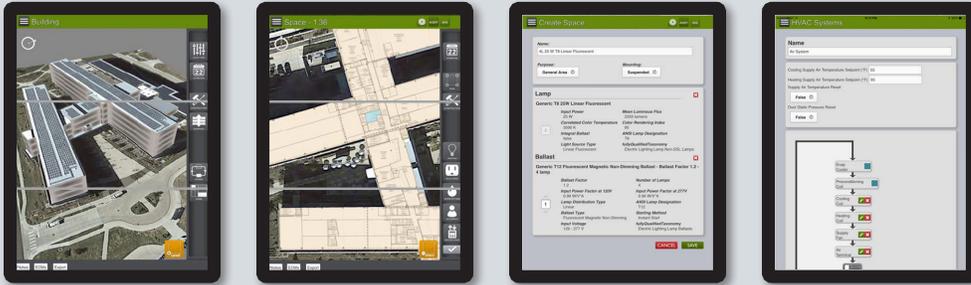


Electronic Auditing Tool with Geometry Capture



Tablet-Based Energy Audit Application Reduced Time and Costs by 53%

National Renewable Energy Laboratory (NREL) researchers compared simuwatt® Energy Auditor software with traditional audits at 13 buildings across five DoD sites.

► INTEGRATED ENERGY AUDIT TOOL

This tool integrates several existing audit and software technologies to perform ASHRAE Level II audits faster and with fewer errors. It collects data onsite, conducts whole-building energy analysis, automatically generates standardized reporting, and preserves data for future audit updates. It also facilitates portfolio-wide tracking, reporting, energy modeling, and decision-making.

► ONE-YEAR SIMPLE PAYBACK ESTIMATED

In the first of two demonstration phases, simuwatt audits averaged a 53% cost savings compared with past DoD audits. In the second phase, head-to-head audits found the simuwatt audit 28% faster than a traditional approach. Though independent experts found that the audit reports weren't comprehensive enough, DoD reviewers were equally satisfied with reports from both simuwatt and traditional auditing teams. DoD-wide use of the simuwatt Energy Auditor tool over four years could save \$43 million annually and result in a 1-year simple payback per installation.

Technology Tested

SIMUWATT® ENERGY AUDITOR

Integrates NREL audit methodology with:

- Advanced 3D geometry capture tools;
- Integrated community-driven library of energy simulation data;
- NREL OpenStudio whole building energy software platform;
- Analysis with U.S. Department of Energy's (DOE) EnergyPlus Simulation Engine.

Mitigates entry of incorrect inputs by:

- Using component data from a library populated with trusted information;
- Automating energy model creation;
- Standardizing ECM analysis;
- Comparing model results with actual utility bills to ensure analysis is sound.

Leverages previous audit data to:

- Identify efficiency opportunities at economies of scale and across building portfolios;
- Tie data to facility maintenance systems;
- Support model-based control strategies.

Limitations

- Requires building walk-through.
- Does not export data to ENERGY STAR Portfolio Manager for ENERGY STAR scoring. Will export to Excel.

Required Inputs

- Satellite imagery and floor plans.
- Software guided data collection: zoning, construction, windows, HVAC, schedules, lighting, water fixtures, occupants etc.

ABOUT ESTCP



Demonstration Sites: 5 Sites, 13 Buildings

In Phase I, NREL auditors used the simuwatt tool to audit DoD buildings across four sites: the Air Force Academy in Colorado Springs, CO; Fort Bliss in El Paso, TX; Fort Jackson in Columbia, SC; and Tyndall AFB in Panama City, FL.

In Phase II, two teams, one using simuwatt and the other using a traditional auditing approach, audited the same two buildings at Naval Support Activity Monterey, in Monterey, CA, for comparative outcomes.

INSTALLATION'S COSTS*

SOFTWARE LICENSE

\$399/month for single-user license
\$1M/year DoD-wide

LABOR

simuwatt audit	\$0.11/ft ²
Recurring simuwatt audit	\$0.05/ft ²
Traditional DoD audit	\$0.20/ft ²

Typical cost of simuwatt audit

\$100/building

*Cost information is for reference only. Individual sites should do due diligence to determine local costs.

TAPS INTO EXISTING SOFTWARE TOOLS

NREL researchers and concept3D developers tapped into existing software tools and methodologies to glean the best practices available. The simuwatt Energy Auditor software demonstrated in this project eliminates many of the old inefficiencies, doubles auditing capacity, and was able to pinpoint site-specific opportunities for energy savings.

Additional Resources

► EW-201260 FINAL REPORTS AND TECHNOLOGY TRANSFER TOOLS

<https://serdp-estcp.org/Program-Areas/Energy-and-Water/Energy/Conservation-and-Efficiency/EW-201260>

► TECHNOLOGY USED AT DEMONSTRATION SITE

Simuwatt Energy Auditor, concept 3d, www.concept3d.com/simuwatt/.

NOTE: Before incorporating new technology, refer to Unified Facilities Criteria (UFCs) and other appropriate guidance to ensure compliance with current requirements. <https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc>



Demonstration Results

AUDIT SAVINGS

- Up to 53% average cost savings compared to past DoD audits.

INSTALLATION & USE REQUIREMENTS

- For DoD auditors to use simuwatt directly, the software will need to complete the DoD IT security process. If a third-party auditor is used, DoD will need to establish ownership and control of the data.

REPORT COMPREHENSIVENESS, COMPLETENESS & TECHNICAL MERIT

- Phase 1: Auditing experts scored simuwatt 40.5/80; DoD personnel 49.9/80.
- Phase 2: Auditing experts scored simuwatt 45/80 and traditional audits 71/80; DoD personnel scored both simuwatt and traditional audits 71/80.

SIMUWATT OPERATIONS & MAINTENANCE

- Data collection is standardized and DoD owns and controls resulting data, reducing costs of recurring audits.
- Can explore portfolio of buildings to find opportunities and economies of scale.
- Can leverage data for other uses such as facility maintenance plans.
- Building models can be used for automated fault detection and diagnostics.
- Report templates are customizable.
- Monthly software licensing fee provides maintenance, guaranteed availability to technical expertise, storage of photos and videos and minor feature enhancements.
- A few days of training is necessary for auditors new to simuwatt.

COST-EFFECTIVENESS

- On a DOD-wide basis up to \$51 million in annual savings over 25 years, compared to traditional audits.
- An auditor averages 4 buildings a month. For roughly 200,000 ft² @\$399/mo the software license is \$100 per building.
- Roughly 35% auditor time savings demonstrated using the simuwatt system.