Electronic Energy Audit Tools, Features and Field Experience
About Me

Led Design & Implementation of Hancock’s Electronic Energy Audit Tool

• 7 years experience building mobile and web based audit tools

• DOE Approval for the Weatherization Assistance Program

• Guided 5 States through the Change of Audit Tool Request process

• Resnet approval

• Member of the home performance standard (HPXML) working group
Session Objective

Highlight important features & benefits in electronic energy audit tools that enable your programs to excel in DOE and Utility service delivery.
DOE Approved Tools per WPN 13-5

Many Choices

HEAT

NEAT

MHEA

REM

E-Quest

TIPS

EA-Quip

TREAT
What makes audit tools great?

1. Easily gather many different kinds of data in the field
2. Actionable energy savings results
3. Flexible Work Flow Processes
4. Aids in client education
Part 1: Data Collection
Easy Data Entry

What makes an electronic audit tool great?

Data entry is simple & configurable
Collect mechanical systems data
Collect envelope data
Enter ECMs
Record diagnostic results
Diagnostic Tests

- Blower Door Tests
- Refrigerator Metering
- Duct CFM Testing
- Worst Case Depressurization Test
- Combustion Testing
- Indoor Air Quality Tests
- System Sizing
What makes an electronic audit tool great?

Work Offline, Disconnected from the Internet

- Native app on a mobile device
- All functionality is available offline
- Holds data until you are connected to the internet again
What makes an electronic audit tool great?

Flexible Data Collection

Configurable Questionnaire

Deliver on Mobile
Photo Capture

Use mobile devices or cameras at the job site

Integrated into an electronic audit tool

View on an online gallery

What makes an electronic audit tool great?
Part 2: Actionable Energy Savings Results
Latest advances in electronic energy modeling softwares include:

- Bin analysis methodology
- Fuel switching analysis
- Model any type of duct, flex duct or ductless using standards such as BPI distribution efficiency & ASHRAE 152-04 protocols
- Ventilation calculator ASHRAE 62.2-2013
- Ground, ambient and house temperature effect on unconditioned basements and crawl spaces
- Windows and solar heat gain and solar radiation data
- Cascading calculations to determine individual ECM SIR and overall SIR

Methodology

The primary driver of energy consumption is the heat loss for heating season and heat gain for the cooling season.

What makes an electronic audit tool great?
Comprehensive

a. Measures
b. Framing descriptions
c. Health and safety (H&S) tests and measures
d. Weather data that fit any type of climate
e. Industry standard calculations
f. Complete building analysis
g. Audit report prepared
What makes an electronic audit tool great?

Example of Calculator:

**ASHRAE 62.2-2013 Ventilation**

- **New or existing construction** [Existing]
- **Use infiltration credit** [Yes]
- **Closest weather station** [United States]
- **Weather and shielding factor [1/hr]**
- **Floor area [ft²]**
- **Number of occupants**
- **Building height [ft]**
- **Measured leakage @ 50Pa [CFM]**

**Use Advanced Blower Door Inputs**

**Use Local Ventilation Alternative Compliance**

**Whole-Bldg Ventilation Results**
- **Effective annual avg infiltration rate [CFM]**
- **Total required ventilation rate [CFM]**
- **Infiltration credit [CFM]**
- **Required mechanical ventilation rate [CFM]**

Example of Calculator Embedded in Audit Tool:

- **Building Ventilation**
  - **Name**: Kitchen
  - **Type**: Kitchen
  - **Affected**: [X]
  - **Window Operable**: [X]
  - **New**: [ ]
  - **Exhaust Fan**: 375.000 (cfm)

**Ventilation Details**
- **Total Airflow Deficit (cfm)**
- **Total Required Ventilation Rate, (cfm)**: 80.700
- **Alternative Compliance Supplement, (cfm)**: 0.000
- **Effective Annual Average Infiltration Rate, (cfm)**: 85.925
- **ASHRAE 62.2-13 Required Continuous CFM**: -7.225
- **Installed Mechanical Ventilation Fan Capacity, (cfm)**: 0.000

**Name**
- **Type**
- **Affected**
- **Windows (override New Exhaust)**
- **Upstairs Bath**: Bath [X]
- **Kitchen**: Kitchen [X] 375.000
Part 3: Flexible Process
One tool, more than one building type

- Single Family
- Manufactured Homes
- Low-rise
- Mid-rise
- High-rise multifamily
Weatherization Process

Client Intake
Customer Applies for Weatherization

Energy Audit
Scheduled and Performed

Install
Measures are installed.

Invoicing
Jobs are invoiced to the State.

Inspection
Agencies inspect and send callbacks to the subcontractor. Agency performs final inspection.

Payments
States process payments. Given state approval, agencies can rework already invoiced jobs.

State Monitor Jobs
States inspect agency jobs and send back measures that need correction. Agencies correct jobs for state’s final approval.

Reporting
Agencies report on performance internally and to their state. State reports to funding sources.

Work Order
Create work order and send to subcontractors.
Audit Information Automatically Flows into Work Scope

Audit Tool Results

- SIR Control based on funding source
- Do not allow SIRs less than 1 onto work scopes
What makes an electronic audit tool great?

Create Change Orders & Re-calculate SIRs

Keep a history of the original energy audit

Recalculate SIRs

<table>
<thead>
<tr>
<th>Measure</th>
<th>Status</th>
<th>Unit Cost (Old/New)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHW Heater - Drip Drain-HS</td>
<td>Installed</td>
<td>30.00 / --</td>
</tr>
<tr>
<td>ES - Airsealing - Other</td>
<td>Installed</td>
<td>1,214.65 / --</td>
</tr>
<tr>
<td>ES - CFL - 20W Spiral</td>
<td>Installed</td>
<td>6.00 / --</td>
</tr>
<tr>
<td>ES - Duct Sealing - Mastic</td>
<td>Installed</td>
<td>1.95 / --</td>
</tr>
<tr>
<td>ES - Faucet Aerators - Install</td>
<td>Installed</td>
<td>5.00 / --</td>
</tr>
<tr>
<td>ES - Insulation - Install R-19 Fiberglass(Attic)</td>
<td>Installed</td>
<td>1.50 / --</td>
</tr>
<tr>
<td>ES - Insulation - Install R-30 Fiberglass(Attic)</td>
<td>Installed</td>
<td>1.65 / --</td>
</tr>
<tr>
<td>ES - Insulation - Install R-49 Celulose(Attic)</td>
<td>Installed</td>
<td>1.80 / --</td>
</tr>
<tr>
<td>ES - Showerhead - Install Low-Flow Showerhead</td>
<td>Installed</td>
<td>25.00 / --</td>
</tr>
<tr>
<td>ES - Water Heater - Install Blanket</td>
<td>Installed</td>
<td>65.00 / --</td>
</tr>
<tr>
<td>ES - Water Lines - Insulate</td>
<td>Installed</td>
<td>0.85 / --</td>
</tr>
<tr>
<td>IR - Baffles</td>
<td>Installed</td>
<td>2.00 / --</td>
</tr>
<tr>
<td>IR - Carpentry Repairs (General)</td>
<td>Installed</td>
<td>0.00 / 0.70</td>
</tr>
</tbody>
</table>

Job SIR: 5.17
Job Cost: $2,842.25
Annual Savings: 81.3 mmbtu
Lifetime Savings: 1535.6 mmbtu
What makes an electronic audit tool great?
Certified Quality Control Inspectors (QCI) perform final inspections in compliance with the specifications outlined in the SWS

- The quality control inspection is the final step in the weatherization process. The QCI ensures all of the work was done properly along the way.

- If data is collected electronically, accurate and uniform data collection will create a seamless process to complete QCI inspections.
Automation of QC Inspection Process

1. Review History of Job in its Entirety (Work Orders, Paperwork)
2. Review In Process Pictures and Approve Paperwork
3. Review Detailed Energy Audit / Site Assessment
4. Have a Conversation with the Client
5. Perform QC Inspection & Verify With Photos
6. If Measure Fails, Create a Punch List
7. Go Over Results with the Client
8. Obtain Client Signatures
Exports Data Easily

- HPXML data transfer standard for the residential energy efficiency industry
- CSV
- Web Services
Part 4: Client Education
Introducing an Electronic Audit Tool to your Workflow

Immediately Enhances Client Education

What makes an electronic audit tool great?

Introducing an Electronic Audit Tool to your Workflow

Immediately Enhances Client Education

Energy Plus Program

Top Energy Savings Recommendations

HVAC Upgrade

There’s never been a better time to upgrade your small business’s HVAC system. Not only is this installation going to increase the efficiency of your building, but it is also going to yield annual energy savings. With today’s advances in technology, high-efficiency HVAC systems use as much as 50% less energy.

SMART Lighting

Controls are a key part of any lighting system. Specify controls that maximize the flexibility of your system while eliminating light usage, often automatically. A common inefficiency of exterior lighting systems is a tendency to “dayburn.” This is when lights are on during the day, wasting energy and money. This problem can be prevented by installing light-sensitive controls that turn the lights on and off automatically based on daylight, thus producing convenient energy savings. Timers can be used, but do not react to changing daylight conditions.

Air Duct Integrity / Seals

Leaky ductwork can cost you on your monthly energy bill. Do your ducts circulate air the way they should? Do they bring dirt and air contaminants inside your home? Have them properly sealed and insulated to make your home more comfortable and improve the quality of the air you breathe every day.
Hancock Software offers energy audit and program management solutions for Weatherization Assistance Programs (WAP) and Utility Programs.

12 States and more than 250 agencies and housing authorities have standardized on the Hancock Platform.

Thank you!

Dan Chartier
danc@hancocksoftware.com

6 min video - https://youtu.be/qKfilcTmO3o

longer video - https://youtu.be/-9QlpLpaRpg