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Energy Management System:

Pathway to

Optimizing Energy Efficiency

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Agenda

- A. Introductions & Background – John**
- B. EMS Case History – Frank**
- C. Energy Projects - Albert**

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Profile

- **Cooper Tire & Rubber Company - Global company that specializes in the design, manufacture, marketing and sales of passenger car, light and medium truck tires, motorcycle and racing tyres**
- **Headquarters - Findlay, Ohio - www.coopertire.com**
- **Cooper Tire has manufacturing, sales, distribution, technical and design facilities within its family of companies located in 10 countries around the world**
- **Prior to 2007 No formal Energy Management System in Place**
- **Desired to:**
 - **Reduce Energy Consumption**
 - **Improve Margins & Profitability**
 - **Enhance Corporate Natural Resource Stewardship**



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Purpose

To create a system of daily energy metrics that will allow each North American Tire Plant to evaluate performance, analyze overall trends, highlight areas of focus based on key performance indicators, and track daily efficiency.

Bottom line, conserve energy while increasing safety, product quality and customer satisfaction.



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Case History

- I. Overview**
- II. Evaluation**
- III. Implementation**
- IV. Retention**
- V. Results**
- VI. Final Thoughts**





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Energy Conservation Project

- **Consultant**
 - **Modular Process Control - “MPC”**
- **System Approach**
 - **Benchmark**
 - **Develop/Improve**
 - **Install**
 - **Monitor**
- **Shared Risk / Reward**

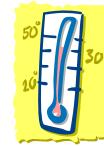
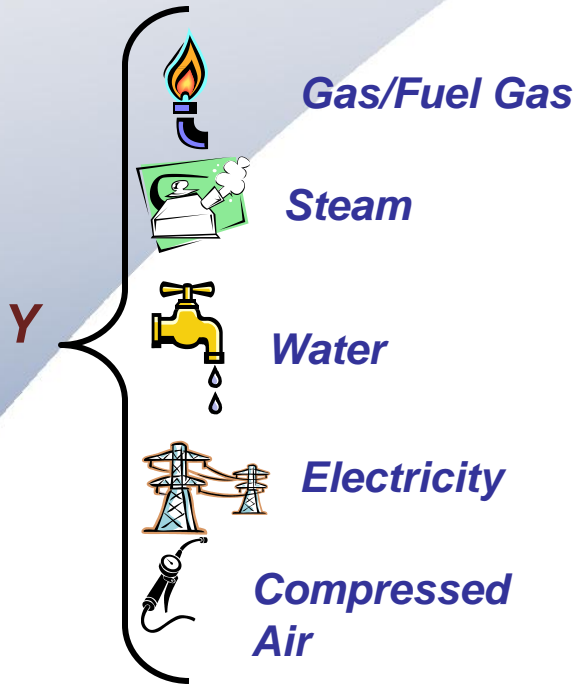




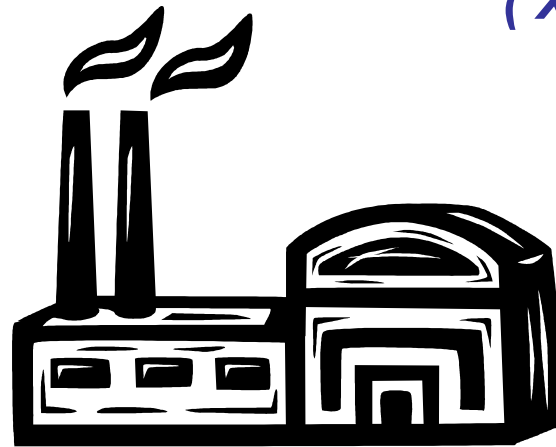
Project Preparation

- Do we know what our true Energy Requirements are to produce our products?
- How does that compare to actual consumption?
- Do we know what is causing the variance?
- If we used 10 percent more energy than we needed, how would we know?
- How much energy are we wasting every day?
- What impact does that have on our bottom line?

Schematic of Energy Utilization



**Heating Degree & Cooling Degree Days
(X_1 & X_2)**



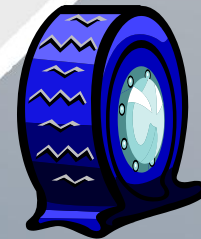
**Operating/Not
Operating/Holiday
(X_3)**



**Product / Batches
($X_4, X_5 \dots$)**

$$Y = F(X_1, X_2, X_3 \dots)$$

$$Y = \text{Base} + C_1X_1 + C_2X_2 + C_3X_3 \dots$$

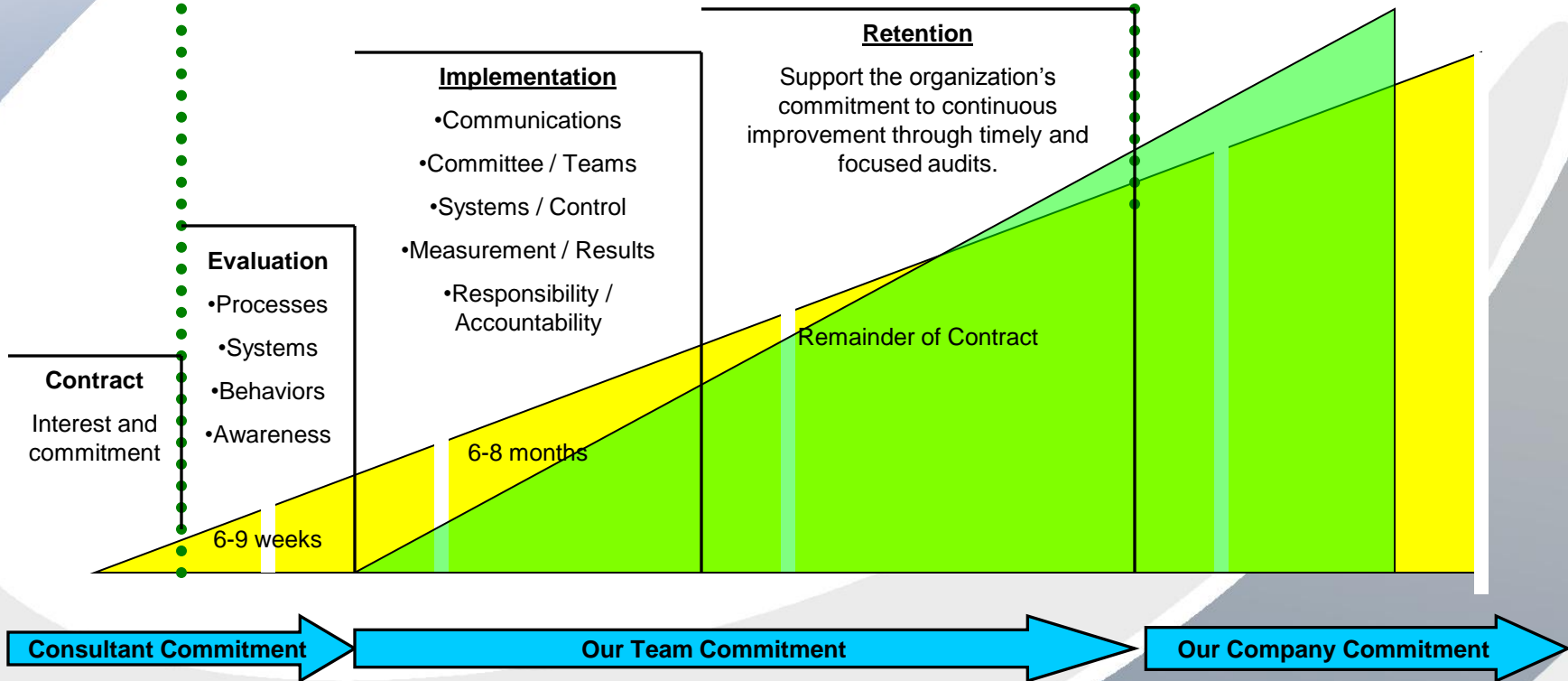


The Project Concept

Measurable Performance Contract

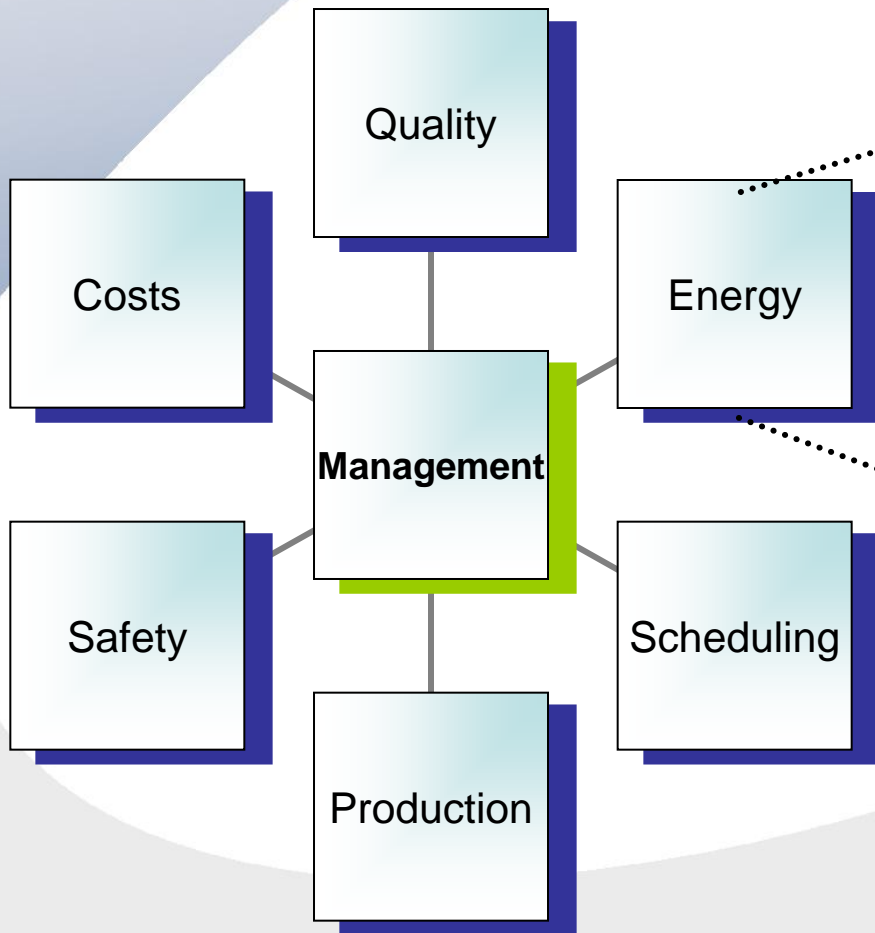
Competitive Advantage

Application of the RESULTS towards improving our business.





Evaluation: Understand the management systems that exist

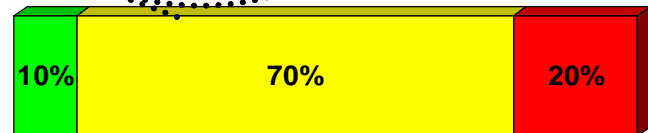


SUMMARY OF ENERGY MANAGEMENT CONTROL

■ ELEMENT EXISTS EFFECTIVELY UTILIZED
 ■ EXISTS - REQUIRES UPGRADE
 ■ DOES NOT EXIST IS NOT UTILIZED

SYSTEM ELEMENT	OVERALL	
	EXIST	UTILIZ.
ENERGY TARGETS / STANDARDS	Yellow	Red
ENERGY CONSUMPTION PLAN	Yellow	Red
ENERGY CONSERVATION PROC	Yellow	Yellow
MAINT. REPAIR PROCESS	Yellow	Yellow
ACTION NEEDED PROCESS	Red	Red
METER READING / TRACKING	Green	Yellow
MANAGEMENT REPORTING	Yellow	Yellow
EVALUATION PROCESS	Yellow	Red
EQUIP CONDITION PROCESS	Yellow	Yellow
AUDIT PROGRAM	Red	Red

SUMMARY OF ELEMENT EXISTENCE



SUMMARY OF ELEMENT UTILIZATION





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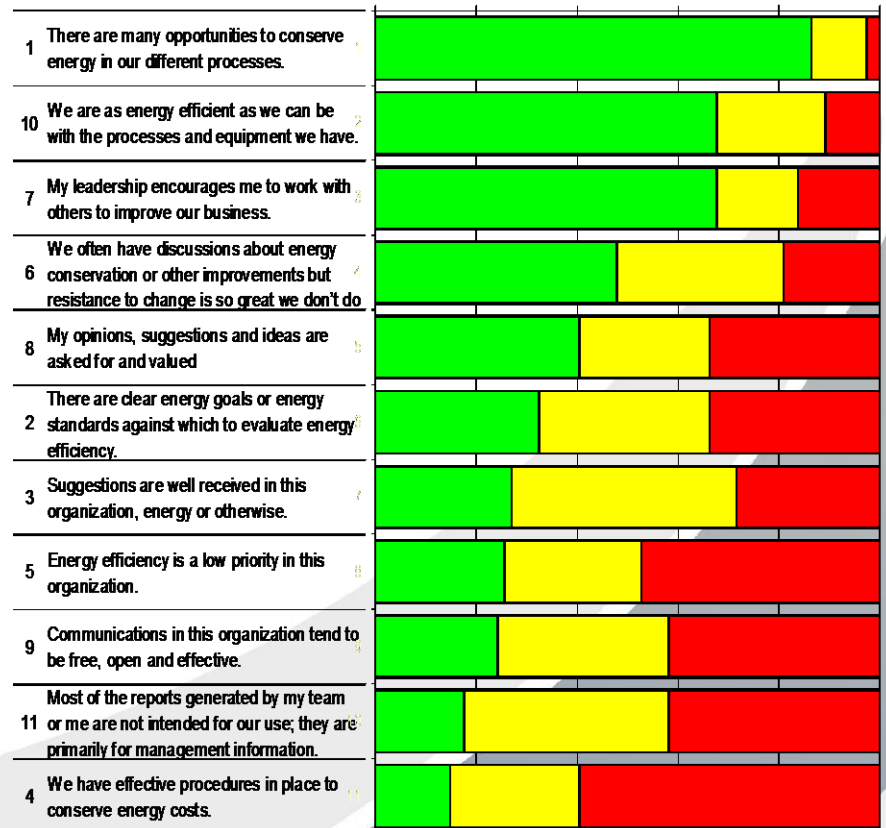
Evaluation: Understand the current awareness level of the organization.



Illustrative Example

OVERALL RESPONSES BY STATEMENT (Sorted by category)

0% 20% 40% 60% 80% 100%
FAVORABLE UNDECIDED UNFAVORABLE



What is the general opinion towards:

Energy Opportunities?

Change initiatives?

Relevant systems?

Effective teamwork?

There is a correlation between an organization's general opinion and it's ability to effectively implement and maintain any change initiative.



What We Found

Existing Systems and Data

Needed :

- Energy Performance Results
- Formalized Energy Management System
- Additional Energy Specific Key Performance Indicators (KPI)



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Data Challenges

- Backup Boiler metering
- Steam sub-metering
- Plant daily electric or water usages
- Electric demand measurements or data
- Focus on management of data
- Balance energy supply and usage



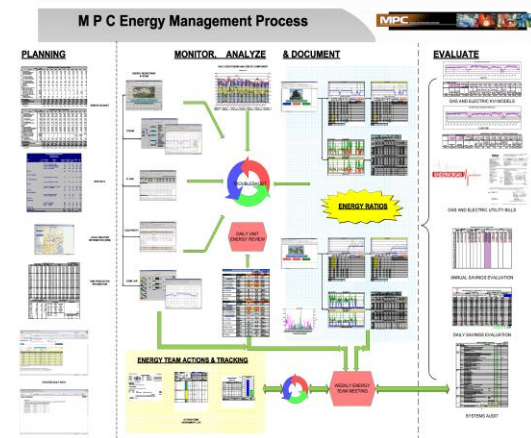


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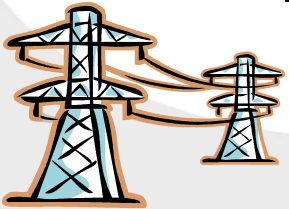
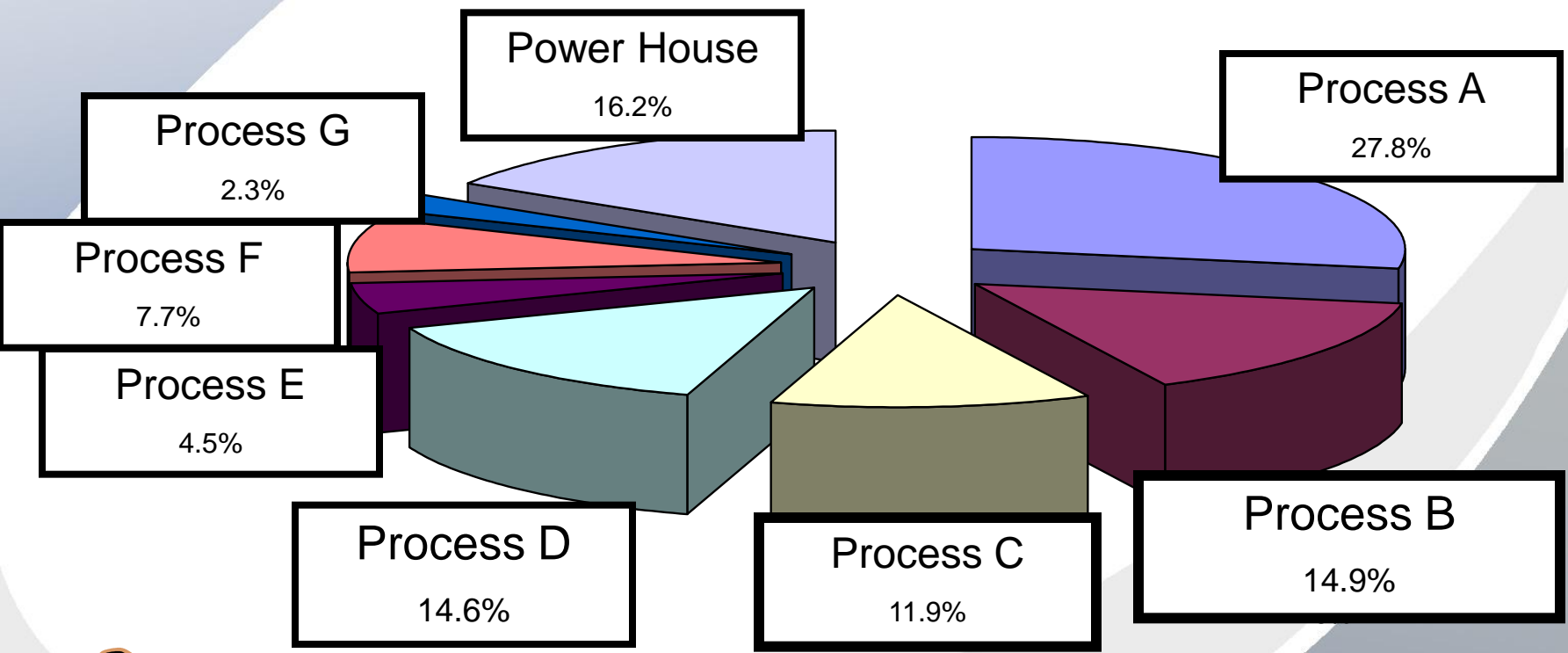
What We Developed

Daily Energy System

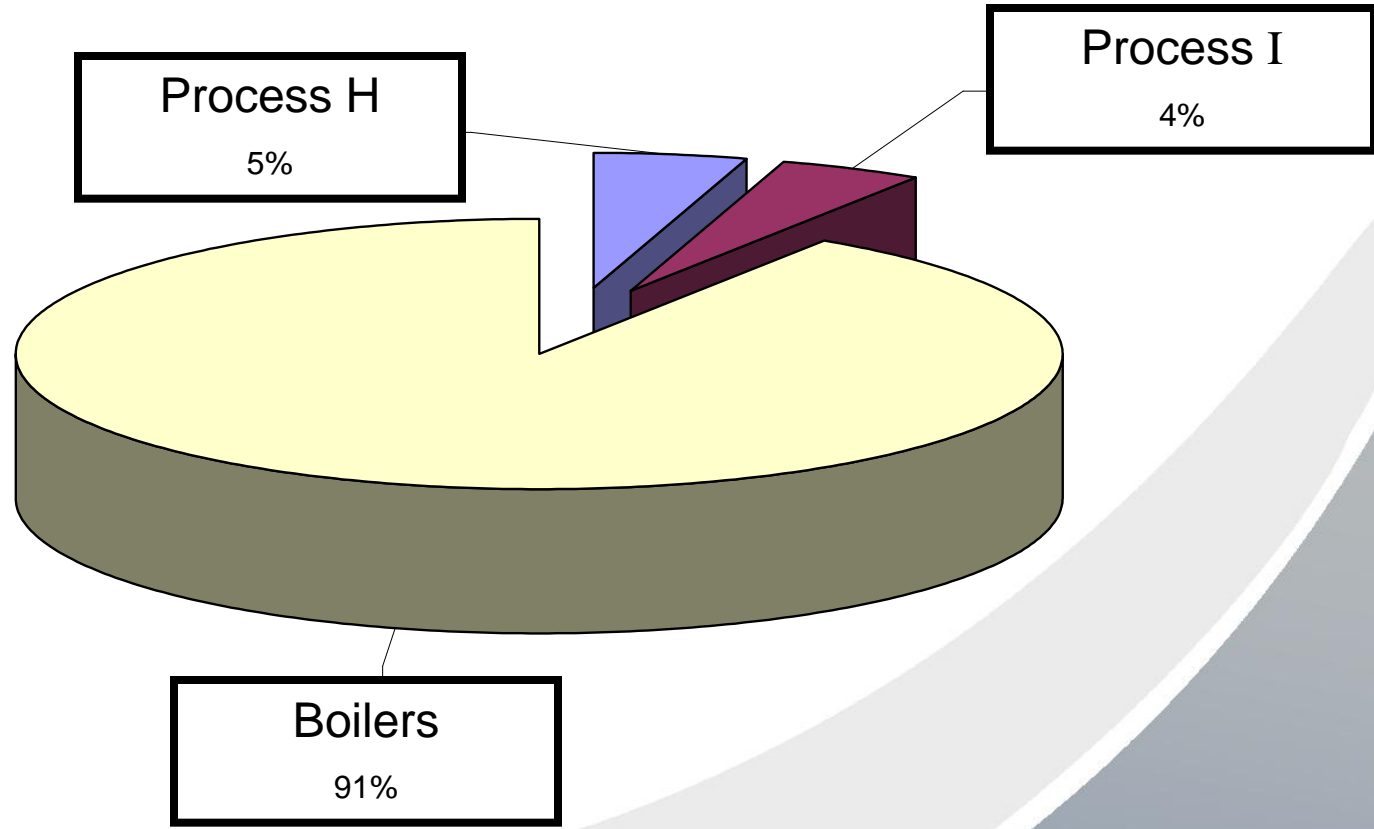
- Analyzed key energy users / generators
- Validated key metering accuracy
- Assessed Energy / Production performance
- Developed Daily Ratio targets
- Determined Key Energy Indicators
- Evaluated daily trends / impacts
- Highlighted unit process opportunities
- Focused on non-capital projects



ELECTRICAL BREAKOUT



NATURAL GAS BREAKOUT



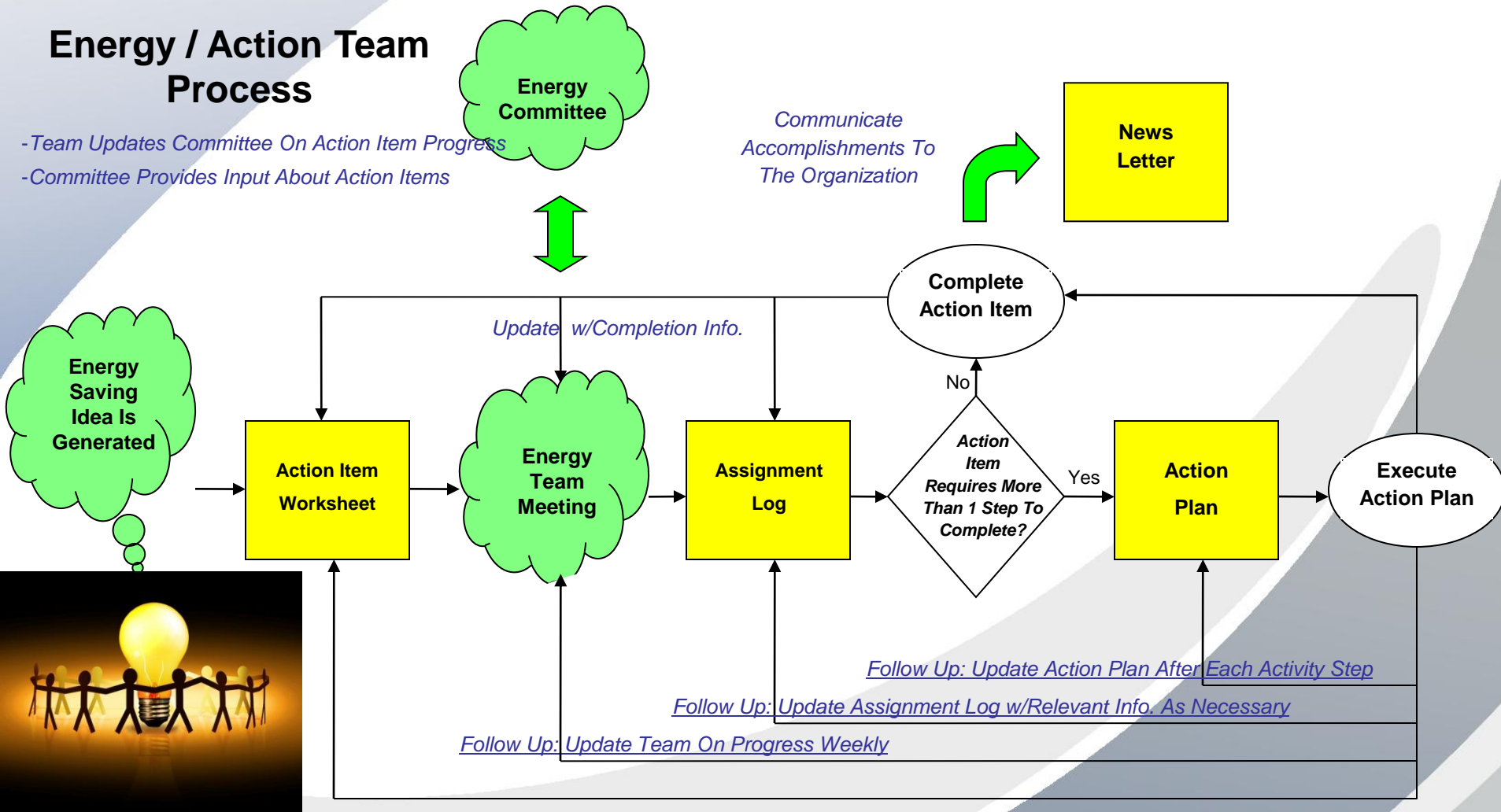


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How are the Opportunities Implemented??

Energy / Action Team Process

- Team Updates Committee On Action Item Progress
- Committee Provides Input About Action Items






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Energy Log

Illustrative Example

				Priority #	ENERGY LOG					Value by Categories		
Current Date 14-Aug-08 Estimated \$\$ \$0 Completed \$\$ \$0 Total Assigned 0 Total Completed 0					S	W	G	E	A	\$0	\$0	
No.	Cat.	Brief Description of Assignment	Assigned To		AREA	Dates				Savings Value		
					Assn.	Due	F / U	Comp	Est.	Comp		
1											\$0	\$0
2											\$0	\$0
3										\$0	\$0	
4										\$0	\$0	
5										\$0	\$0	
6										\$0	\$0	
7										\$0	\$0	
8										\$0	\$0	
9										\$0	\$0	
10										\$0	\$0	
11										\$0	\$0	
12										\$0	\$0	
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Energy Log / Team

- Organized List of opportunities
- Focused on non capital vs. capital projects
- Quantified and Prioritized opportunities
- Created Team that was cross section of organization to implement opportunities
- Team focused on completion of opportunities
- Team needed support from management and unit operations to succeed

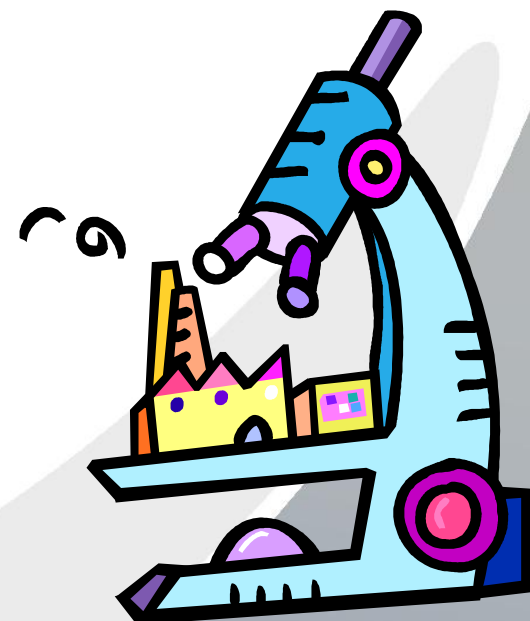




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Sustainability Keys

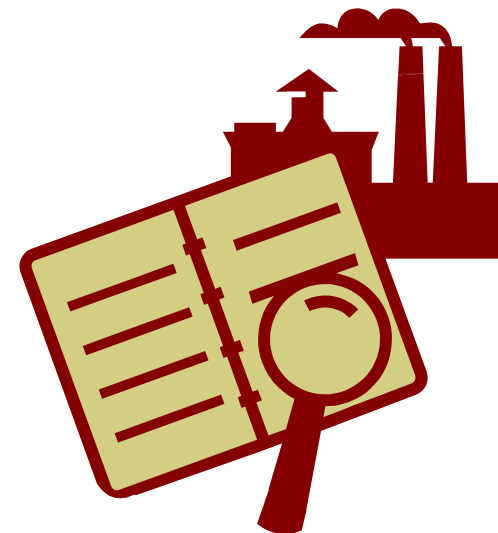
- Engage the Organization
- Highlight Improvement Opportunities
- Develop Management System
- Develop Measurement System
- Communicate Successes
- Audit/Retention





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Project Results



- **26 project opportunities identified, qualified and quantified during Evaluation**
- **Increased to 50+ projects thru Continuous Improvement**
- **Represented 9 percent annual energy savings; without the use of Capital**

Tupelo Pilot – Overview

- Operational Oct. 15, 2008
 - Reduced Capital Investment by Cooper
 - Balance Paid with Savings
 - Attached Below the Economizer
 - 5.1 mmBTU/hour - Preheat Boiler Feedwater
 - 0.6 mmBTU/hour – Tire Assembly Humidity
- Documented Energy Savings
 - 77,685 mmBTU Heat Saved thru 10/31/10
 - 95,900 mmBTU N.G. Saved thru 10/31/10

Boiler Stack Waste Heat Recovery

Financial Impacts

- High Degree of Confidence
- Future Value of Energy Saved
Dependent on Price of Natural Gas
(\$ per mmBTU)



Environmental Impacts

Annual Reduction (est.)

Carbon Emissions & Footprint

Plant	mmBTU N.G. Reduction	CO2e Metric Ton	Acres Pine or Fir
Findlay	33,233	1,773	378
Texarkana	44,157	2,356	502
Tupelo	59,927	3,198	682



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Incentive Projects

- ***Building Management System***
- ***Steam Piping Insulation***
- ***Boiler Intake Air Pre-Heat***
- ***Warehouse Lighting***
Future project





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Building Management System

- A. New A/C Drives & Motors
- B. New 24 Volt Controls
- C. Networked Controls - Air Handling Units
- D. New 550 Ton Chiller - Energy Efficiency
- E. New Cooling Tower - 3 Section





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Steam Piping Insulation

- A. DOE (Department Of Energy) Assessment
- B. Improved Controls for Heaters
- C. Great Benefits





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Boiler Intake Air Pre-Heat

- A. New ID Fan
- B. New Control System
- C. Pre-Heat Boiler Intake Air





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Warehouse Lighting

- A. Finished Goods Warehouse
- B. New T5 Fluorescent Fixtures
- C. Motion Sensors
- D. Skylights - Natural Light
- E. Great Energy Savings





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Final Thoughts...

- *Focus on What Can be Done Better*
- *Change Culture*
- *Act Now*
- *Additional Benefits*

