Integrating Energy/GHG Management Systems

CEAA Conference

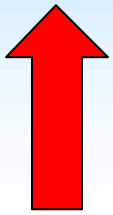
Lauri Gregg

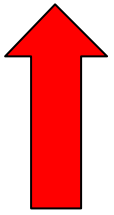
October 6, 2005

Key Messages

- Integrating Energy/GHG Management into industrial operations is a new paradigm
- Energy/GHG emissions must be considered as a important process variable within production process operation
- ISO 14001 & TSM provide a sustaining management frameworks

Energy Management Priority Drivers

COST OF ENERGY 

COST OF GHG EMISSIONS 

Energy cost has a direct impact on the profitability of a corporation

Falconbridge At A Glance

- Founded in 1928
- 75 year history in mining Nickel and Copper
  - 3rd largest Nickel producer in the world
  - 11th largest Copper producer in the world
- One of the largest metal recyclers and processors
- 14,500 employees – 18 countries
- 2004 sales US$ 7 B and US$ 9.6 B assets
- Market capitalization of C$4.2 B
- Energy 31% of Cost of Operations
- Electricity represents 51% of energy costs

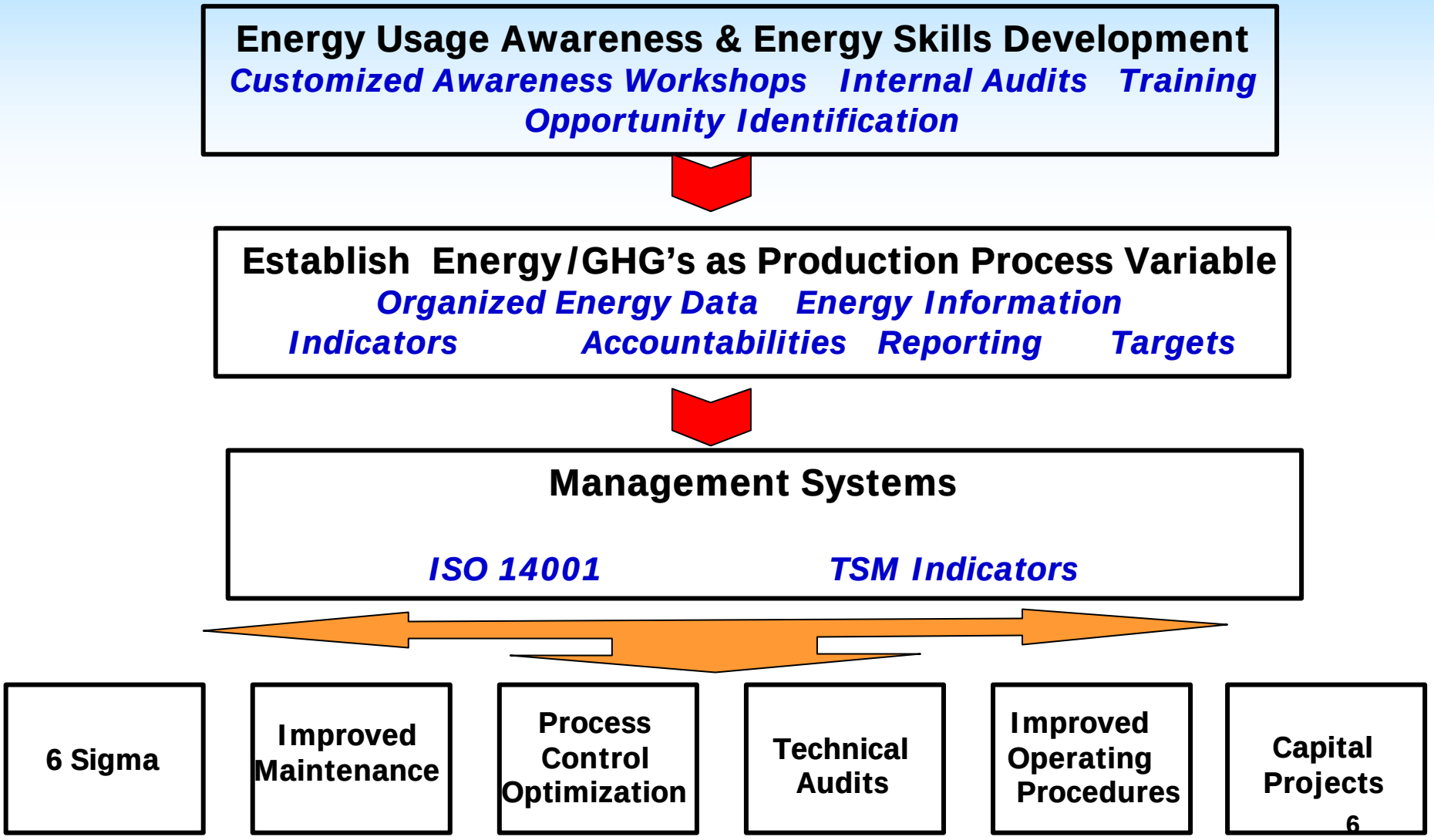
Falconbridge faces Global Competition

Falconbridge is a price taker in a global market place and cannot pass through increasing costs

Integrating Energy Management

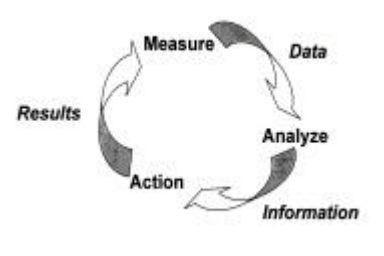
- New Paradigm
  - New Technologies
  - New Skills
  - New Allocation of Resource Time
  - New Performance Metrics and Business Processes

Energy/GHG Management Integration



INTERGRATE ENERGY/GHG EMISSIONS MANAGEMENT INTO PRODUCTION PROCESS OPERATION

Energy/GHG Management in Production Processes



"If you cannot measure it you cannot improve it. To measure is to know"

Lord Kelvin

3 Levels of Reporting for Metrics

Manager's Report

Performance Control Report

Operator Control Screen

Managers

Supervisors/Engineers Analysis

Project Management

Audit Report

6 Sigma

Observations

Performance Improvement Objectives

Energy Efficiency Improvements

Real Time Data & Analysis

Operators with the responsibility for energy

Audits

Technology Improvements

METERING

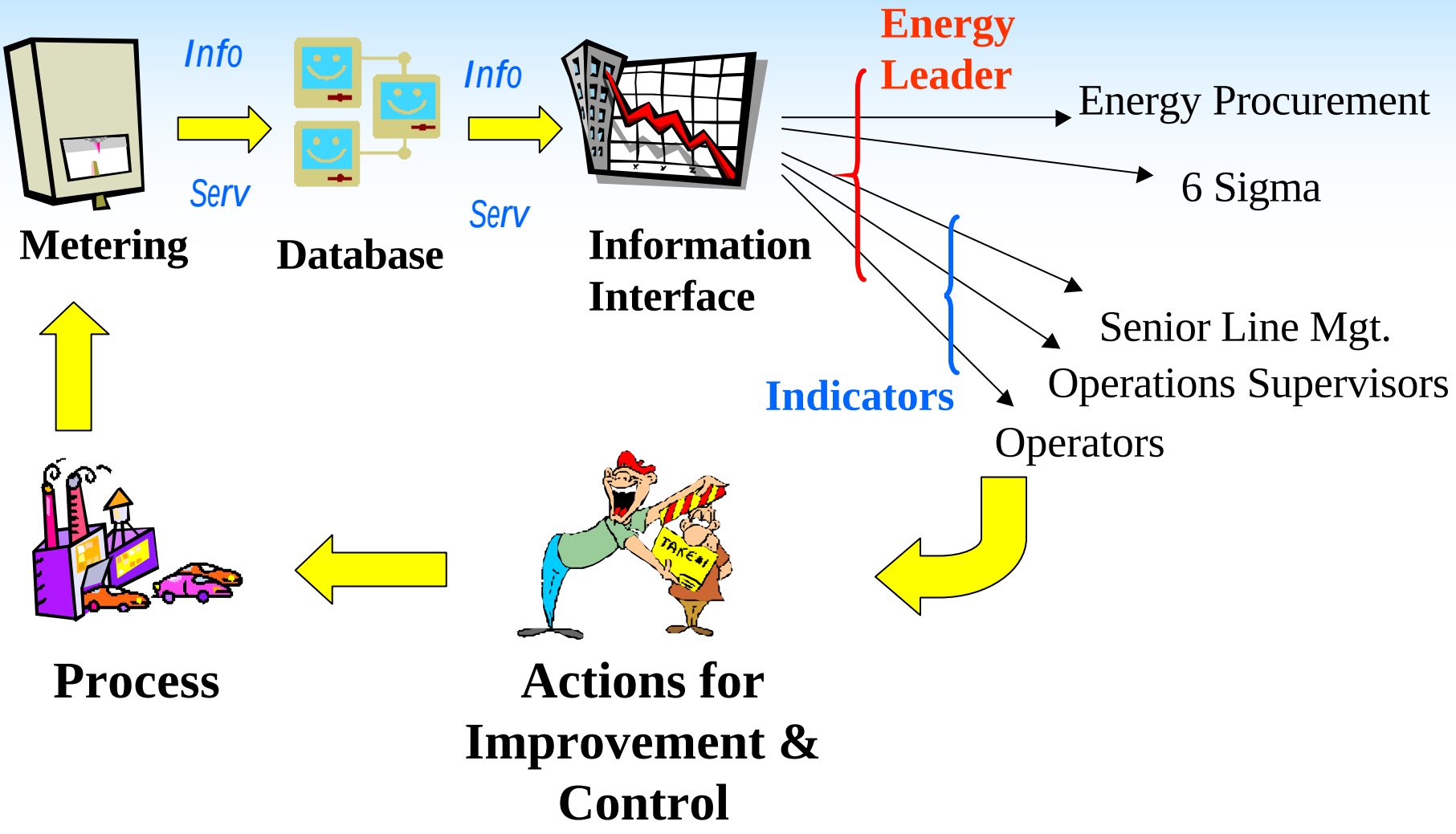
ACTIONS

ANALYSIS

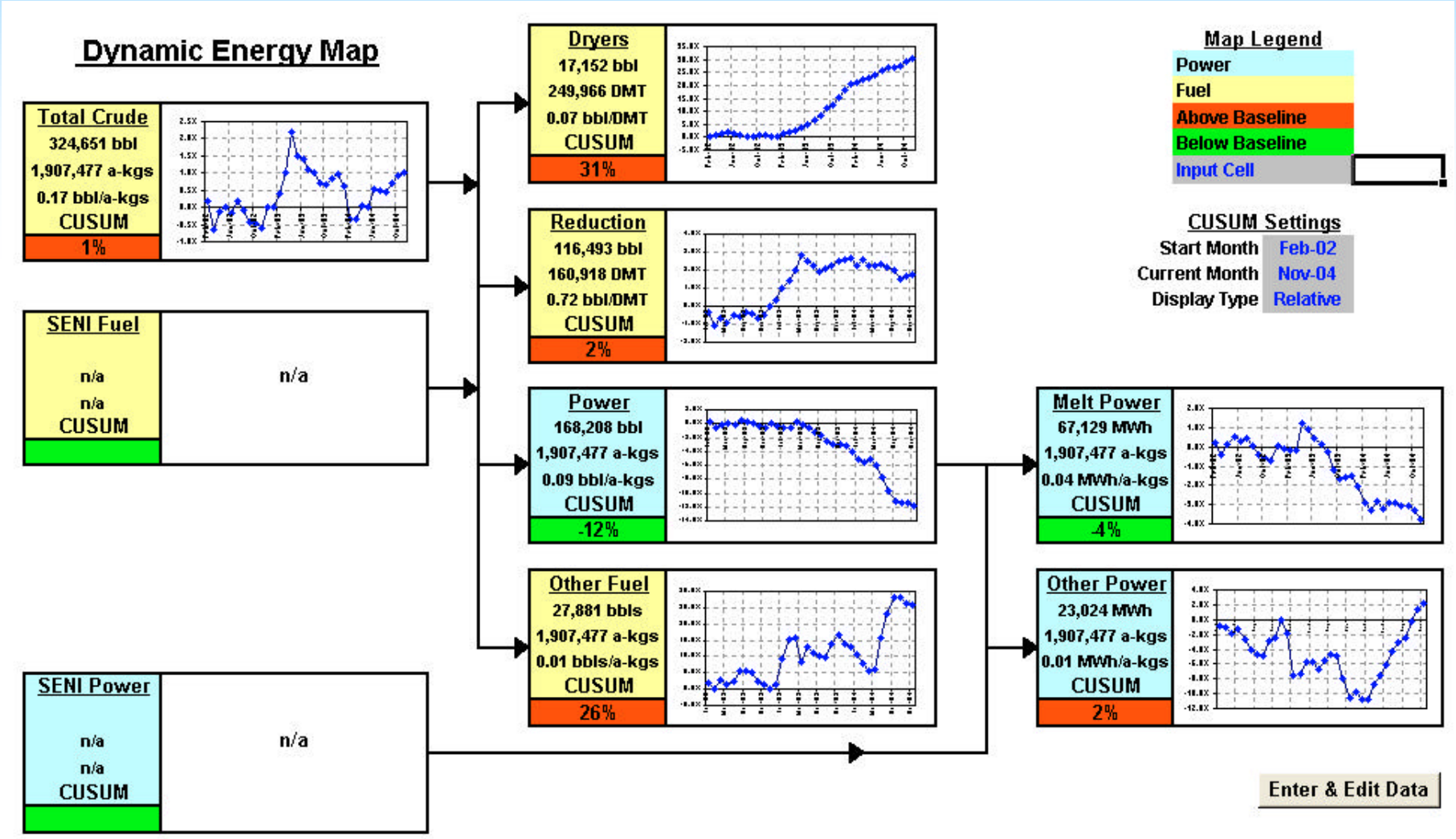
ACTIONS

Production Processes

Building the capacity within operations to control energy use

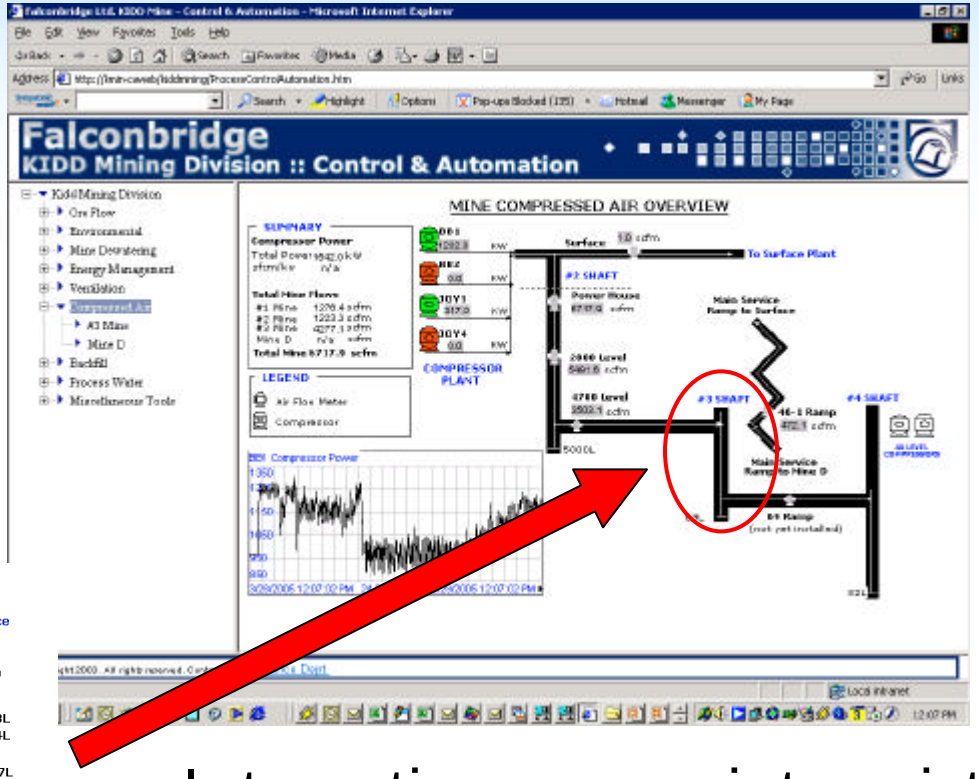


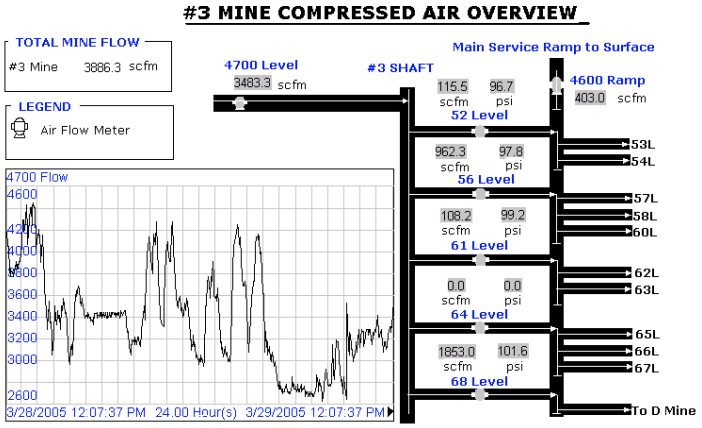
Dynamic Energy Performance Analysis



Process Mapping

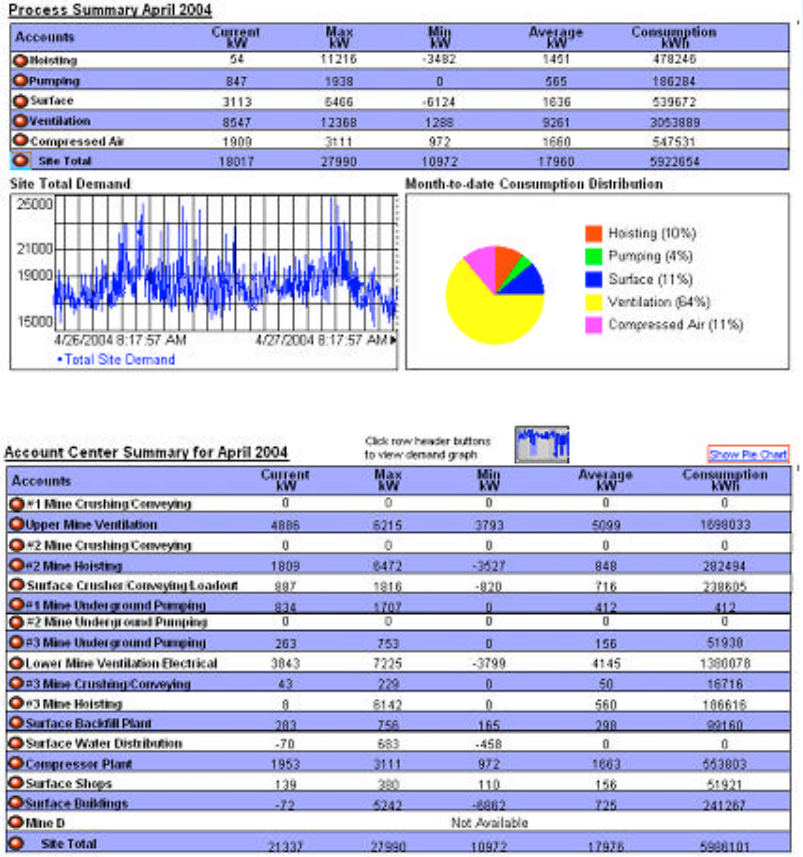
Operators have Energy Targets to Maintain!





- Integrating energy into existing process targets
  - Compressed Air & Process Water

Energy Consumption Accountability



Process Summary April 2004

Accounts	Current kW	Max kW	Min kW	Average kW	Consumption kWh
Hoisting	54	11216	-3482	1451	478246
Pumping	847	1938	0	565	186284
Surface	3113	6466	-6124	1636	539672
Ventilation	8547	12368	1288	9261	3053889
Compressed Air	1909	3111	972	1660	547531
Site Total	18017	27990	10972	17960	5922654

Site Total Demand

Month-to-date Consumption Distribution

Account Center Summary for April 2004

Click row header buttons to view demand graph

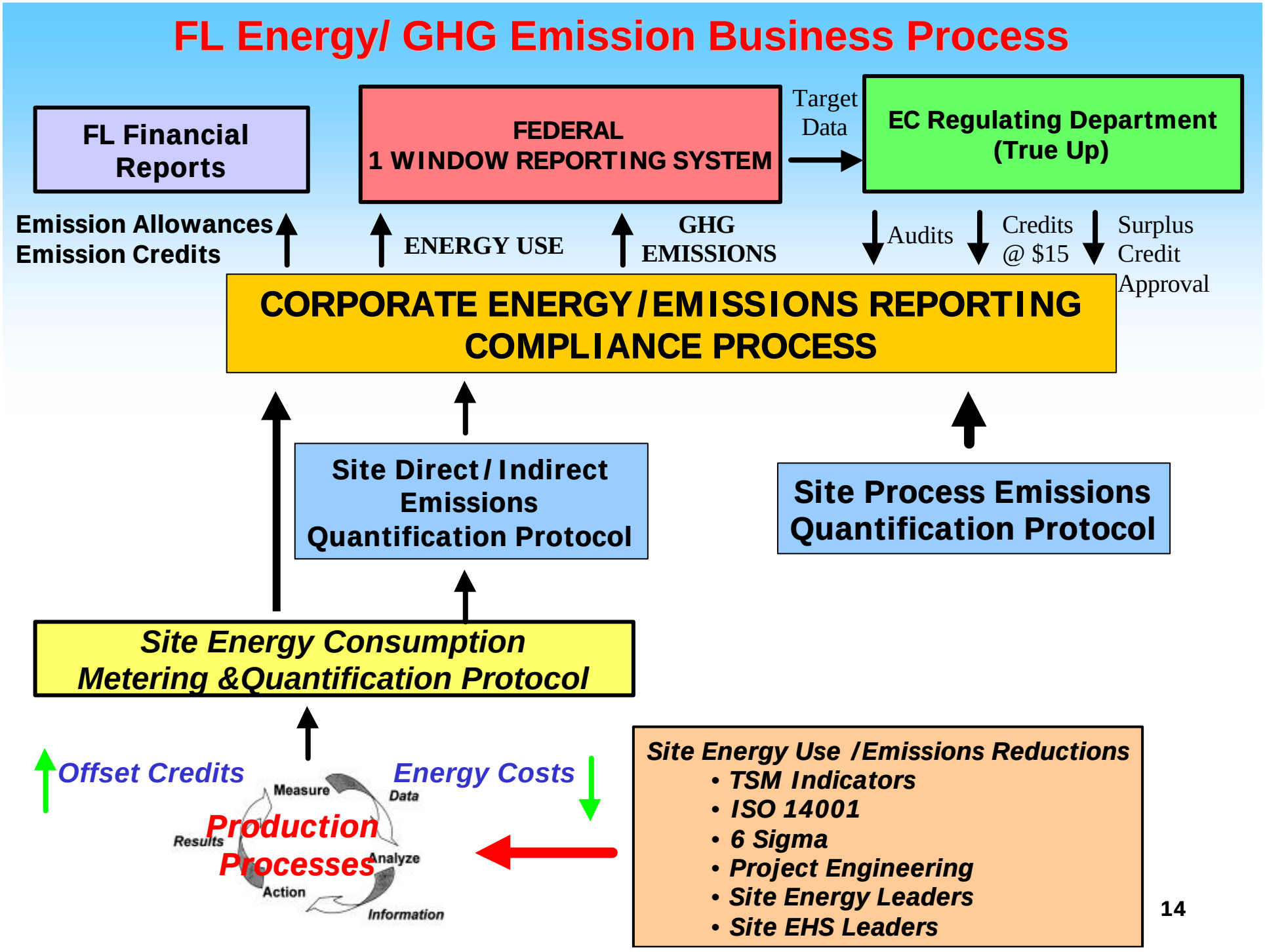
Show Pie Chart

Accounts	Current kW	Max kW	Min kW	Average kW	Consumption kWh
#1 Mine Crushing Conveying	0	0	0	0	0
Upper Mine Ventilation	4886	6215	3793	5099	1698033
#2 Mine Crushing Conveying	0	0	0	0	0
#2 Mine Hoisting	1809	6472	-3527	848	282494
Surface Crusher Conveying Loadout	887	1816	-820	716	238605
#1 Mine Underground Pumping	834	1707	0	412	412
#2 Mine Underground Pumping	0	0	0	0	0
#3 Mine Underground Pumping	263	753	0	156	51938
Lower Mine Ventilation Electrical	3843	7225	-3799	4145	1380078
#3 Mine Crushing Conveying	43	229	0	50	16716
#3 Mine Hoisting	0	6142	0	560	186616
Surface Backfill Plant	283	756	165	298	99160
Surface Water Distribution	-70	683	-458	0	0
Compressor Plant	1953	3111	972	1663	553803
Surface Shops	139	380	110	156	51921
Surface Buildings	-72	5242	-6882	725	241267
Mine D	Not Available				
Site Total	21337	27990	10972	17976	5986101

- Ability to view energy consumption by major process area or by account centre
- Forces ownership of energy consumption in each area of the mine to the Process Owner of the area

INTERGRATE ENERGY / GHG EMISSIONS MANAGEMENT INTO EXISTING MANAGEMENT SYSTEMS

FL Energy/ GHG Emission Business Process



ISO 14001

- Energy/GHG emissions as a significant aspect
- Measurement and energy/emissions info
- Improvement targets
- Action plans
- Internal reporting re: targets
- Engaged environmental leaders
- Internal audits
- External audits

Towards Sustainable Mining

- a strategy for improving the mining industry's performance by aligning its actions with the priorities and values of Canadians in 4 categories:
  - Energy and GHG Reduction
  - Tailings Management
  - Crisis Management
  - External Outreach

- Self assessment
- Senior officer sign-off
- Public reporting

TSM Energy Use and GHG Emissions Management Indicators

- Six indicators to report on MAC member progress:
  - Energy Use Management Systems
  - Energy Use Reporting Systems
  - Energy Intensity Targets
  - Greenhouse Gas Emissions Management Systems
  - Greenhouse Gas Emissions Reporting Systems
  - Greenhouse Gas Emissions Intensity Targets

Energy Use Management System Indicator

Level	Criteria
1	**No formal energy use management systems** in place.
2	**Basic systems in place for energy use management** which must include the following elements: ? written senior management commitment ? facility level Energy Leaders ? facility level monitoring infrastructure that measures consumption of energy with a level of disaggregation by major process activity ? aggregation of facility level measured data into a facility level database
3	***Formal systems in place for energy use management which achieves all of Level 2 criteria and must include the following elements:*** ? standard quantification and estimation methodologies are used to convert energy data to comparable energy information ? clear accountability for energy use assigned to operational managers ? the facility or plant management system and operators control energy use to ensure maximum efficiency ? company level Energy Leader ? energy system integrated within an operational management system ? company level energy database ? energy awareness included in training programs
4	**Integration into decision making:** In addition to the formal system for energy use management criteria achieved in Level 3, the following elements have been integrated into the process: ? energy management integrated into business planning ? regular verification of energy use management system
5	**Excellence and leadership:** To achieve this level the company must achieve all Level 4 criteria, and is recognized as a leader of integrated energy use management into a broader sustainable business strategy. For example : ? procurement policies and supply chain management incorporates energy efficiency criteria ? investments in research, development and demonstration of technologies and processes that reduce energy consumption ? participation with our communities of interest to improve energy efficiency (e.g., community events, environmental non-government organizations, government energy efficiency programs …)

GHG Emissions Reporting Systems Indicator

Level	Criteria
1	**No GHG emissions reporting procedures in place**
2	**Basic facility reporting system in place:** Company has established a facility GHG emissions reporting system: ?GHG emissions database used to report annual facility level emissions internally.
3	***Formal GHG emissions reporting system in place:*** Meets Level 2 criteria and company has implemented a formal GHG emissions reporting system which must include the following: ?internal quarterly reporting of estimated current year's GHG emissions used to support management decision making process ?facility based GHG emissions performance factors reported to management ?external company annual reporting of actual GHG emissions for public awareness ?external company annual reporting of performance vs company or facility GHG intensity target for public awareness
4	**External verification of GHG reporting system:** Achieves Level 3 criteria and implements the following actions ?internal verification of reporting system to verify progress and accuracy of company GHG emissions reporting system ?report on future GHG intensity targets.
5	?E**xcellence and leadership:** Achieves all Level 4 criteria and seek external feedback on performance which includes the following: ?GHG emissions reporting system has been externally verified and validated by an accredited third-party expert ?recognition by a reputable third-party as an industry/sector leader for its inventory, measurement and reporting accomplishments.

GHG Emissions Improvement Targets Indicator

Level	Criteria
1	**No GHG emissions intensity improvement targets in place.**
2	**Company or facility level net GHG emissions intensity improvement targets in place,** and include the following: ?company or facility level net GHG emissions intensity improvement target of at least 1 percent per annum ?current company performance falls short of the target.
3	***Company net GHG intensity improvement targets are achieved:*** ?facility level targets are rolled-up to company target ?company performance meets or exceeds target.
4	**Sustained net GHG intensity performance exceeds the target:** ?company performance exceeding the one percent per annum net GHG emissions intensity improvement target has been sustained over the previous five year period
5	**Excellence and leadership:** ?company is formally recognized by a reputable third party as an industry/sector leader for its progress and accomplishments for reducing net GHG emissions per unit of output

Key Messages

- Integrating Energy/GHG Management into industrial operations is a new paradigm
- Energy/GHG emissions must be considered as a important process variable within production process operation
- ISO 14001 & TSM provide a sustaining management frameworks