DEVELOPMENT OF ENERGY TRACKING SYSTEM

FUEL AND ELECTRICAL USAGE

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MILLER BREWING COMPANY OVERVIEW

- Six Large Breweries
- Three Smaller Scale Operations
- Acquired by South African Breweries (SAB) in July 2002
- Acquisition created SABMiller plc, the World's second largest brewer

MILLER BREWERY LOCATIONS

MILLER BREWING COMPANY OVERVIEW

- SABMiller plc
  - Headquartered in London
  - Owns and operates 118 breweries in 24 countries, employing over 69,000 people
  - World's second largest brewer with 2001/2002 volume of 120 million hectoliters (3.17 billion gallons)
  - World's largest bottler of Coca-Cola products

MILLER BREWING AND CLIMATE LEADERS

- Charter Partner of Climate Leaders
- Goal is 18% Reduction in GHG emissions over Five Years (2001 Baseline Year)
- Emissions reductions to be realized entirely through reductions in fuel consumption and electrical usage
- Needed a tracking system that allowed for accurate and efficient tracking of fuel and electrical usage

TRACKING SYSTEM DEVELOPMENT

- Tracking existed to some extent prior to Climate Leaders Participation
  - Established Environmental Metrics in 1997
    - Evaluate and track environmental impact of operations
    - Set Benchmarks and goals for impact reductions-Identify Best Performers
    - Identify Cost Saving opportunities
    - Continuous Improvement
  - Measured and Tracked:
    - Water Usage, Wastewater Discharge, Fuel Usage, Electrical Usage, Waste to Landfill, Recyclables

TRACKING SYSTEM DEVELOPMENT

  - Spreadsheet used to track performance against usage reduction goals
  - No calculation of emissions initially
- Operating facilities collected information and submitted to Corporate office on monthly basis
- Information was input into Excel spreadsheet
- Report forwarded to operating facilities monthly and Corporate parent annually

TRACKING SYSTEM DEVELOPMENT

- To prepare for emissions reporting, energy usage tracking had to be refined
  - Began calculating emissions in 1998
  - Energy Tracking has been evolving as operations become more complex
    - Co-generation
    - Fuel Switching
    - Sale of electricity

TRACKING SPREADSHEET-1997

1997	Generated Electricity(kw) Brewery Data	Purchased Electricity (kW)	Total kw/barrel	Total Electric(kW)	Purchased Natural Gas (therms)	Purchased Water (Barrels)
January			0.0000	0		
February			0.0000	0		
March			0.0000	0		
April			0.0000	0		
May			0.0000	0		
June			0.0000	0		
July			0.0000	0		
August			0.0000	0		
September			0.0000	0		
October			0.0000	0		
November			0.0000	0		
December			0.0000	0		
Totals		-	0.00	0	-	-
Finish barrels						
energy/barrel						
				kW/bbl	therm/bbl	Water/Beer bbl/bbl

TRACKING SPREADSHEET-1999

Miller Brewing Company Performance Indicators

Year	Water Consumption		Electrical Consumption		Fossil Fuel Consumption		Reduction of Greenhouse Gas (Emissions)	Solid Waste - Total Recycled		Solid Waste - Total Landfill		Wastewater Discharge		Total Barrels (millions)
1997							-							
1998														
1999														
2000														
Units	bbls-H_20 / bbl-beer		kW-hr / bbl-beer		therms / bbl-beer		tons / year	lbs. / bbl-beer		lbs. / bbl-beer		bbls-waste / bbl-beer		barrels

NOTES:

Positive % numbers represent improvement over previous year

Reductions in recycled solid waste are in part caused by switching to reusable materials.

ACTION ITEMS:

1. Initiate a "Performance Indicators" reduction goal of 5%.
2. Maximize self-generation and reduce equipment use during peak cost periods.
3. Established focus groups to identify and implement water conservation.
4. Replaced older equipment with newer and more efficient equipment.(i.e.: high efficiency motors, high efficiency lighting and etc.)
5. Implement employee information programs to educate them on the impact of their actions on the environment.

PREMIUM BEER SOUTHPAW LIGHT™

TRACKING SYSTEM REFINEMENT

- STEP 1: Evaluated what we wanted in an energy tracking system
- STEP 2: Evaluated information needed for tracking system
- STEP 3: Modified existing energy usage tracking to meet Climate Leaders' requirements

TRACKING SYSTEM DEVELOPMENT

- Step 1: What do we want?
  - Allow input at Brewery level rather than roll-up and input at Corporate level
  - Allow for roll-up on monthly basis
  - Allow for comparison of historical data
  - Include all fuel usage
  - Account for co-generation and electricity sales
  - Flexibility
    - Changes in protocols, formulas, emission factors

TRACKING SYSTEM DEVELOPMENT

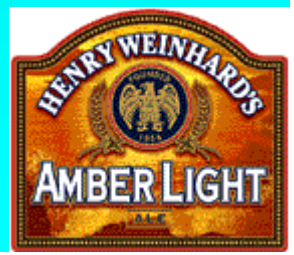
- Step 2: What do we need?
  - Acceptable formulas and emission factors for calculating emissions
  - ACCURATE fuel usage and electrical consumption data
    - Enlisted assistance of Climate Leaders
      - What should be included/omitted

TRACKING SYSTEM DEVELOPMENT

- Utilized Climate Leaders Draft Protocols
  - *Direct and Indirect Emissions From Stationary Sources*
  - *Indirect Emissions From Purchases/Sales of Electricity and Steam*
    - *Provided ideas as to possible sources of usage data*
    - *Provided formulas for incorporation into tracking system*

TRACKING SYSTEM DEVELOPMENT

- Step 3: Spreadsheet Development
  - Already utilized spreadsheet for tracking usage of primary fuels
  - Refined to incorporate all fuels
  - Incorporated formulas and emission factors from Climate Leaders' Protocols
  - Spreadsheet Improved
    - Requires input of usage values only
    - Ensure units are converted to intensities for reporting purposes



TRACKING SYSTEM DEVELOPMENT

- Enlisted assistance from Climate Leaders in developing spreadsheets and obtaining emission factors
- Climate Leaders reviewed methodology and accuracy

TRACKING SPREADSHEET-2003

Facility Name:									
Fiscal Year:									
Month	Annual Natural Gas Consumption	Emission Factor	Total Emission in Annual Natural Gas Consumption	Annual Coal Consumption	Emission Factor	Total Emission in Annual Coal Consumption	Annual Fuel Oil Consumption (Barrels - 42 gal/bbl of fuel)	Emission Factor for #2 Fuel Oil	Total Emission in Annual Fuel Oil Consumption
Units of Measure	MMCF	lbsCO2/MMCF	lbs	Tons	lbsCO2/Ton	lbs	barrels	lbsCO2/barrel	lbs
April	0.00	119,140.78	0	0.00	4,933.76	0	0.00	928.05	0
May	0.00	119,140.78	0	0.00	4,933.76	0	0.00	928.05	0
June	0.00	119,140.78	0	0.00	4,933.76	0	0.00	928.05	0
July	0.00	119,140.78	0	0.00	4,933.76	0	0.00	928.05	0
August	0.00	119,140.78	0	0.00	4,933.76	0	0.00	928.05	0
September	0.00	119,140.78	0	0.00	4,933.76	0	0.00	928.05	0
October	0.00	119,140.78	0	0.00	4,933.76	0	0.00	928.05	0
November	0.00	119,140.78	0	0.00	4,933.76	0	0.00	928.05	0
December	0.00	119,140.78	0	0.00	4,933.76	0	0.00	928.05	0
January	0.00	119,140.78	0	0.00	4,933.76	0	0.00	928.05	0
February	0.00	119,140.78	0	0.00	4,933.76	0	0.00	928.05	0
March	0.00	119,140.78	0	0.00	4,933.76	0	0.00	928.05	0
Total	**0.00**		**0**	**0**		**0**	**0**		**0**

TRACKING SPREADSHEET-2003 …Continued

Annual Purchased Electricity Consumption	Annual Purchased Electricity Consumption w/ Transmission Loss	Emission Factor	Total Emission in Annual Electricity Consumption	Total On site Generated Electricty	On site Generated Electricty Not Lost Through Transmission	On site Generated Electricty Emission Credits	Generated Electricity Sold	Emission Credit From Sold Electricity
kWh	kWh	lbs/kWh	lbs	kWh	kWh	lbs	kWh	lbs
0.00	0	2.05	0	0.00	0	0	0.00	0
0.00	0	2.05	0	0.00	0	0	0.00	0
0.00	0	2.05	0	0.00	0	0	0.00	0
0.00	0	2.05	0	0.00	0	0	0.00	0
0.00	0	2.05	0	0.00	0	0	0.00	0
0.00	0	2.05	0	0.00	0	0	0.00	0
0.00	0	2.05	0	0.00	0	0	0.00	0
0.00	0	2.05	0	0.00	0	0	0.00	0
0.00	0	2.05	0	0.00	0	0	0.00	0
0.00	0	2.05	0	0.00	0	0	0.00	0
0.00	0	2.05	0	0.00	0	0	0.00	0
0.00	0	2.05	0	0.00	0	0	0.00	0
0	**0**		**0**		**0**	**0**		
							Total CO2 Emissions =	**lbs**

TRACKING SPREADSHEET-2003 …Continued

GHG's = Carbon dioxide (CO2), Methane (CH4), Nitrouse oxides (N2O), Halogenated fluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulfur hexafluoride (SF6)

Emission Factor and Fuel Data Entry								
Natural Gas Emission Factor =	119,140.78		**Emission Factors Information from Climate Leaders**					
Emission Factor Units =	lbsCO2/MMCF		**Natural Gas:**	119,140.78 lbs/MMCF	**IL:**	1.387439 lbs/kWh	**NV:**	
Fuel Units =	MMCF		**Coal:**	4,933.76 lbsCO2/ton	**IN:**	2.305007 lbs/kWh	**NY:**	
Coal Emission Factor =	4,933.76		**Fuel Oil #2:**	1,078.98 lbsCO2/barrel	**KS:**	1.749423 lbs/kWh	**OH:**	
Emission Factor Units =	lbsCO2/Ton		**Fuel Oil #6:**	928.05 lbsCO2/barrel	**LA:**	2.177987 lbs/kWh	**OK:**	
Fuel Units =	Tons		**AK:**	1.375452 lbs/kWh	**MA:**	1.386081 lbs/kWh	**OR:**	
Fuel Oil Emission Factor =	928.05		**AL:**	1.380287 lbs/kWh	**MD:**	1.460014 lbs/kWh	**PA:**	
Fuel Oil Type =	#2		**AR:**	1.305271 lbs/kWh	**ME:**	0.756738 lbs/kWh	**RI:**	
Emission Factor Units =	lbsCO2/barrel		**AZ:**	1.109108 lbs/kWh	**MI:**	1.636409 lbs/kWh	**SC:**	
Fuel Units =	barrels		**CA:**	0.477842 lbs/kWh	**MN:**	1.727248 lbs/kWh	**SD:**	
State or Local Utility Electrical Emission Factor =	2.05		**CO:**	2.099325 lbs/kWh	**MO:**	1.974274 lbs/kWh	**TN:**	
State =	Ohio		**CT:**	1.358796 lbs/kWh	**MS:**	1.418786 lbs/kWh	**TX:**	
Emission Factor Units =	lbs/kWh		**DC:**	2.480187 lbs/kWh	**MT:**	1.468730 lbs/kWh	**UT:**	
Fuel Units =	kWh		**DE:**	2.364853 lbs/kWh	**NC:**	1.294862 lbs/kWh	**VA:**	
Generated Electrical Emission Factor =	2.05		**FL:**	1.502330 lbs/kWh	**ND:**	2.534818 lbs/kWh	**VT:**	
Emission Factor Units =	lbs/kWh		**GA:**	1.398473 lbs/kWh	**NE:**	1.620292 lbs/kWh	**WA:**	
Fuel Units =	kWh		**HI:**	1.604320 lbs/kWh	**NH:**	0.721970 lbs/kWh	**WI**	
Transmission Loss from Utility =	0.09		**IA:**	2.126231 lbs/kWh	**NJ:**	0.742016 lbs/kWh	**WV:**	
Final CO2 Unit of Measurement =	lbs		**ID:**	0.032641 lbs/kWh	**NM:**	2.202100 lbs/kWh	**WY:**	

Notes: 1. Make sure that the emission factors correspond with each-other so that the Total CO2 calculation is Correct. If emission factor is lbsCO2 per fuel unit, than all the given emis …on factors

CHALLENGES

- Communicated reason for request to Breweries to gain buy-in
- Entity wide tracking which meant Breweries had to report information accurately and timely for roll-up
  - Not evaluated against individual goals any longer-Efforts impact entire company goal
- More emphasis on accuracy than in past
  - No longer just for tracking usage reductions

CHALLENGES

- Best source of electrical usage information
  - Meters vs. Invoices vs. Purchasing Department
    - Meters must be calibrated/All areas must be metered/ Meters must be read
    - Invoices from suppliers are estimated in some cases
    - Purchasing Department estimates based on previous year's usage

CHALLENGES

- Account for different types of fuels
  - Fuel Types at Breweries differ depending on location
  - Some Breweries have more than one fuel type
  - Breweries must report all fuel usage, no matter how small

FUEL USAGE TRACKING

- Two Options:
  - Obtain records from supplier
  - Measure onsite
- Miller utilizes records from supplier
  - More labor intensive to weigh on-site
  - Found to be more accurate

ELECTRICAL USAGE TRACKING

- Two options for monitoring
  - Invoices
  - Meter Readings
- Initially Utilized Invoices
  - Discrepancy between meter readings and invoices
  - Discovered Purchasing Department was estimating current usage based on historical usage

ELECTRICAL USAGE

- Shifted to utilizing meter readings
  - Some meters not calibrated routinely
  - Some areas not metered
  - Requires additional labor commitment to read meters

TRACKING FORM

- Energy Tracking System has evolved into emissions tracking system
- Currently updating spreadsheet to utilize regional electrical generation emission factors as opposed to state specific (E-Grid 2002)
- Developing Access Database

QUESTIONS?


Miller
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