DOE BUILDINGS PERFORMANCE DATABASE
FUELING INVESTMENT IN ENERGY EFFICIENCY

Window Replacement Retrofit—Commercial Building

Sample Scenario

The DOE Buildings Performance Database is a decision-support platform comprised of a database and data analysis tools that enables financial and engineering practitioners to evaluate energy efficiency products and services in commercial and residential buildings.

The scenario described below highlights the Database's ability to evaluate commercial energy efficiency projects. It is based on the commercial building data currently contained in the Database and will demonstrate the capabilities of the energy performance tool. As more building performance data is added to the Database, additional sample scenarios will be developed to demonstrate how the Database can inform investment decisions in energy efficiency projects.

Retrofit Inputs

Select the following input parameters to generate an energy usage forecast and financial forecast analysis on a commercial window type retrofit.

Classification Screen Selection

Energy Usage Forecast

Location Screen Selection

Zone: 3B (1931)

Building Information Selection

Square Footage

Facility Type	Select All Office Types (Multi-Select)
Square Footage (Sq. Ft.)	Min. 10,000 Max 50,000

Retrofits Page Selection

Window Type

Pre-Retrofit Characteristics	Single-pane
Post-Retrofit Characteristics	Double-pane

Windows Operable

Pre-Retrofit Characteristics	False
Post-Retrofit Characteristics	False

Retrofit Results

After selecting the designated inputs, the Results tab displays a series of charts based on your search parameters and building specifications. Here we examine Annual Gas Usage.

Energy Savings—Annual Gas Usage

The charts below show the annual gas savings. The top chart shows the probability distribution of the energy use intensity (kBtu/sf/year) for the pre-retrofit consumption (blue line) and post-retrofit consumption (green line). The bottom chart shows the net savings—the difference between the pre- and post-consumption probability distributions. The results show a mean annual gas savings of about 17 kBtu/sf/year and a relatively large standard deviation of about 20 kBtu/sf/year (Figure 1). The monthly charts show that the gas savings are higher in winter months and electricity savings higher in summer months, as expected.

The wide range is likely because the analysis is based on very few parameters—just climate, building type, and size. The energy use of each building is affected by a number of other parameters such as HVAC system type, wall and roof insulation, etc. For example, if you don't control for operable windows in this analysis, the results show mean gas savings of 14 kBtu/sf/year with 19 kBtu/sf/year standard deviation (Figure 2), as compared to 17 and 20 kBtu/sf/year, respectively. If the analysis controlled for additional parameters, the savings estimates will become more accurate and have lower uncertainty. This will be possible as more and richer data are added to the Database.

Figure 1 Energy Savings—Annual Gas Usage (shows only buildings with inoperable windows)

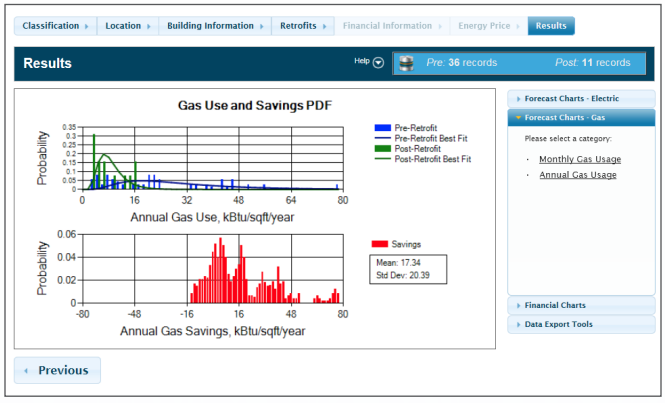
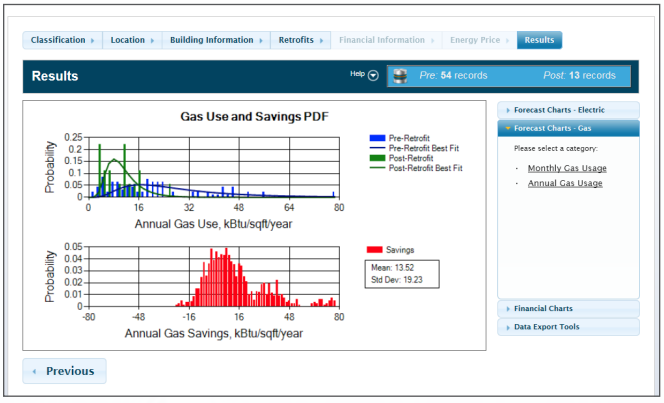


Figure 2 Energy Savings—Annual Gas Usage (shows buildings with operable and inoperable windows)



For more information visit:
http://www.commercialbuildings.energy.gov/bpd.html