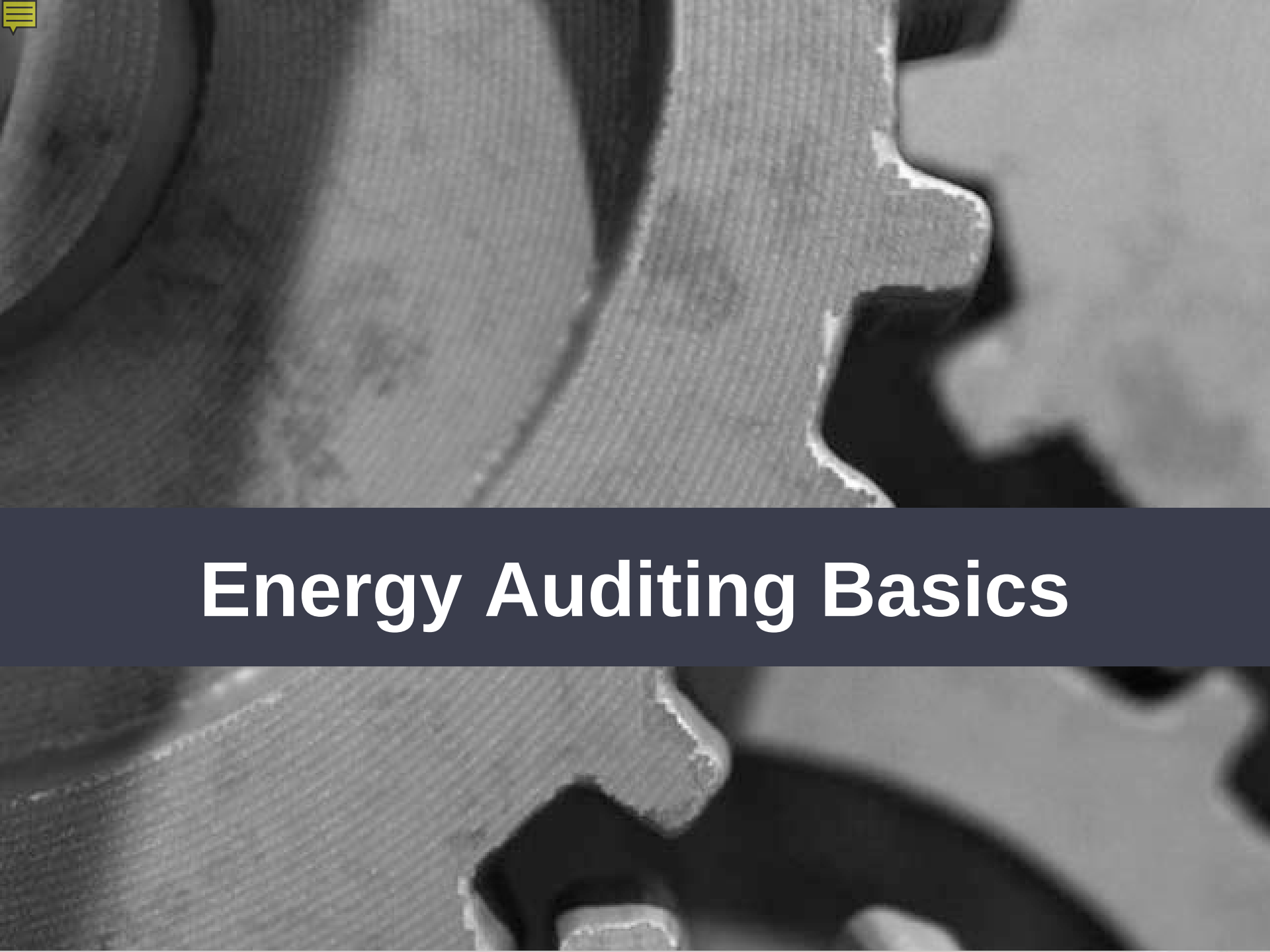

Energy Auditing Basics

Preplanning

Form a team

Define the audit scope

Chose the level of detail required

Level 1

- The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) identifies three levels of energy audits:
- **Walk-through Assessment**: energy bills are analyzed and, possibly, a brief visual survey of the facility is conducted. The subsequent report identifies no-cost and low-cost opportunities. This is the least costly of the three levels.

Level 2

- **Energy Survey and Analysis**: a more detailed analysis is conducted, including a breakdown of how energy is used within the building. Recommendations consider an owner's operations and maintenance, constraints, and economic criteria. Potential capital-intensive opportunities are identified in the final report for further research and analysis. This is the typical level of audit.

Level 3

- **Detailed Analysis of Capital-Intensive Modifications (Investment-grade Audit)**: this analysis focuses on capital-intensive opportunities and provides a higher degree of monitoring, data collection, and engineering analysis. The report includes detailed cost and savings information with a high-level of confidence sufficient for major capital investment decisions.

Preparation

- Develop a spreadsheet which is usable for recording all of the inputs, outputs, controls, hours of operation, hours of use, physical condition of the consumer, point of use, area condition and comments.

Resource

Energy Auditing Guidebook

www.energy.wsu.edu/Documents/audit2.pdf

Preparation

- Gather utility information for 24 months
- Discuss each line item with your utility provider for a thorough understanding
- Obtain a floor-plan and establish a route
- Identify meter locations and the area that it services

Common Equipment Needs

- Notepad
- Voice recorder
- Camera
- Flashlight
- Safety equipment
- Metering instruments (if required)

Objective

- To identify where the utility dollars are spent
- To inventory all consumers for the rated or actual utility use.
- To identify energy conservation opportunities (no or low cost changes)
- To identify energy conservation measures (retrofits)

Tools

- Building Energy Software Tools

http://apps1.eere.energy.gov/buildings/tools_directory/

- Conversions, Calculators and Formulas

www.engineeringtoolbox.com

Lighting Points to Consider

- Indoor and Outdoor
- Control System
- Fixture Ballast Usage
- Adequate Lighting
- Proper Fixture Placement
- Technology Upgrade

Case Summary

Project	Annual Savings	Environmental Impacts
Lighting Retrofit	$39,400	695,400 kWh

Hospital Lighting Fact Sheet

Energy Efficient Hospital Lighting Strategies Pay Off Quickly

http://apps1.eere.energy.gov/buildings/publications/pdfs/alliances/hea_lighting_fs.pdf

Boiler Points to Consider

- Horsepower, Output Capacity
- Proper Fuel Mix
- Heating
- Process
- Adequate Insulation
- System Survey
- Energy Recovery

Case Summary

Project	Annual Savings	Environmental Savings
Steam Trap Program	$213,000	225,000 Therms
Boiler Economizer	$135,000	130,000 Therms
Indirect Boiler Economizer	$190,000	200,000 Therms

HVAC Points to Consider

- Motor Size and CFM Rating
- Conditioned Air Distribution
- Building Condition
- Door Seals and Windows
- Air Balance

Case Summary

Project	Annual Savings	Environmental Impacts
Dedicated Heat Recovery Chillers	$368,125	482,394 Therms
Upgrade Suite HVAC Controls	$135,241	67,399 Therms 1,209,900 kWh
Energy Management System	$328,500	265,420 Therms 1,173,000 kWh
Computer Power Mgmt	$47,000	900,000 kWh
AHU Retrofit	$31,000	40,800 Therms

Free Cooling Points to Consider

- Demand
- Sized Correctly
- Control System
- Energy Losses
- VFD Motors

Case Summary Results

Project	Annual Savings	Environmental Impact
Free Cooling	$100,000	2,000,000 kWh
Chiller 4 VFD Drive	$45,000	900,000 kWh

Office Points to Consider

- Computers
- Copiers
- Plug Loads

Plug Load Fact Sheet

Hospitals Pulling the Plug on Energy Wasting Electric Equipment and Procedures

http://apps1.eere.energy.gov/buildings/publications/pdfs/alliances/hea_plugloads.pdf

Case Summary

University of Pittsburgh Medical Center

http://apps1.eere.energy.gov/buildings/publications/pdfs/alliances/hea_upmc.pdf

Retrofitting Fact Sheet

Quick Win Energy Efficiency Tips for Facility Managers and Operators

http://apps1.eere.energy.gov/buildings/publications/pdfs/energysmarthospitals/esh_quickwinfs_0808.pdf

Questions

Chuck Geguzis
Facilities Engineer
Pollution Prevention Services
Iowa Department of Natural Resources
(319) 331-1527 (phone)
chuck.geguzis@dnr.iowa.gov
www.iowap2services.com