



Monitoring and Verification

Global Resource Efficiency Services
www.gresworld.com

Monitoring and Verification Overview

Energy management follows a management process: Analysis – Implementation – Monitor. Monitoring is used to measure energy cost avoidance for specific energy efficiency measures. A credible Monitoring and Verification program should follow the IPMVP (International Performance Measurement and Verification Protocol)

The most basic and important component of a successful energy management program is its cornerstone of information. One can't manage what one can't measure. The goal is to build an information infrastructure for growing a long-term, highly successful energy management program.

Having an advanced energy information infrastructure delivers the following benefits:

1. Places Facility Operations and Maintenance in a proactive position to identify and detect maintenance issues early, which will help to mitigate equipment failure and expensive replacements.
2. Aligns all building operations and maintenance personnel involved in energy conservation, which eliminates even more waste and further reduces cost.
3. Provides the critical information needed to evaluate energy efficiency projects and hold energy service vendors accountable for the work performed on campus.
4. Motivates instructors to incorporate the real-life data and building systems into their classroom lesson plans, which begins the process of empowering people to take this knowledge and apply it in other parts of their lives.

Creating a Baseline

Monitoring and Verification is required to measure the performance of the environmental and energy measures. One critical aspect of any monitoring system is the definition of a baseline. The baseline is the term used to describe the condition before measures are implemented. For energy management purposes, buildings will use historical energy use as a baseline. A number of monitoring methods are defined in the IPMVP International Performance Measurement and Verification Protocol.

The main energy monitoring methods defined in the protocol are:

- Baselines are determined for individual measures with metering at the measure level.
- Baselines are determined for individual meters with metering at the building level.
- Baselines are determined using energy simulation models and simulation is calibrated using metered energy use.

Energy accounting software is used to establish baselines and compare baseline energy use to current energy use. The software can adjust for weather and utility reading dates for utility billing periods. The software can also verify utility bills for the correct application of utility rate structures. Reports are provided that can be adapted for specific energy management needs.

Develop Database Structure: The software is only as good as the information it contains; therefore, before the utility bills are entered, an organized structure (blueprint) of the utility distribution is developed for all facilities.

Construct Database: Once the database structure is complete, the database construction starts. In this step, a 24-month database is constructed from the detailed, line-item information contained on each utility account.

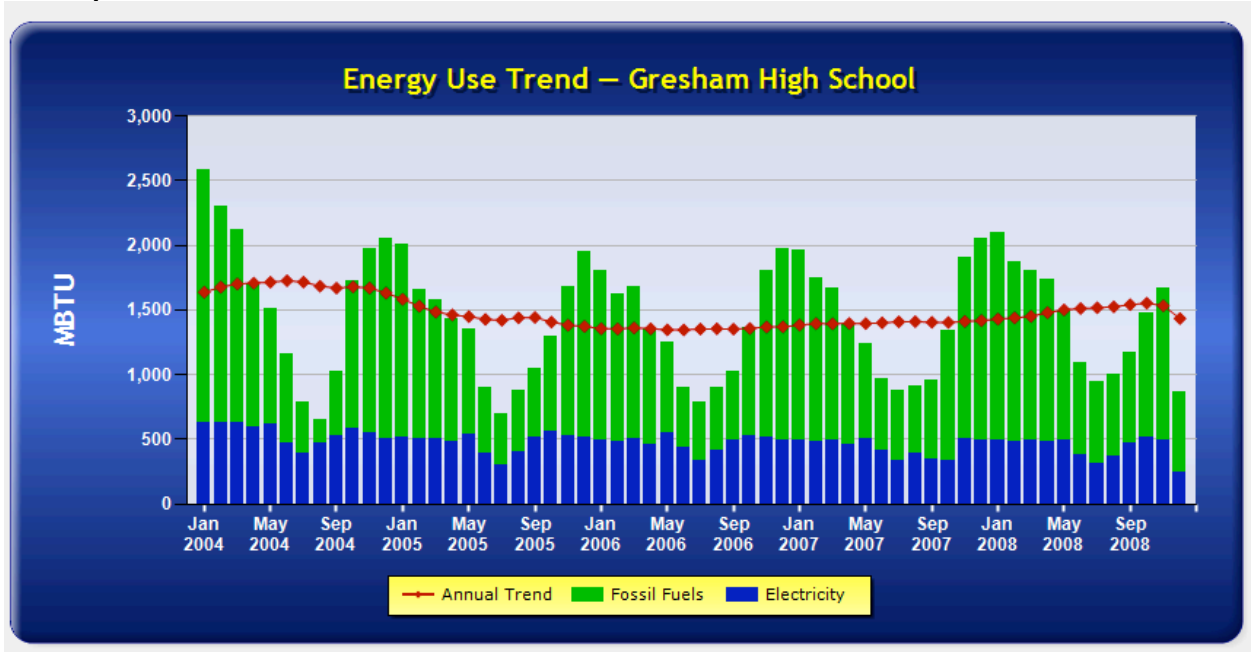
Audit Bills: This detailed work involves: a) determining whether each account is being correctly billed, b) ensuring the proper and most cost-effective rate is in effect, c) verifying proper account ownership d) verifying proper meter multipliers.

Maintain Database - Bill Population: In order to maintain the database, the monthly data entry of utility bill information in account line-item detail is necessary. The process entails collection of all Clients' utility bills on a monthly basis. The utility bills are verified to each account in the database.

Audit Report - Refund Collections & Rate Reductions: The audit report captures in detail, refund opportunities from billing errors, rate reduction scenarios, and meter-related opportunities. The actual refund collection and rate reduction changes are secured through active negotiations with the appropriate utility providers. Refunds and/or savings are not considered "actual" savings, until received.

Construct Cost Avoidance: A baseline year is established. With information gathered about the facilities regarding loads to the current year compared to the baseline year, adjustments are developed and incorporated to insure accuracy and fairness for the comparison. Our approach is open book for the project so all information used is agreed upon and appropriate for calculation of Cost Avoidance savings. The formulas and reports are explained in detail to eliminate confusion and assure credibility for savings calculations.

Samples of screen shots are as follows:



Month: Jun Year: 2009 Report Type: CO2 Reduction Bar Graph Show ENERGY STAR Rating Line

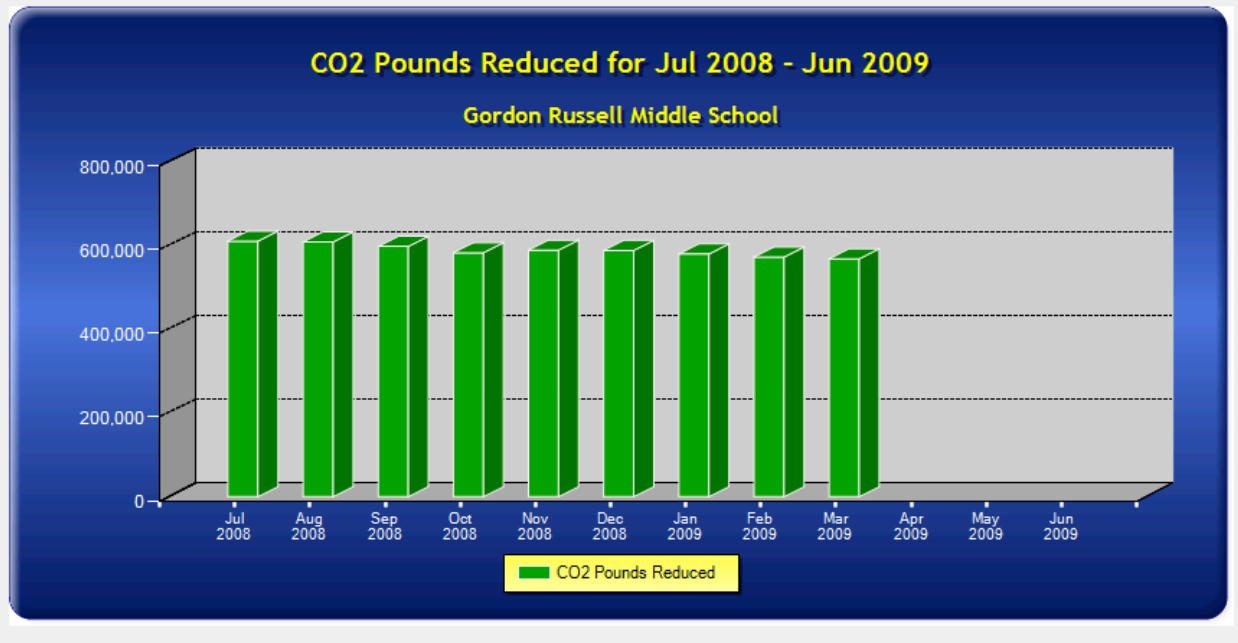
School: Gordon Russell Middle School

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Year: 2008

Cost avoidance data runs in arrears. Electricity a

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