

Advanced Auditing Technologies and Techniques



Alternative Auditing Approaches

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DOE's National Renewable Energy Laboratory

40 Years of Clean Energy Research

Nearly 1,700 employees, including more than 300 early-career researchers and visiting scientists

World-class facilities, renowned technology experts

Nearly 750 partnerships

Campus operates as a living laboratory

National economic impact of \$872 million annually



Overview

- Background
- Alternative Auditing Approaches
- Considerations and caveats



Background

- Energy Independence and Security Act (EISA) of 2007 requires that federal agencies audit 25% of their 3.1 billion square feet (ft²) of covered facilities each year.¹
 - These audits are typically ASHRAE level I or level II audits, estimated to cost \$0.10 to \$0.15/ft²
- Executive Order (E.O.) 13693, “Planning for Federal Sustainability in the Next Decade,” directs agencies to promote building energy efficiency “using remote building energy performance assessment auditing technology.”

1. <https://www.gpo.gov/fdsys/pkg/BILLS-110hr6enr/pdf/BILLS-110hr6enr.pdf>

Problem = Opportunity

- The problem: Costly, Variable Quality Audits
 - Tedious, non-standardized, and error-prone process
 - A broad spectrum of ECMs/REMs/WCMs audited; varying levels of detail
 - Inconsistent/variable use of assumptions
- The opportunity: Alternative Audit Approaches
 - Potential to:
 - Significantly reduce energy auditing costs for the federal sector
 - Improve accuracy and identification of conservation measures
 - Facilitate standardized processes for data collection and analysis amongst and between agencies

Federal agency drivers

- Making audit procedures more efficient and effective
- Managing compliance cost
- Making sure audits are objectively used



How big is the opportunity?

- 775,000,000 ft² (25% of 3.1 billion ft²) audited for EISA compliance each year in the federal sector²
- The direct cost savings for the combination of virtual audits and automated field audits could be \$23 million to \$46 million annually (based on a reduction in audit costs of \$0.03/ft² to \$0.06/ft²)

2. https://archive.epa.gov/greenbuilding/web/pdf/fedcomm_greenbuild.pdf

Energy Audit Continuum



Benchmarking

Traditional benchmarking such as EPA Portfolio Manager



Advanced Benchmarking

More comprehensive benchmarking such as EnergyIQ and Asset Score



Virtual Audit / Desktop Audits

Virtual energy audit with 15 minute interval data, tools such as FirstFuel and Retroficiency and desktop audit tools such as FEDs



Traditional Audit

Standard energy audit using spreadsheets, eQUEST, ECAM, etc.



Automated Field Audit

Tablet based automated audit includes data collection, analysis and reporting, such as EMAT, simuwatt, etc.

Source: Jesse Dean (NREL)

ASHRAE Task Comparison

ASHRAE Process and Reporting Tasks versus Various Alternative Audit Products³

ASHRAE Process Tasks	Level 1 Audit	Level 2 Audit	Level 3 Audit	Tool 1	Tool 2	Tool 3	Tool 4	Tool 5	Tool 6	Tool 7	Tool 8
Conduct preliminary energy analysis (PEA)	X	X	X		X	X	X		X	X	X
Conduct walk through survey	X	X	X	X	X	X	X	X		X	
Identify low-cost/no-cost recommendations	X	X	X	X	X		X		X	X	X
Identify capital improvements	X	X	X	X	X	X	X			X	X
Review mech.and elec.(M&E) design & condition & O&M practices		X	X	X	X		X	X		X	X
Measure key parameters		X	X			X	X	X		X	
Analyze capital measures (savings and costs, including interactions)		X	X	X		X	X			X	X
Meet with owner/operators to review recommendations		X	X	X		X	X	X	X	X	X
Conduct additional testing/monitoring			X							X	
Perform detailed system modeling			X		X		X			X	X
Provide schematic layouts for recommendations			X		X						

ASHRAE Reporting Tasks	Level 1 Audit	Level 2 Audit	Level 3 Audit	Tool 1	Tool 2	Tool 3	Tool 4	Tool 5	Tool 6	Tool 7	Tool 8
Estimate savings from utility rate change	X	X	X				X		X	X	
Compare EUI to EUIs of similar sites	X	X	X				X		X	X	X
Summarize utility data	X	X	X			X	X		X	X	X
Estimate savings if EUI were to meet target	X	X	X						X	X	X
Estimate low-cost/no-cost savings		X	X	X			X		X	X	X
Calculate detailed end-use breakdown		X	X				X			X	X
Estimate capital project costs and savings		X	X	X		X	X			X	
Complete building description and equipment inventory		X	X		X	X		X		X	
Document general description of considered measures		X	X	X	X	X	X	X		X	
Recommend measurement and verification (M&V) method		X	X								
Perform financial analysis of recommended EEMs		X	X	X		X	X		X	X	X
Write detailed description of recommended measures			X	X		X	X		X	X	X
Compile detailed EEM cost estimates			X	X		X	X			X	X

3. <https://www.ashrae.org/standards-research--technology/standards--guidelines>

Other Considerations

- Not every product is appropriate for every agency or every building
 - For example, some require 15-minute interval data
- Costs need to be appropriate for savings potential
- Some products' time and cost investments may not be realized until second audit on a building
- Understand which measures a product considers



So many options, what's an Energy Manager to do?

- Proceed cautiously when considering alternative audit approaches:
 - Very new, fluid market
 - Products and companies rapidly entering and exiting the marketplace
 - Pilot an array of products to determine which are best for your agency
 - Look for published, third-party reviews of products
 - Look for related guidance, webinars, and training from FEMP

Any Questions?

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