

Introduction

Cost Savings – Areas of Focus:

- Energy Bills
- Lighting
- Electrical Motors
- Variable Frequency Drives
- Air Compressors
- HVAC
- Case Studies

Energy Bills – Understanding Utility Bills

- Gas Bills:
 - Fixed Charge or Customer Charge
 - Usage Based on CCF, MCF, or Therms
 - Sales Tax
 - Commodity Cost
- Electrical Bills:
 - Fixed Charges (including energy optimization)
 - Demand Charges (based on kW)
 - Energy charges (based on kWh)
 - Sales Tax
 - Power Factor Penalty
 - Third Party Provider?
- What is Demand?
 - Cost of Electricity Being Available
 - Calculated on Highest 15 Minute Usage Rate (kW) during Peak Hours
 - Can be One-third of Bill
 - It's the Cost Paid for Electricity You Don't Use
- Load Factor:
 - kWh for the Period: Peak kW x Total Hours in the Period
 - Ideally 80% for Three Shift Operation
- Power Factor:
 - kW / Voltage x Amperes
 - Generally 0.80 or Greater to Avoid Penalty
- General Electrical Cost Savings
 - Install Electrical Meters
 - No Sales Tax on Manufacturing Usage
 - Shift Usage to Off-Peak
 - Reduce Demand Peaks

Lighting – Most Common Recommendation:

- Replace Metal Halide with Fluorescent or LED Fixtures
- Fluorescent: T5 or T8
- LED: Low Wattage, Long Life, Dimmable, No Mercury, Instant On
- Typical Payback: One to Two Years
- Often Use Motion Sensors and Light Harvesting

Electrical Motors:

- Three Phase or Single Phase
- Determine Cost of Operation:
 - $\text{kW} = \text{HP} \times .746 \text{ kW/HP} \times \text{Motor Loading} / \text{Efficiency}$
 - $\text{kWh} = \text{kW} \times \text{Annual Operating Hours}$
- Motor Cost Savings Opportunities:
 - Replace with Higher Efficiency Motor
 - Savings Depends on Hours of Operation
 - Payback can be Two Years or Less
 - Install Variable Frequency Drive
 - Must have Variable Load
 - Often One Year Payback or Less

Air Compressors:

- Most Expensive Utility
- Common Opportunities:
 - Excessive Operating Pressure
 - Leakage
 - Piping and Receiver Design
 - Lower Compressor Air Intake Temperature
 - Recover Exhaust Heat

Heating and Ventilation – Types of Heating:

- Hydronic- water/steam
- Forced Air furnaces
- Radiant
- Heat Pumps

Heating and Ventilation – Areas of Focus:

- Boiler Replacement
- Air Conditioning Replacement
- Heat Pumps
- Control Changes

Boiler Replacement

- Types of Boilers:
 - Fire Tube
 - Water Tube
 - Cast Iron
 - Modular Water Tube
 - Modular Condensing Water Tube

- Boiler Cost Savings Options
 - Modular Condensing Boilers
 - Recover Waste Heat
 - Burner Replacement
- Boiler Control Changes
 - Variable Hydronic Heating Temperature
 - Variable Hydronic Heating Flow
- Charlevoix County Courthouse
 - Replaced Old Boilers with Modular Condensing Boilers
 - Resulted in a 45% Decrease in Fuel Costs

Air Conditioning / Heat Pump Replacement

- Efficiency Ratings in SEER and EER
- Typical Efficiency Ratings
 - Air Conditioners
 - Heat Pumps
- Air Conditioning Cost Savings Options

Control Changes

- Variable Hydronic Heating Temperature
- Variable Hydronic Heating Flow
- Variable Air Makeup
- Time of Day Thermostat or Central Control
- Control Changes Cost Savings Options

Energy Assessment Programs

- Better Buildings (Detroit Commercial) – no cost – (313) 237-4601
- Clean Energy Coalition – fee based – (734) 585-5720 ext.18
- Delta Institute – fee based – (312) 554-0900
- EcoWorks – fee based – (313) 894-1030
- Green Lodging Michigan – no cost – (517) 241-6224
- Industrial Assessment Center – no cost – (734) 647-4790
- Michigan Energy Options – fee based – (517) 337-0422
- Michigan Economic Development Corporation – (888) 522-0103
- Michigan Farm Energy Audit Program – \$500 – (517) 353-3232
- Michigan Industrial Energy Center – no cost – (734) 763-7470
- Michigan Manufacturing Technology Center – fee based – (888) 414-6682
- Michigan RETAP – no cost – (888) 749-7886
- Rebuild Michigan – no cost – (517) 241-6281

Michigan RETAP – Retired Engineer Technical Assistance Program

- Onsite Pollution Prevention & Energy Conservation Assessments Conducted by Teams of Retired Engineers
 - Free
 - Confidential
 - Non-Regulatory
 - No Obligations
 - Objective
- Michigan RETAP Contact Information
 - David Herb: 800-662-9278 or herbd@michigan.gov
 - Retired Engineer Technical Assistance Foundation 888-749-7886

Energy Assessment Success Stories - RETAP

- Linn Products, Charlotte, MI
 - RETAP Helps Linn Products Save Over \$180,000 Annually
- Kenwal Steel, Dearborn, MI
 - RETAP Helps Linn Products Save Over \$185,000 Annually
- Seimens Industries, Benton Harbor, MI
 - RETAP Helps Siemens Save Over \$125,000 Annually
- Flexfab, LLC, Hastings, MI
 - RETAP Helps Flexfab Save Over \$162,000 Annually