



# WHAT IS AN ENERGY AUDIT—AND WHY YOU SHOULD DO ONE

MIDWEST ENVIRONMENTAL COMPLIANCE CONFERENCE (MECC) | SEPTEMBER 26, 2023



# INTRODUCTION

- EHS, food safety & quality consulting firm based in Madison, WI & Atlanta, GA
- EHS services include:
  - Auditing & assessments
  - ISO-based management systems development & implementation
  - Regulatory compliance assistance (EPA, OSHA, DOT, state, local)
  - Information management solutions
  - Training
- Tailored solutions to address compliance & certification requirements
- Focus on building strong, long-term client partnerships
- Information & data management solutions with Microsoft 365®



# AGENDA

- What is an energy audit?
- Why is energy auditing important?
- Types of energy audits
- The triple bottom line
- Benefits to profit, people & the planet
- Energy audit process
- Return on investment
- Common challenges
- Best practices
- Energy management
- Tips for a successful audit
- Conclusion & questions



# WHAT IS AN ENERGY AUDIT

- Key part of energy management
- Energy usage & efficiency of your facility, building, or process
- Most often conducted in residential buildings, commercial spaces, or industrial settings
- **VALUE** for homeowners, business & organizations seeking to reduce costs & their carbon footprint



Goal: Reduce usage & improve efficiency

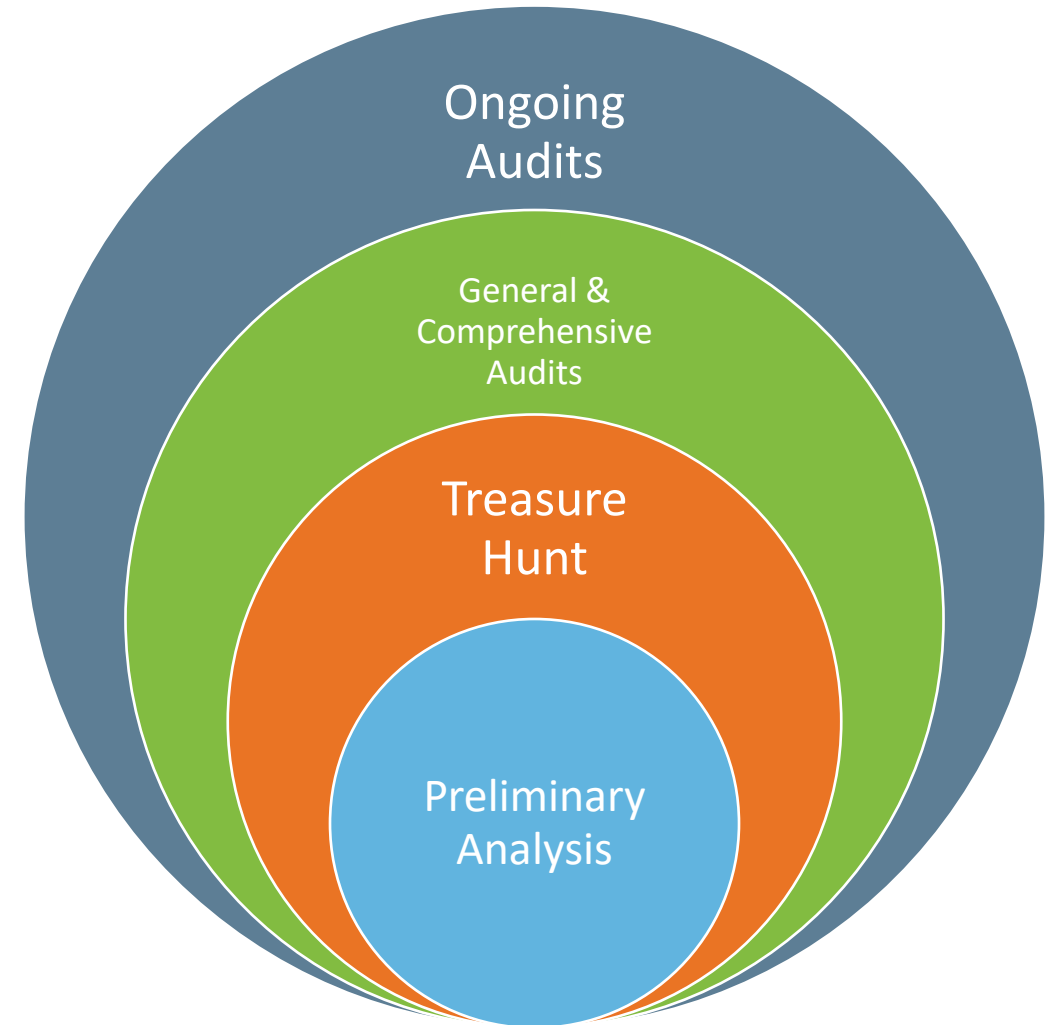
# WHY IS ENERGY AUDITING IMPORTANT

- Cost savings
- Environmental impact
- Resource conservation
- Regulatory compliance
- Employee comfort & retention
- Productivity
- Risk mitigation
- Marketing
- Financial planning



# TYPES OF ENERGY AUDITS

- Preliminary analysis
  - Anywhere
- Treasure hunt
  - Anywhere
- General audit
  - Commercial, industrial, large residential
- Comprehensive audit
  - Large commercial, industrial
- Ongoing audits (monitoring)
  - Facilities with advanced energy systems
  - Retro-commissioning



# THE TRIPLE BOTTOM LINE – THE 3 Ps



**Profit:** Financial bottom line



**People:** Social responsibility bottom line



**Planet:** Environmental sustainability bottom line

# BENEFITS TO PROFIT



- Identify inefficiencies
- Energy Efficiency Measures (EEMs)
- Building systems optimization
- Culture shifts
- Financial incentives
- Marketing benefits
- Regulatory compliance



# BENEFITS TO PEOPLE

- Climate change mitigation
- Public health & air quality
- Cost savings opportunities for employees & customers
- Employee satisfaction
- Stakeholder expectations
- Advancement of sustainable technology



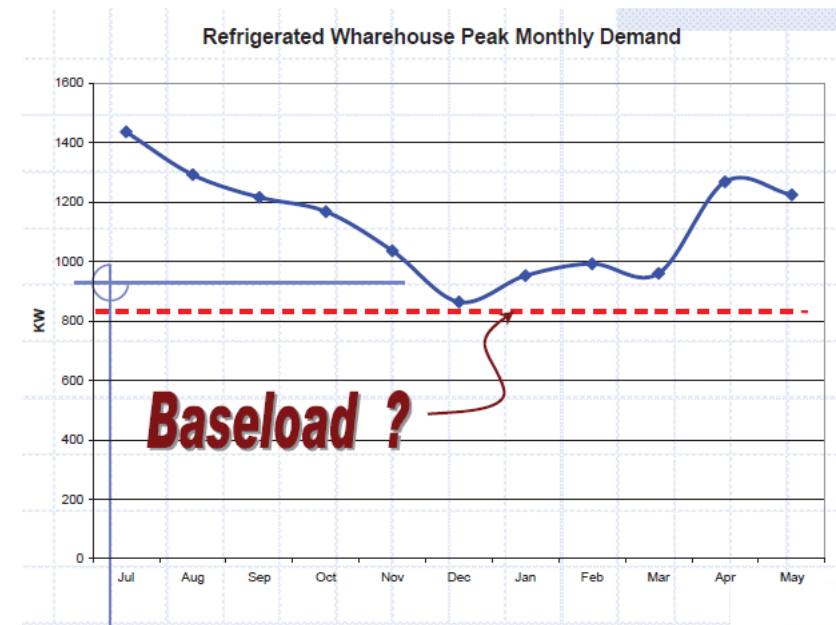
# BENEFITS TO THE PLANET

- Reduced carbon footprint
- Lower energy demand
- Resource conservation
- Reduced pollution
- Waste reduction
- Preservation of natural habits



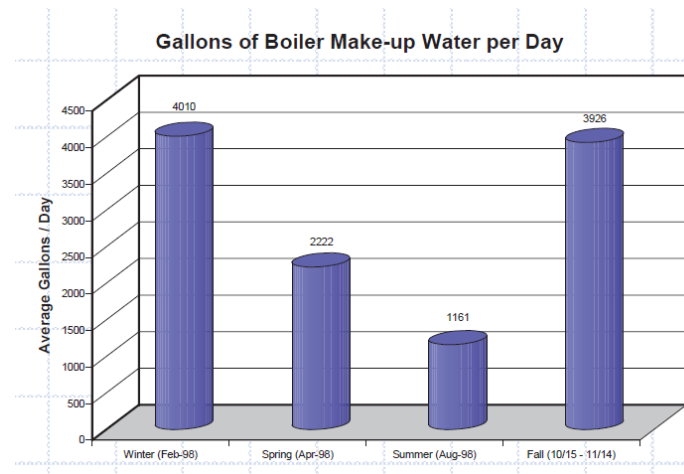
# ENERGY AUDIT PROCESS: PRE-AUDIT

- Bill review
  - Demand charges
  - Power usage
  - Load factor
- Energy consumption patterns
  - Identify the “hogs”
  - Peak usage trends
- Logs
  - Boiler logs
  - Equipment repair
  - Occupant complaints
- Prior audit review
- Discussion with management
  - Internal goals
  - Financial criteria
  - Upgrades & future plans



# ENERGY AUDIT PROCESS: SITE VISIT

- Interviews with operators, decision makers
- Data collection
  - Facility data
  - Nameplate data
  - Forms & logs
- Walkthrough/Tour
  - Site development
  - Building envelope
  - Follow the BTUs
    - Boiler/HVAC
    - Compressors
    - Refrigeration
    - Large equipment
- Walkthrough (cont.)
  - Exterior: Roof plan, outdoor lighting, exterior equipment
- Measurements
  - Combustion
  - Lighting
  - Temperature
  - Ultrasonic



# ENERGY AUDIT PROCESS: ANALYSIS

- Calculations

- Energy

- Baseload energy
    - Peak energy
    - Adjust for weather, occupancy, production

- \$\$\$

- Apply rates accurately
    - Time of use applications
    - Seasonal applications
    - Utility bill “ratchet”

- Calculations

- Energy efficiency measures

- Material & installation
    - Disposal
    - Engineering design
    - Permits & fees
    - Don’t forget rebates & incentives!!



# ENERGY AUDIT PROCESS: REPORT

- \$\$ first!
- How to use
  - Action plan
    - Short term – low-hanging fruit
    - Long term – budgeted improvements
    - Company goals
  - Reference
    - Site management
    - Future problems
    - Testing programs



Energy Efficiency Measure (EEM) Summary

## 350 Technology Drive

Energy Efficiency Measure (EEM)	Est. \$ Savings	Est. Ann. Energy Savings (kWh)	Peak Demand Savings (kW)	Est. Ann. Gas Savings (therms)	Est. Cost	Return on Investment	Simple Payback
Upgrade Production Floor Lamps, Ballasts, and Lighting Controls	\$41,211	777,564	63.9		\$115,845	36%	2.8
Identify The Potential For Well Water Availability For Refrigerant Cooling	\$12,588	237,500	60.0		\$ 25,000	50%	2.0
Reprogram Thermostats on Production Floor	\$6,551	44,000		3,375	\$0	immediate	0.0
Adjust Schedule of Packaged DX serving half of 1st floor office area	\$192	3,630			\$0	immediate	0.0
Install roll-up doors on openings between receiving & main production area	\$873			698	\$3,750	23%	4.3
Install automated controls on Main-East roll-up door	\$5,248	5,255		3,975	\$1,500	350%	0.3
Install automated controls on Fabrication Shop door.	\$1,476	1,478		1,118	\$1,500	98%	1.0
Adjust Carrier PC Command program to reduce occupied settings on weekends	\$86	1,626		155	\$0	immediate	0.0
Upgrade Office Area Lighting Controls & Schedules	\$520	15,434	3.2		\$1,525	34%	2.9
Install Vending Machine Load Controllers & Delamping	\$723	13,643			\$1,348	54%	1.9
<b>TOTALS:</b>	<b>\$ 69,467</b>	<b>1100131</b>	<b>127</b>	<b>9321</b>	<b>\$150,468</b>	<b>1614%</b>	<b>0.1 Years</b>



# RETURN ON INVESTMENT

- Simple payback – time-based calculation
- NPV – includes inflation, time value of money, risk, financing, etc.
  - Positive = good, Negative = bad
- Lifecycle cost
  - Equipment & repair expenditures
  - Energy usage increases or decreases
  - Maintenance savings or increases
  - Useful life of equipment
  - Tax issues
- Other values: reduced greenhouse gases, marketing, reputation

**Initial investment: \$200,000**

<b>Year</b>	<b>Cash inflow</b>	<b>Cumulative cash inflow</b>
1	\$ 70,000	\$ 70,000
2	60,000	130,000
3	55,000	185,000
4	40,000	225,000
5	30,000	255,000
6	25,000	280,000



# COMMON CHALLENGES

- Limited budget → Start small & plan ahead
- Lack of data → Start tracking
- Time constraints → Plan ahead
- Resistance to change → Create culture shifts, incentivize
- ROI → Reduced discount rates

**CHALLENGE**  
**ACCEPTED**





# ENERGY AUDIT BEST PRACTICES

- Clear objectives
  - Energy savings?
  - Reducing costs?
  - Sustainability goals?
- Data gathering
  - Trend energy consumption
  - Utility bills
  - Building specifications
- Audit expertise
  - Certified Energy Managers (CEMs)
  - Engineering expertise
- Inspections & assessments
  - Steam trap surveys
  - Compressed air leak inspections
  - Duct cleaning
- Measurement & verification
  - Ensure EEMs are achieving the expected results
- Stakeholder engagement
  - Include management staff, employees & decision makers



# ENERGY MANAGEMENT

- Cost savings, energy efficiency, environmental sustainability
- Predictive maintenance
  - Monitoring allows for early detection of issues
  - Reduce downtime, expand equipment life
- Regulatory compliance
- Energy transparency
  - Stakeholder satisfaction
  - Data-driven decisions
- Financial planning: Forecast & budget energy costs
- Competitive edge: Attract environmentally conscious customers & partners
- Others: Employee engagement, building comfort, remote monitoring



# TIPS FOR A SUCCESSFUL AUDIT

- Select the right audit type
- Hire the right auditors
- Engage your employees
- Set goals
- Be open-minded
- Create solutions



# CONCLUSIONS

- Energy audits are a key part of your management systems
- Energy audits lead to reduced costs, energy savings, employee engagement, increased reputation, higher productivity, lowered risk
- There's an energy audit type that will suit your needs
- Energy auditing leads to bottom-line growth in your profit, your people & our planet





# CONTACT US

COULTER WOOD, CEM, SR. CONSULTANT | [CWOOD@GOKTL.COM](mailto:CWOOD@GOKTL.COM)

[GOKTL.COM](http://GOKTL.COM) | 608.226.0531