

Fluke. **Energy answers.**

Part 1: Pre-work to successful energy audits

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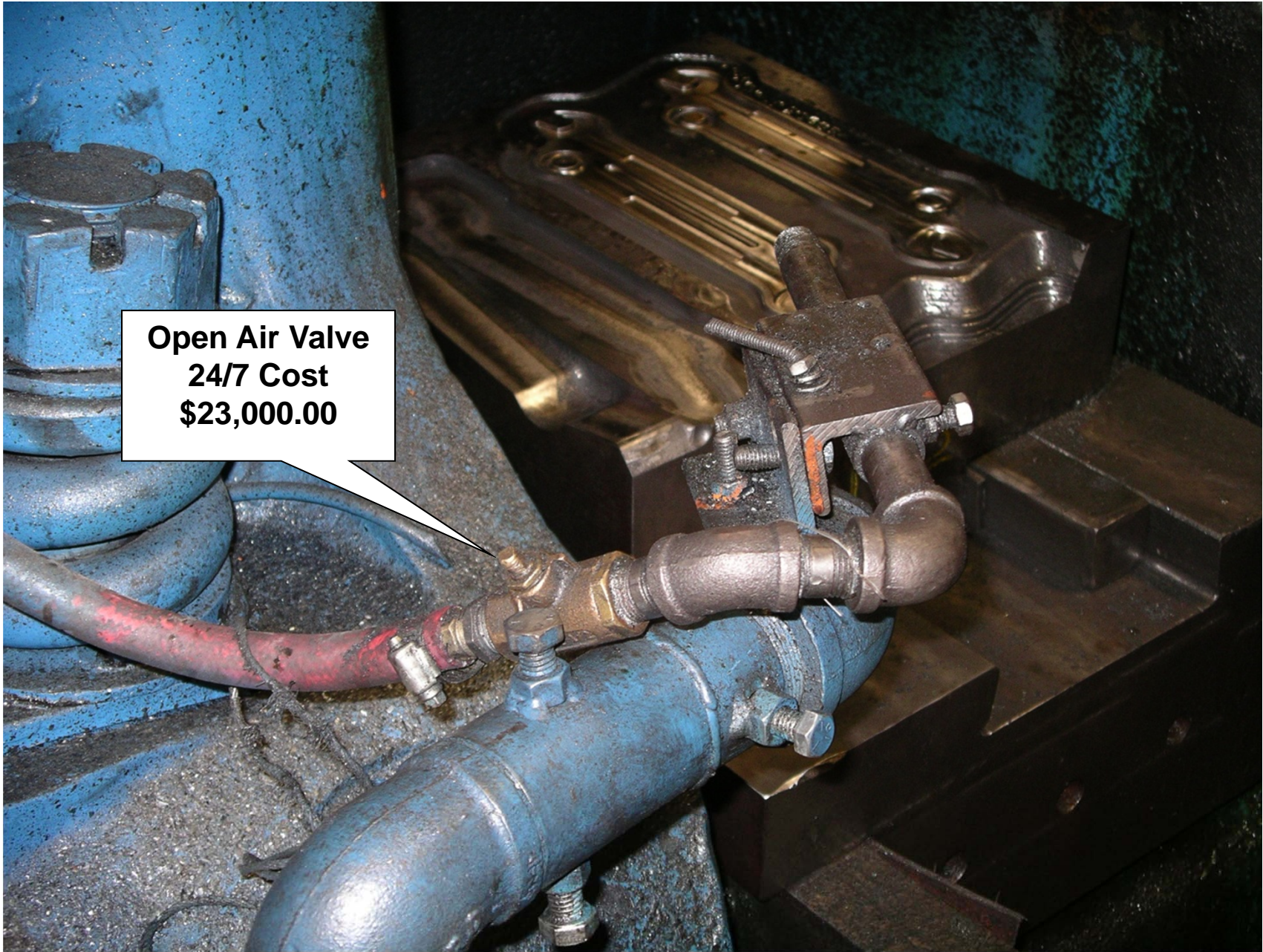
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**Open Air Valve
24/7 Cost
\$23,000.00**

Energy audit savings opportunities

Reduce utility costs by 25%
with <1 year payback

Sample annual savings from Fluke energy kit users:

- Compressed air: \$238K
- Water conservation: \$40K
- Boiler operation changes: \$22K - \$310K
- Sludge dryer/waste reduction: \$60K
- Recycling: \$46K
- Lighting retrofits: \$85K to \$187K

Overall annual savings from \$365K to \$1.1 million

Benefits to controlling utility costs

Energy audits tap a whole new savings opportunity

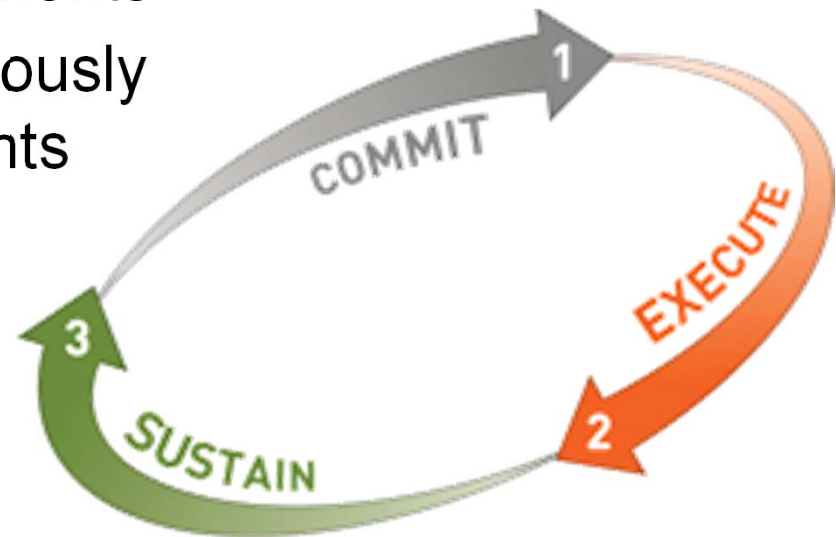
- Expand free cash flow/working capital
- Greater return on invested capital
- Bigger margins
- Better positioned for growth and opportunity
- More efficient operations



How this energy program works

Three steps to reducing energy costs

1. **Commit to energy savings**
2. Execute an action plan and implement improvements
3. Sustain and continuously monitor improvements



How these Webinars work

1. Pre-work to a successful audit

Plant profile, scope/goals, team, bills, measurements

2. Conducting an energy audit

More measurements, savings calculations, action plan

3. Taking energy audit measurements

What measurements to take where, why, how

4. Implementing & sustaining energy plans

Make changes, measure results, proactive maintenance

Accomplishments at each audit phase

Pre-work

Profile plant / create goals, scope, schedule / identify team, resources

Collect paperwork / measure full cycles



Audit

Take targeted measurements

Input data and calculate savings

Create score card and action plan



Sustain

Implement changes, measure savings, maintain results



Audit pre-work: Tasks and measurements

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Administrative/Organizational tasks



4. Identify internal and external roles.

Determine the degree to which consultants, service providers, vendors, and other providers will be used.

Administrative/Organizational tasks

5. Collect energy, water and waste information for last 12 months
 - Gather utility bills
 - Identify energy use, billing rates, capacity or power factor penalties, etc.
6. Research local, state, and federal tax deduction and rebate opportunities



Track and report your results

Enter billing info in Energy Star Portfolio Manager



- Track multiple energy and water meters per facility
- Benchmark your facility relative to past performance
- View percent improvement
- Share data with others inside or outside of your organization

Measurement tasks

Take measurements ahead of time, in key areas:

- Energy consumption
 - HVAC
 - Motors/large loads
 - Compressed air
- “Baseline” your facility





Electrical measurements

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Electrical distribution measurement tasks

1. Log power at main and secondary panels
2. Record kW, kWh, and power factor

You'll use this data during the audit to:

- Compare against utility meter/bills
- Evaluate peak demand and power factor charges (if applicable)





HVAC measurements

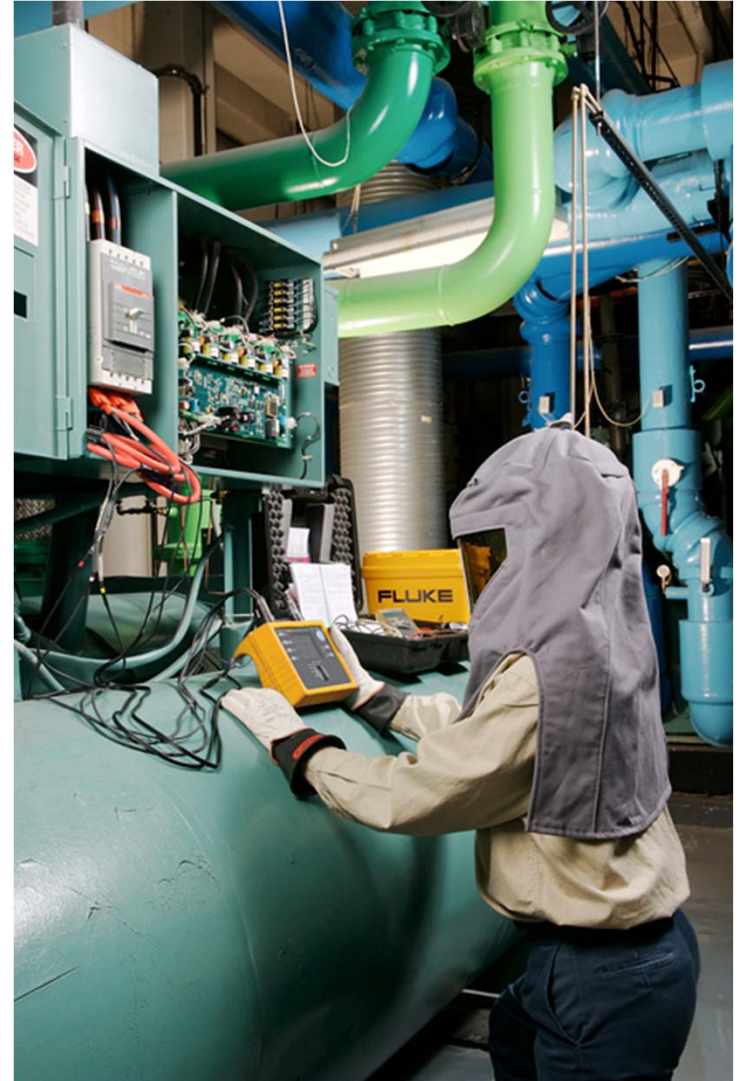
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HVAC task list

1. Profile your HVAC system
2. Schedule power logging
3. Log energy consumption
4. Find all thermostat and HVAC component locations





Motor and drive measurements

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Motors and drives task list

1. Log energy consumption at large motors
2. Compare logged data against manufacturers' specifications
3. Compare data against high efficiency motors and/or variable speed drives
 - Consider replacing units before failure. Savings will outweigh replacement costs!
 - If drives are not already present, consider adding to largest loads

Tracking motor data

Use [MotorMaster+](#) software or similar to:

- Access performance data from nearly 30,000 industrial electrical motors
- Perform comparative benefits analysis with possible alternatives
- Maintain motor inventory
- Keep historical records of motor maintenance
- Calculate life-cycle costs of projects



Compressed air

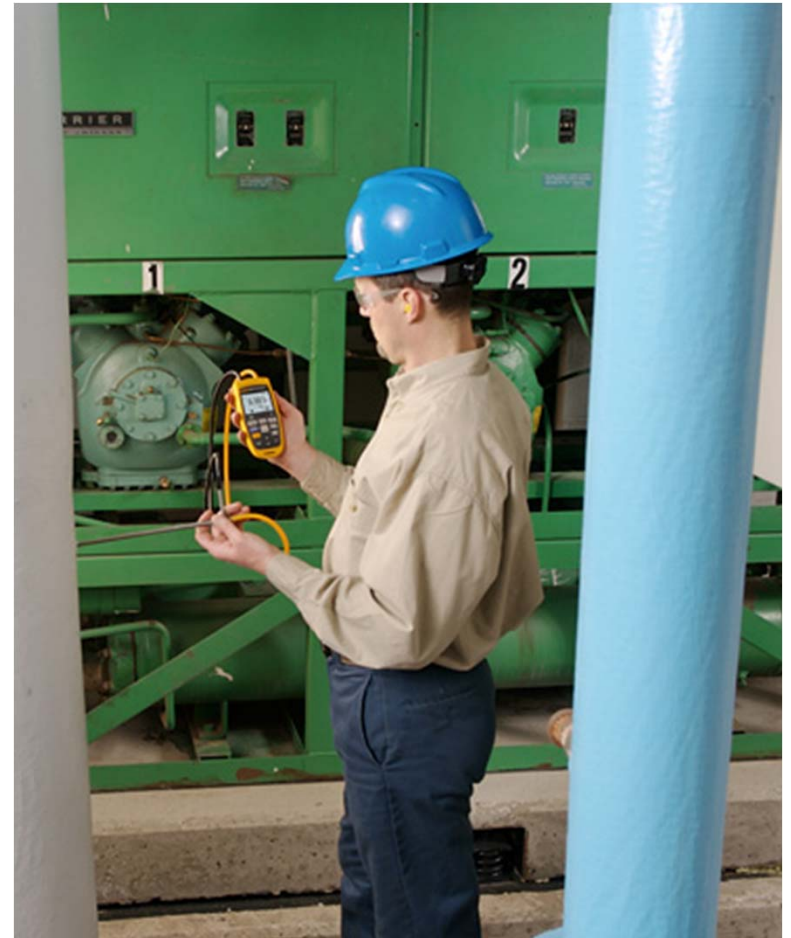
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Compressed air tasks

1. Log energy consumption at all air compressors
2. Create a pressure profile
 - Connect a pressure logger to the compressor output
 - Conduct a leak-down test





Consolidate your data

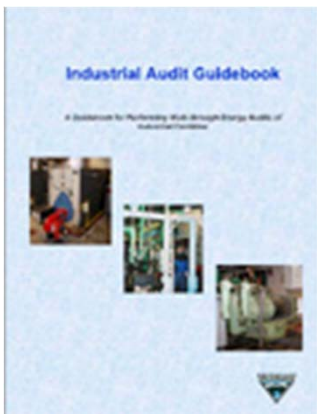
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Audit resources

Save time! Refer to these audit guides



Industrial Audit Guidebook

Better Business Guide to Energy Saving



Assessing energy use at your industrial site



All reference materials are available at the end of this presentation or at the Energy Answers website: www.fluke.com/EnergyAnswers

Other ENERGY STAR tools to calculate savings

ENERGY STAR® Facility Energy Management Assessment Matrix				
Facility Name:		Assessment Date:		
	Little or no evidence	Some elements/degree	Fully implemented	Next Steps
Commit to Continuous Improvement				
Site Energy Leader	None assigned.	Assigned responsibilities but not empowered. 20-40% of time is devoted to energy.	Recognized and empowered leader having site manager and senior energy manager support.	
Site Energy Champion	None identified.	Senior manager implicitly supports the energy program.	Senior manager actively supports the energy program and promotes energy efficiency in all aspects of site operations.	
Site Energy Team	No site energy team.	Informal organization with sporadic activity.	Active cross-functional team guiding site energy program.	
Energy Policy	No energy policy or awareness of organizational policy.	Organizational policy in place. Little awareness by site energy.	Organizational policy supported at site level. All employees aware.	

ENERGY STAR® Energy Management Assessment Matrix				
	Little or no evidence	Some elements	Fully implemented	Next Steps
Site Energy Plan	No			
Accountability	No			
Participation Levels	No or i			
Assess Performance and				
Normalize	Not addressed	Some unit measures or weather adjustments	All meaningful adjustments for organizational analysis	
Establish baselines	No baselines	Various facility-established	Standardized organizational base year and metric established	
Benchmark	Not addressed or only same site historical comparisons	Some internal comparisons among company sites	Regular internal & external comparisons & analyses	
Analyze	Not addressed	Some attempt to identify and correct spikes	Profiles identifying trends, peaks, valleys & causes	
Technical assessments and audits	Not conducted	Internal facility reviews	Reviews by multi-functional team of professionals	
Set Performance Goals				
Determine scope	No quantifiable goals	Short term facility goals or nominal corporate goals	Short & long term facility and corporate goals	
Estimate potential for improvement	No process in place	Specific projects based on limited vendor projections	Facility & organization defined based on experience	

What is ENERGY STAR?

Mission of ENERGY STAR

'Save money and protect the environment through energy efficient products and practices'



ENERGY STAR provides:

- Technical information and tools
- Best management practices
- Easy-to-use building assessment tools

Pre-work resources

General Application Notes

1. How to measure energy consumption

Financial

1. ENERGY STAR Building Upgrade Manual
Investment Analysis, Chapter 3
2. Financial Value Calculator
3. Database of State Incentives for Renewables
and Efficiency

Pre-work resources - Continued

Assessment Tools

1. Energy Program Assessment Matrix
2. Facility Energy Assessment Matrix
3. ENERGY STAR Portfolio Manager

Preparation

1. Plant Profile
2. Audit Checklist
3. BPA Audit Guide
4. Lean Energy Toolkit

Pre-work resources - Continued

Motors and Drives

1. MotorMaster+
Motor system management software
2. Improve Motor Operation at Off-Design Voltages
3. Eliminate voltage unbalance
4. Optimizing your motor driven system
5. Reducing power factor cost

HVAC

1. Over-ventilation wastes money
2. Energy savings make the case for an HVAC upgrade
3. Energy Star Building Upgrade Manual, Chapter 8
4. Energy Star Building Upgrade Manual, Chapter 9

Acknowledgements

ENERGY STAR; www.energystar.gov/

U.S. Environmental Protection Agency;
www.epa.gov/

**U.S. Department of Energy, Energy Efficiency and
Renewable Energy;** www.eere.energy.gov/