet thought to be in millions of British Thermal Units (BTUs), but were instead in Gigajoules.
- Data for electricity consumed were traced to meter readings provided by the local utility.
 - Error was identified, as the data in the Metrics report were the values for net consumption minus consumption by a transformer on site. This led to an understatement of electricity use by approximately two percent.

A stylized world map in a light orange color, centered on the Atlantic Ocean. The map shows the outlines of all major continents. Overlaid on the map is the text "GHG Management" in a dark red, serif font. A horizontal orange line is positioned above the map, spanning most of the width of the slide.

GHG Management

Recommendations for Alcoa Corporate

- **Develop guidance for sites on GHG document retention and audit trail requirements.**
- **Better communicate current QA/QC (checking) procedures of Alcoa GHG Data Management System to site data coordinators.**

Recommendations for Smelters & Refineries

- **Document site procedures for determining and collecting GHG data**
- **Identify ways to leverage their existing ISO 14,001 Environmental Management System with the GHG measuring & reporting process.**

Evolution – Next Steps

- **Continuously Improve Alcoa GHG Data Management System(s)**
- **Participate in Verification of Smelters with Government of Quebec**
- **Better Integrate GHG Measuring & Reporting into Location's Environmental Management System**
- **Contribute to the Development of Common, Credible International GHG Measurement, Reporting and Verification Standards relevant to Aluminum Reduction**
- **Quantify Reductions from Specific Projects**