ALCOA- QUEBEC GOVERNMENT

Voluntary agreement on GHG reduction

Agenda

- Road to the voluntary agreement
- Agreement
  - Basis
  - Plants involvement
  - Conditions of success
  - Reduction strategy
  - Results
- Conclusion
- Future opportunities

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At Alcoa, our vision is to be the best company in the world--in the eyes of our customers, shareholders, communities and people.

We expect and demand the best we have to offer by always keeping Alcoa's values top of mind.

Greenhouse gases (GHG) affect the climate, and Alcoa recognizes that the risk of climate change is a vitally important issue that requires action.

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Road To The Voluntary Agreement…

- Aluminium Association agreement in January 2002
- Alcoa policy on GHG
  - Reduction of 25 % worldwide from 1990 by 2010
  - Voluntary agreement on PFC's in USA
  - Québec smelters already members of EcoGESte

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ALCOA Agreement in Québec

- Signed in June 2002
- First to sign such an agreement in Canada
- Formal contractual agreement
  - Commitment to reduce by about 200 000 t/y average emissions in 2002-03-04 Vs 2001 . This represents a 7 % reduction.
  - Need to compensate with other reduction if target is not met
  - Outside verification of the results by a third party
  - New target has to be negotiated by 2004 for 2005 to 2007

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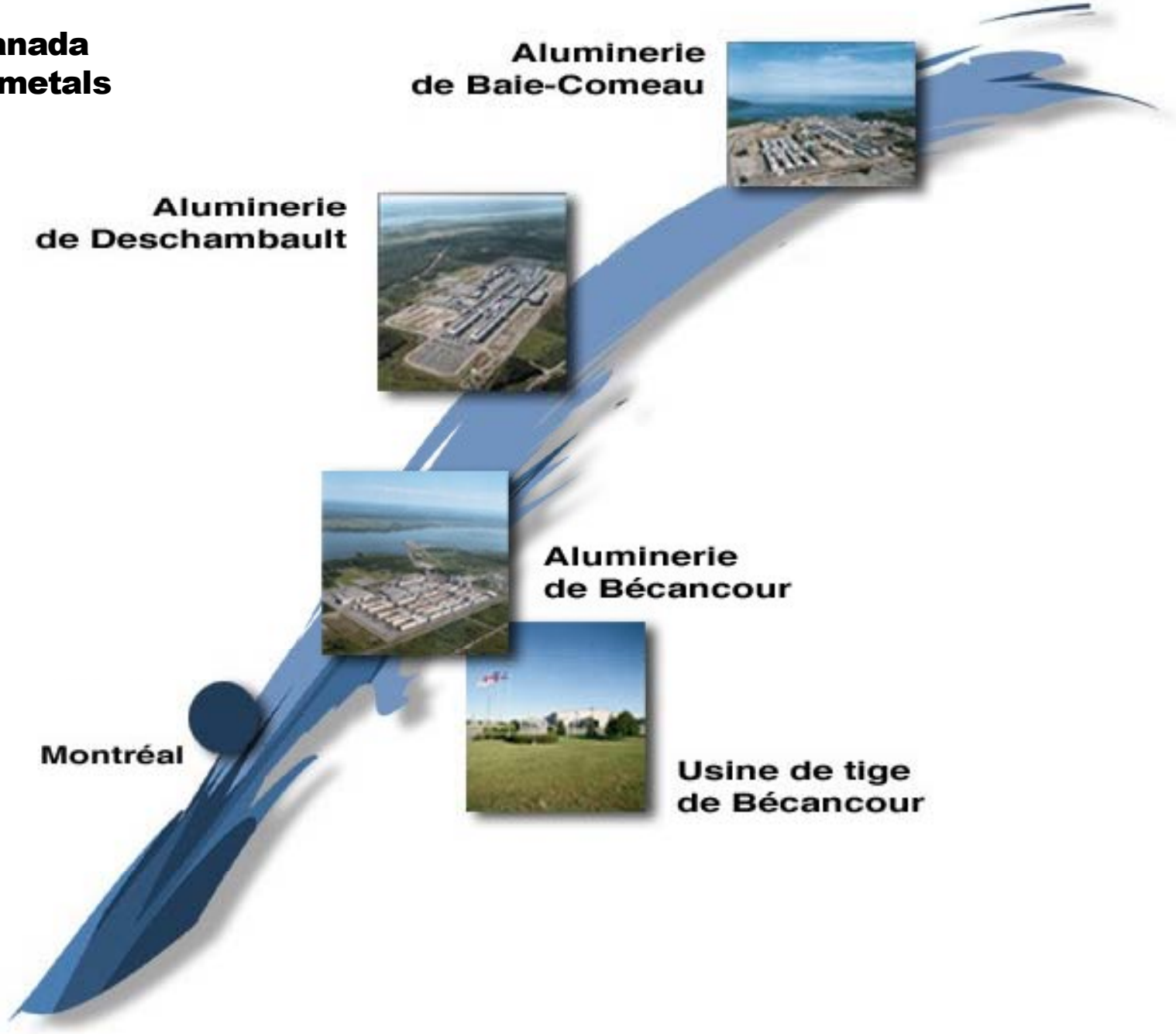
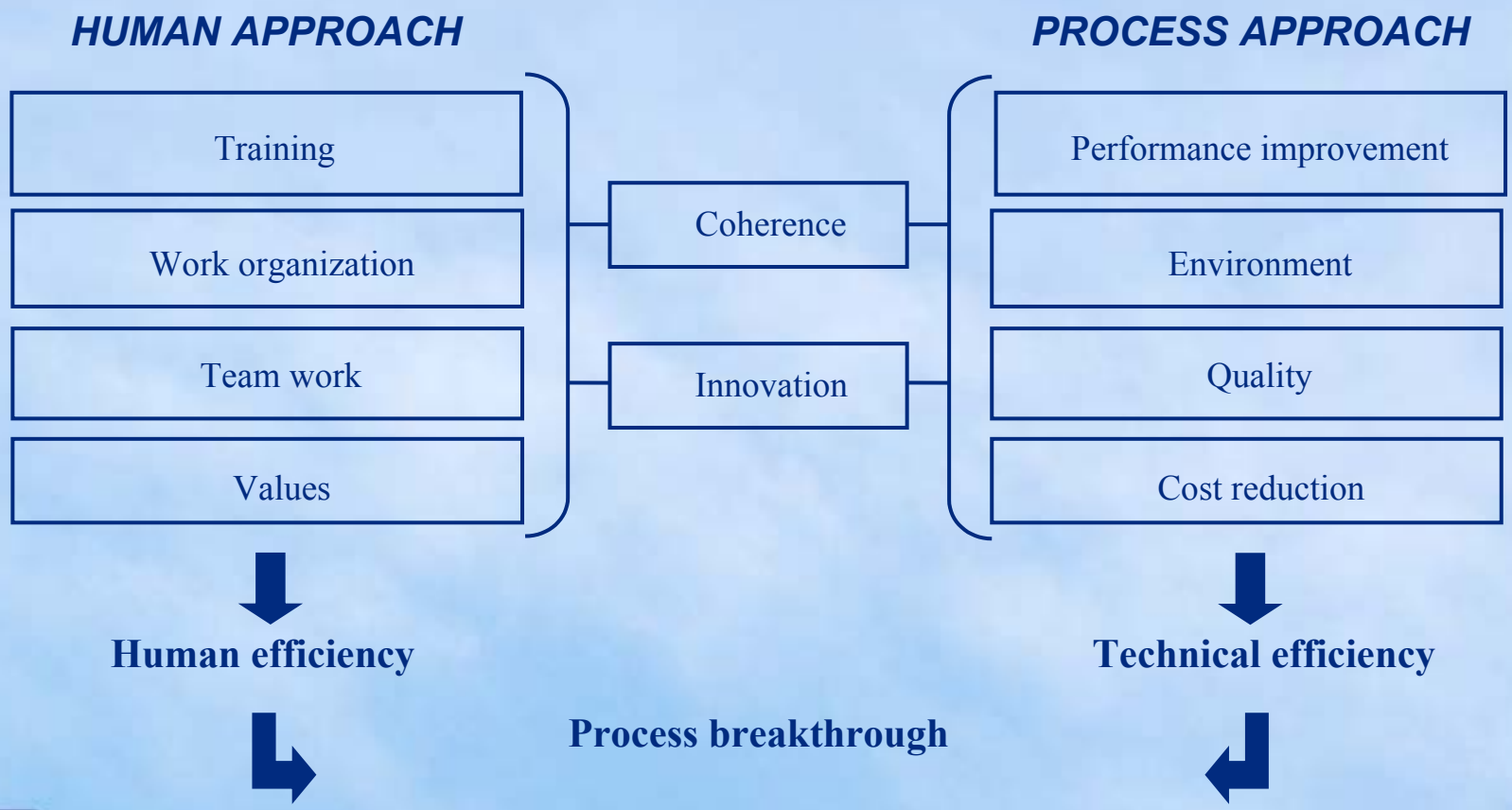
Alcoa Canada
Primary metals



Management Philosophy



Plants Involvement

- Selection of an SPA & team creation
- Determination of the base performance of each plant + benchmark exercise + sharing of best practices
- Selection of improvement opportunities
- Target setting
  - Per plant/per year
- Approval by our top management of the global target
- Approval by Pechiney, ABI co-owner (25%) in a specific agreement

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Conditions Of Success

- Each plant selected their own target
  - One plant was already a benchmark
  - One plant with a mix of a old/recent technology
  - One plant was good but could be improved
- Formal agreement facilitate the mobilization of people
- Mobilization of people to a good cause helps to set aggressive targets

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Reduction strategy

- Establishment of the data base including all sources as per the agreement methodology
- Focus on anode effect reduction (biggest potential)
- Sharing of best practices:
  - Kaizen activity on root causes (prevention)
  - A.E. killing protocol
  - Anode effect prediction
- Meetings on a regularly basis

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Electrolysis Process, Typical Emissions and Energy Consumption

PFC Emissions

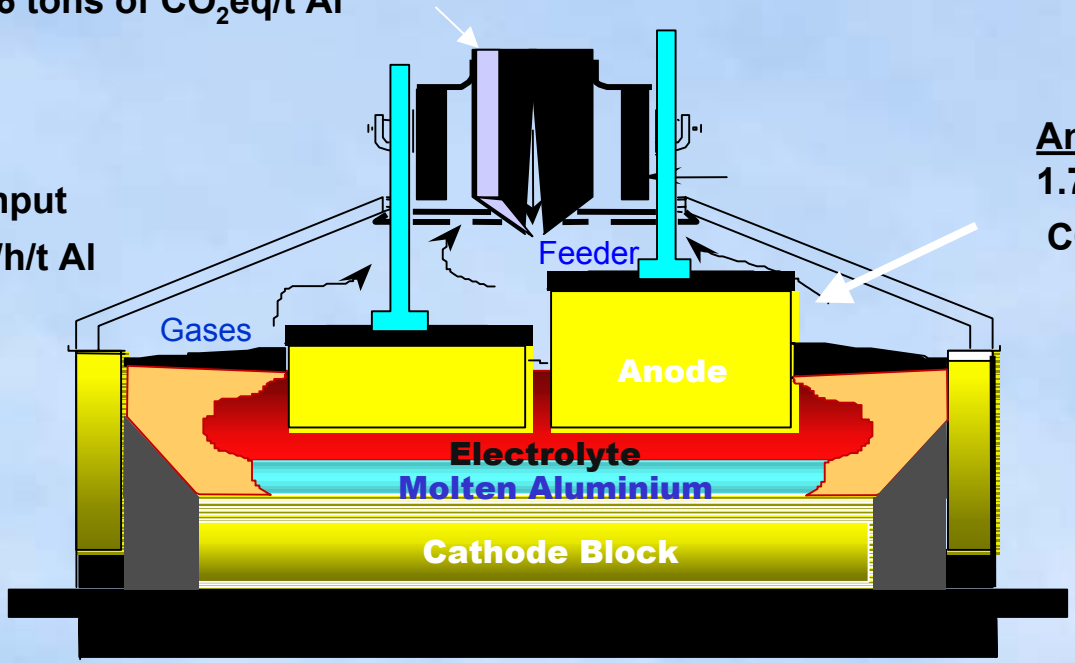
1.6 tons of CO_2eq/t Al

Electricity Input

13 to 16 MWh/t Al

Anode Carbon

1.7 tons of CO_2eq/t Al



- **GHG from Primary Aluminium Production**

  Two PFCs (perfluorocarbon compounds - CF_4 and C_2F_6) contribute about 48% of worldwide primary aluminium GHG emissions

Ref. Aluminium Association

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Understanding PFCs emissions

- PFCs are not generated normally in aluminum electrolysis
- PFCs result from anode effects
  - Anode effects result of a brief upset condition in the raw material feed rate .
  - In the old days, anode effects were seen as beneficial to the process
  - The amount of PFCs produced from anode effects is a function of:
    - Anode effect frequency
    - Duration of anode effects
    - Cell technology
    - Anode effect voltage

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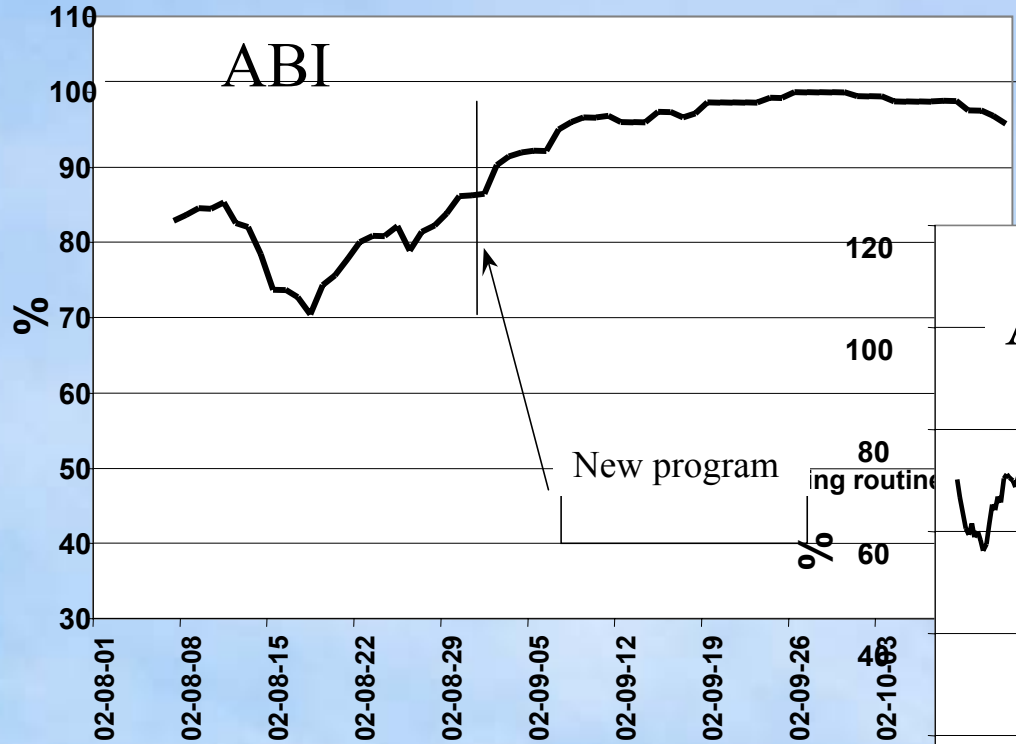
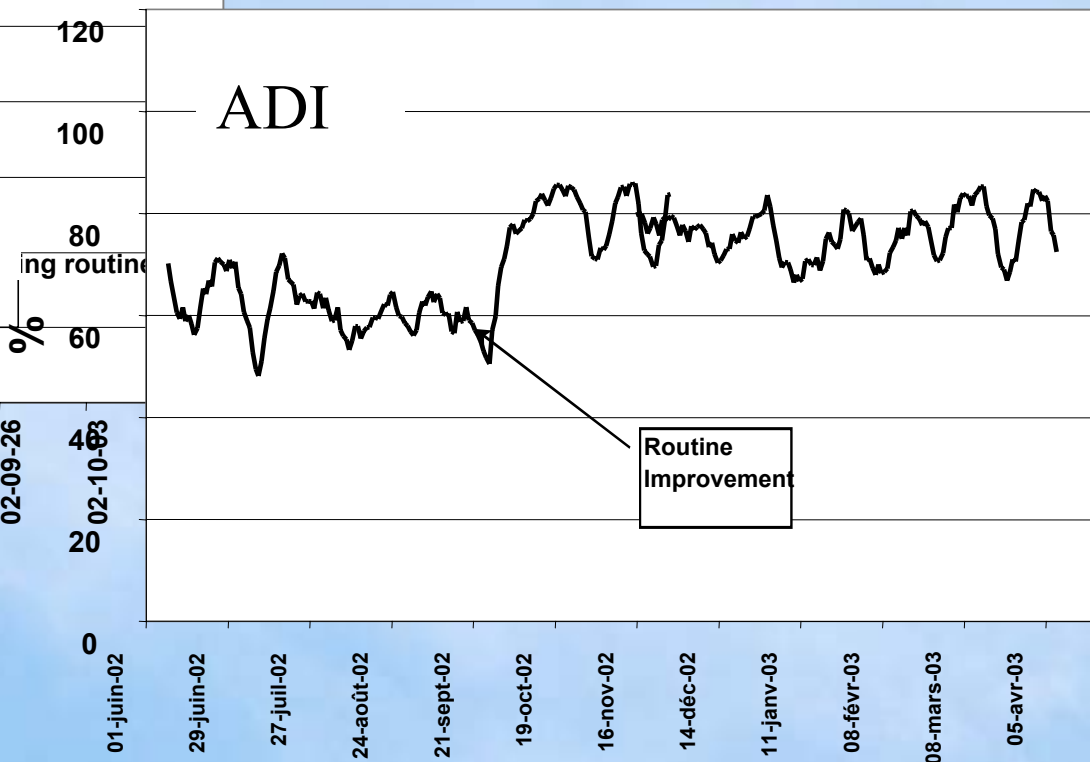
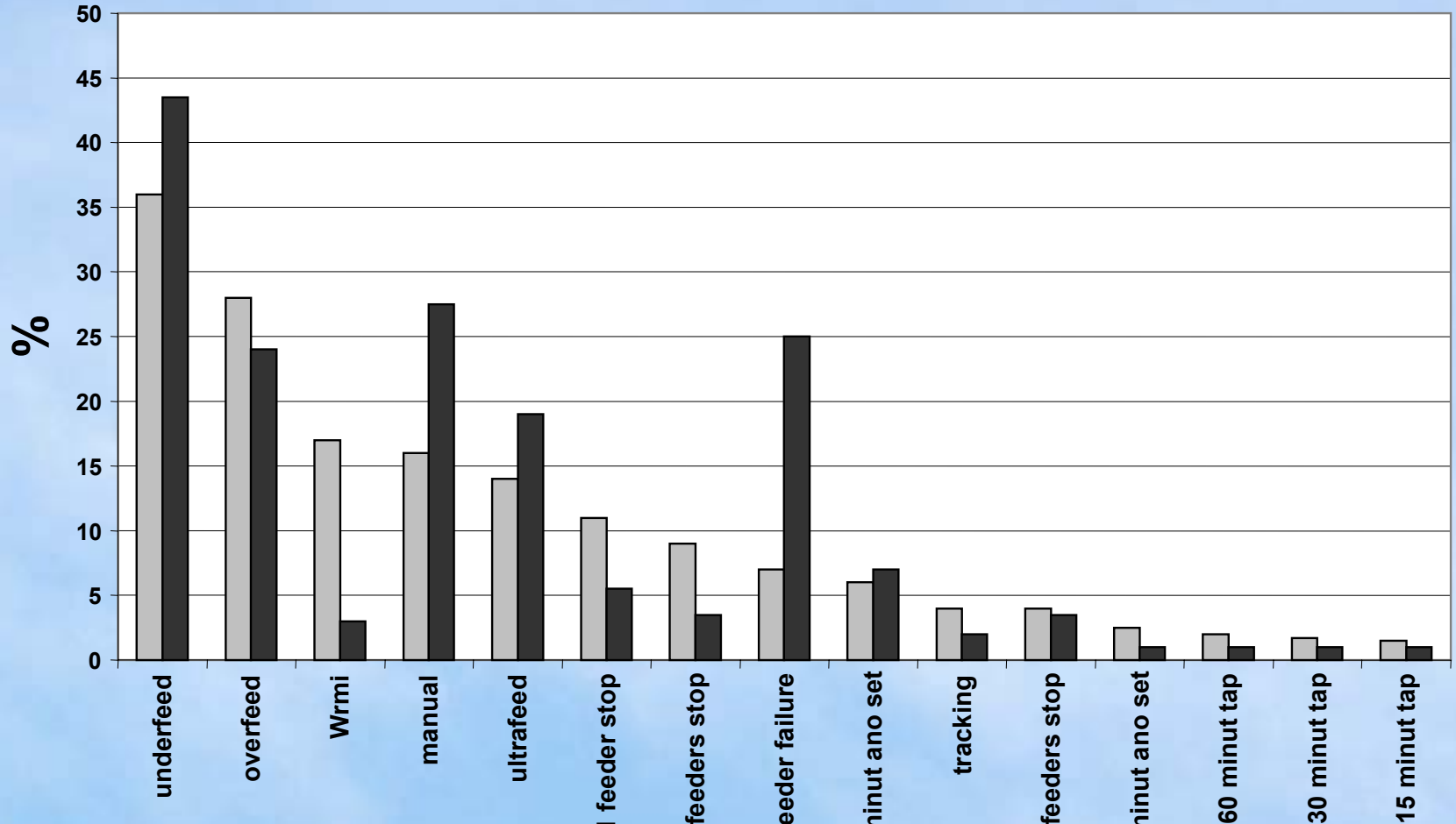
ABI & ADI Performance of A.E. killing routine





Kaizen PARETO -- Anode effect (A.E.) Causes



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KAIZEN Anode Effects (A.E.) Causes Analysis

- Method: 10%-20% A.E. originate from inadequate operational practices (alumina feeder stopped by the operator, pot in manual mode, ...)

- Equipment: Some A.E. are caused by an equipment failure (feeder failure not replaced by a new one, inadequate feeder shots, …)

- Technical: 30%-35% happen during underfeeding mode while 25 % was in overfeeding mode.

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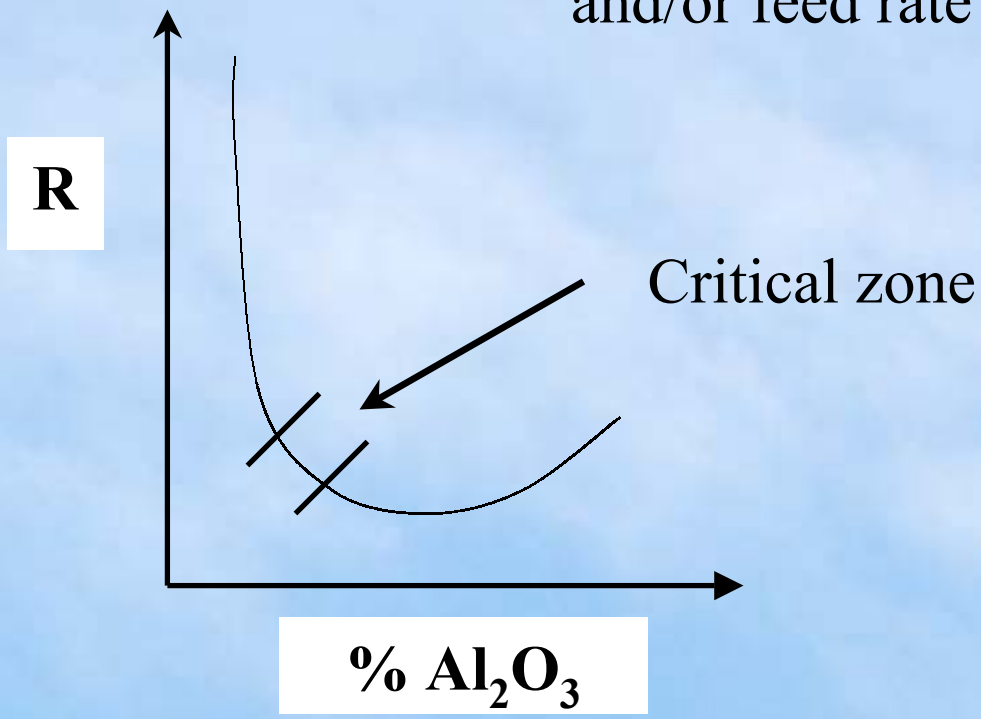
Sensitivity of Anode Effect Prediction Zone

- Identification of a correlation with A.E. circumstances that precedes it.
- Alarm is sent to operators to take action and/or feed rate is adjusted



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Observations

- Knowledge acquisition
  - Calculation methods
  - Anode effect process
- Rigorous inventory keeping
- Challenge of continuous improvement and maintained performance
- Culture change and adaptation to the future and Kyoto requirements
- Change in individuals attitude
- Voluntary agreement is working

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RESULTS

	Alcoa Canada
Production Aluminium (000t/y)	
2001	1049
2002	1059
+/-(%)	0.9
GHG All sources (000tCO2/y)	
2001	2867
2002	2722
+/- (%)	-5.1
PFCs (t CO2/tAl)	
2001	1.01
2002	0.83
Reduction (%)	-18.0
GHG all sources (t CO2/tAl)	
2001	2.73
2002	2.57
+/- (%)	-5.9

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Future GHG Emissions Reduction Opportunities

- Implementation of good practices for reducing anode effect frequency and duration

ACTION Predictive approach	ADI	ABC	ABI
By computer	50%	30%	50%
By operator	25%	0%	15%
Killing routine improvement	90%	90%	90%
Anode effect causes survey	50%	0%	100%

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Future GHG Emissions Reduction Opportunities

- Program in place to continuously reduce plant energy consumption.

- Building new facilities and upgrading current facilities
  - The most modern point feed prebake technology produces PFCs at a rate of only 3% of the worldwide average of all technologies .

  - MOU to modernize Baie-Comeau Soderberg smelter

– Training and involment of the workforce

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