Global Energy Management System

Development and Deployment within ExxonMobil Chemical Company

Presented at the Texas Technology Showcase
Energy-Efficient Process and Best Practices in Chemical and Refining Processes

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Matthew Knight
ExxonMobil Chemical Company
Agenda

- Background & Case for Action
- System Design
- Deployment Strategy
- Results and Conclusions
- Example Project
Enable ExxonMobil to become a recognized industry leader in energy utilization and efficiency

Develop *Global Energy Management System* to improve and sustain energy efficiency at ExxonMobil refineries and chemical plants worldwide

Provide common methodology for each site
Background & Case For Action

- Benchmarking against industry data
- Quantified significant Corporate opportunity
- Analyzed performance for refining and olefins plants at two levels:
  - Company-wide competitive analysis
  - Gaps of each individual ExxonMobil refinery and olefins plant relative to industry top performers
ExxonMobil participates in industry-wide competitive surveys.

Performance gaps versus top industry performers highlighted improvement opportunities.
350 - 400 M $/Year savings estimated if all ExxonMobil refineries and olefins plants could economically achieve leading-edge efficiency
System Design

Management Leadership

Organizational Commitment
- Process Units
- Equipment Classes
- Utility Systems
- Project Design

Personal Accountability
- Planning
- Operating Results
- System Performance

Continuous Improvement

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System Design Methodology

**Equipment Focus:** Optimization of utilities, fired heaters, heat exchangers, and compressor trains

**Process Unit Focus:** Olefin Crackers, Fluid Catalytic Cracking Units, and Crude Distillation
Best practices documented in 12 volume set of manuals
- Contain 1200 pages and identify over 200 key energy variables
- Cover key process, equipment, and utility operations
- Also address energy efficiency in project design
Deployment Strategy
Address Largest Potential Opportunities First

Rollout Sequence
Self-assessments

GAP M$/yr
PLANT SITES

1999 Total Gap M$
1999 % Cumulative

CUMULATIVE GAP (%)

0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

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Deployment Strategy
Rollout Process

6 Months Preparation
6-8 Weeks Execution
0-8 Years Implementation

Preparation
- Site Orientation
- Select & Train Team
- Gather & Review Data
- Arrange Logistics

Operations Assessments
- Process Units
- Equipment Classes
- Utility Systems

Facilities Enhancements
- Optimizations
- Modifications
- Additions

Transfer of Ownership

Deliverables
- Gap Assessment
- Gap Closing Options
- Cost / Benefit Analysis
- Milestone Plan

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Rollout Results

- Rollouts and Self-Assessments address 70-80% of total opportunity
- Potential savings equal to 15% of plant energy bill on average
Rollout Results

- Equipment Classes
- Utility Systems
- Process Units
- G-EMS Rollouts
- Self-Assessments
- Uneconomic
- No/Low Investment
- Requires Investment
Conclusions

- A 15% reduction in site energy bills is potentially achievable through optimization of operations and economically attractive capital projects.

- Nearly half of the benefits can be achieved with little or no capital investment.

- Site Process Units is the largest opportunity for improvement.

- Potential to reduce GHG emissions nearly 5 million tons per year at full implementation.
Conclusions

- Achieving and maintaining energy benefits requires a lot of hard work during preparation, deployment, implementation and sustainment phases. Key requirements are:
  - Management approval of milestone plans and integration into overall improvement plans for the site.
  - Clear ownership of each line item.
  - Strong leadership from both local and regional management.
  - High quality technical support.
  - Continuous improvement through measurement, stewardship, networking and periodic reassessments.
An Olefins Plant Example of a G-EMS related Project is a Heat Integration System Modification

- Project Identified During Initial G-EMS System Development
- Heat Integration between Vaporizing NGL feed and Recovery Area Refrigeration System was found to be less than optimum.
- Modifications to the system were Proposed During the Screening Phase for a Debottleneck Project.
- Project was funded with the Debottleneck Project as an Energy Reduction Step.
- Energy Reduction for the Refrigeration System was Calculated as ~16% even with associated through put increases.
- System was Recently Started Up with Performance Within Design Parameters.