Applying Energy Data Tools to Inform the Valuation of Commercial Buildings

CASE STUDY

The U.S. Department of Energy (DOE) and Environmental Protection Agency (EPA) have created a collection of free, online, interactive tools designed to inform users about the various aspects of energy and building performance. The tools include the EPA's ENERGY STAR® Portfolio Manager®, DOE's Building Energy Asset Score, and DOE's Building Performance Database. Armed with information available from this group of tools, building owners, operators, appraisers, and other stakeholders can:

- Compare a building's performance to its peer group, or to a representative sample.
- Compare how a building is performing against how it is expected to perform.
- Monitor and track building energy performance overtime and track savings from projects.
- Understand the value of energy efficiency and the components of the building that make it energy efficient.
- Identify opportunities for improvement, including recommended equipment upgrades, and prioritize upgrades to maximize building performance.
- Explore data across real estate sectors and regions, and compare various physical and operational characteristics to gain a better understanding of market conditions and trends in energy performance.

This case study is intended demonstrate the value of the information that these tools provide real estate stakeholders, including owners, operators, tenants, and commercial appraisers. Utilizing building information from a commercial office building in Greensboro, North Carolina data was entered into Portfolio Manager, Asset Score, and the Building Performance Database to demonstrate tool outputs and information available to users through these tools.

The case study building is owned by Self-Help, a Durham, NC-based non-profit organization that provides financial services and community-centered investment throughout North Carolina. In July 2011, the organization benefitted from an evaluation of energy opportunities, roughly equivalent in scope to an ASHRAE Level II audit, at their 88,000 square foot office building located at 122 Elm St, Greensboro, NC. The building was constructed in 1971 and Self-Help has owned and operated the property since 1998. It currently houses 21 office tenants, all of which are non-profit organizations. The analysis and energy estimates were paid for by the North Carolina State Energy Office as part of its Stimulus Funding program. The report identified a suite of potential retrofits, from which a lighting retrofit and several upgrades to the HVAC system were implemented. The impacts of these improvements on the property's energy performance and market value were measured and evaluated by

entering data from the building, supplemented with estimated data, into three Federal tools to demonstrate the outputs and information available to users.

IMPLEMENTED UPGRADES

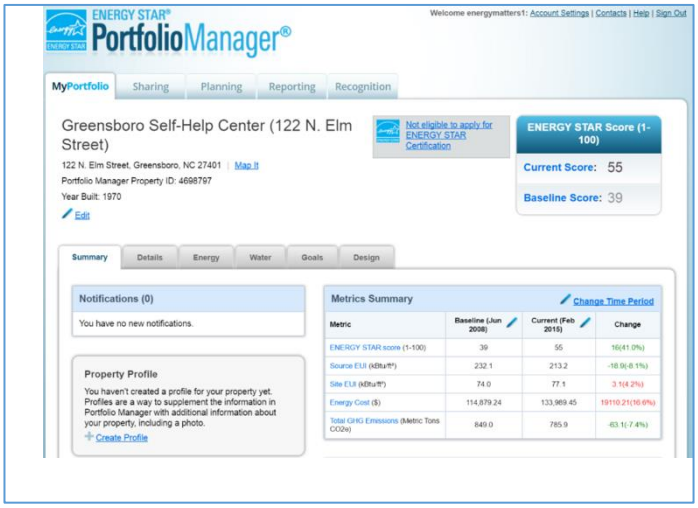
Lighting Upgrades:

- Common area: Reduced number of fixtures and replaced T8 lamp fixtures with lower wattage T5 lamps with reflectors. LED fixtures were not cost effective at that time.
- Occupancy sensors installed in the restrooms, conference rooms, copier/supply rooms, and breakrooms, as well as photosensors in conference spaces.

HVAC Retrofits:

- Three-way control valves for penthouse and basement air handling units (AHU).
- Installed new efficient fan motor and controls for the penthouse AHU return fan.
- Pilot tested the installation of variable air volume (VAV) kits in existing mixing boxes.

ENERGY STAR® Portfolio Manager®: Track Energy Savings and Measure Performance



Upon completing the projects, property performance showed a noticeable improvement. Weather-normalized energy use in 2012 declined 19% from the prior year, producing over $8,111 in annual energy savings. These savings were tracked using the EPA's **ENERGY STAR® Portfolio Manager®**, a free online tool that property and portfolio owners can use to monitor energy use within their portfolio. The tool provides energy use intensities (EUI, or the amount of site energy used per gross square foot), and annual utility costs. The tool can also provide an ENERGY STAR Score, which benchmarks the building's energy use against similar asset types. In this case, the ENERGY STAR score can be used to compare 122 Elm Street's performance against that of other office buildings across the US. The retrofits improved the building's ENERGY STAR score from 33 to a 55, a significant jump in performance. While it falls short of an ENERGY STAR certification—which requires a minimum score of 75—these

Annual Energy Costs

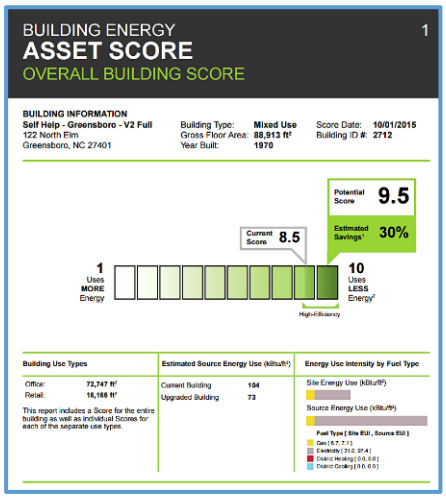
Property Improvements	2011	2012	Improvement (%)
Normalized Site EUI	92	74.3	19%
ENERGY STAR® Score	33	55	67%
Annual Energy Cost	$126,133	$118,022	6.4%

improvements represent a significant down payment on achieving that performance level and lift the building into the top half of its peers. (ENERGY STAR scores are calibrated so that an average building scores a 50.) As the company continues to make investments in the property, it expects to reap additional savings from new retrofits and realize synergies between new fan motors and controls already put into place.

To access Portfolio Manager visit https://portfoliomanager.energystar.gov.

DOE Building Energy Asset Score: Consider the Value of a Building's Energy Assets

Value can also be assessed using DOE's **Building Energy Asset Score**, a nationally standardized tool for evaluating the physical and structural energy efficiency of commercial and multifamily residential buildings. While the tenants and energy use patterns within a building frequently changes, its physical structure and major equipment remain mostly constant. These underlying energy "assets" –the building envelope (roof, walls, and windows), lighting, water, and HVAC systems – have a significant impact on how efficiently energy is used within a building regardless of how the building is operated or the behavior of its occupants. Using building information entered by the user, the tool runs a sophisticated whole-building energy simulation and generates an Energy Asset Score Report that includes the Asset Score, a building system evaluation, and potential energy savings upgrade opportunities.



With known and estimated information about 122 Elm Street, the Building Energy Asset Score was calculated to be an 8.5. The Energy Asset Score Report outlined opportunities to improve the building that could increase the score to a 9.5. Recommended upgrade projects include:

- Implement chilled water temperature reset
- Upgrade cooling plant pumping system to constant primary-variable
- Add low flow faucets
- Upgrade cooling system with high efficiency electric chiller

To access the Asset Score visit www.energy.gov/eere/buildings/building-energy-asset-score.

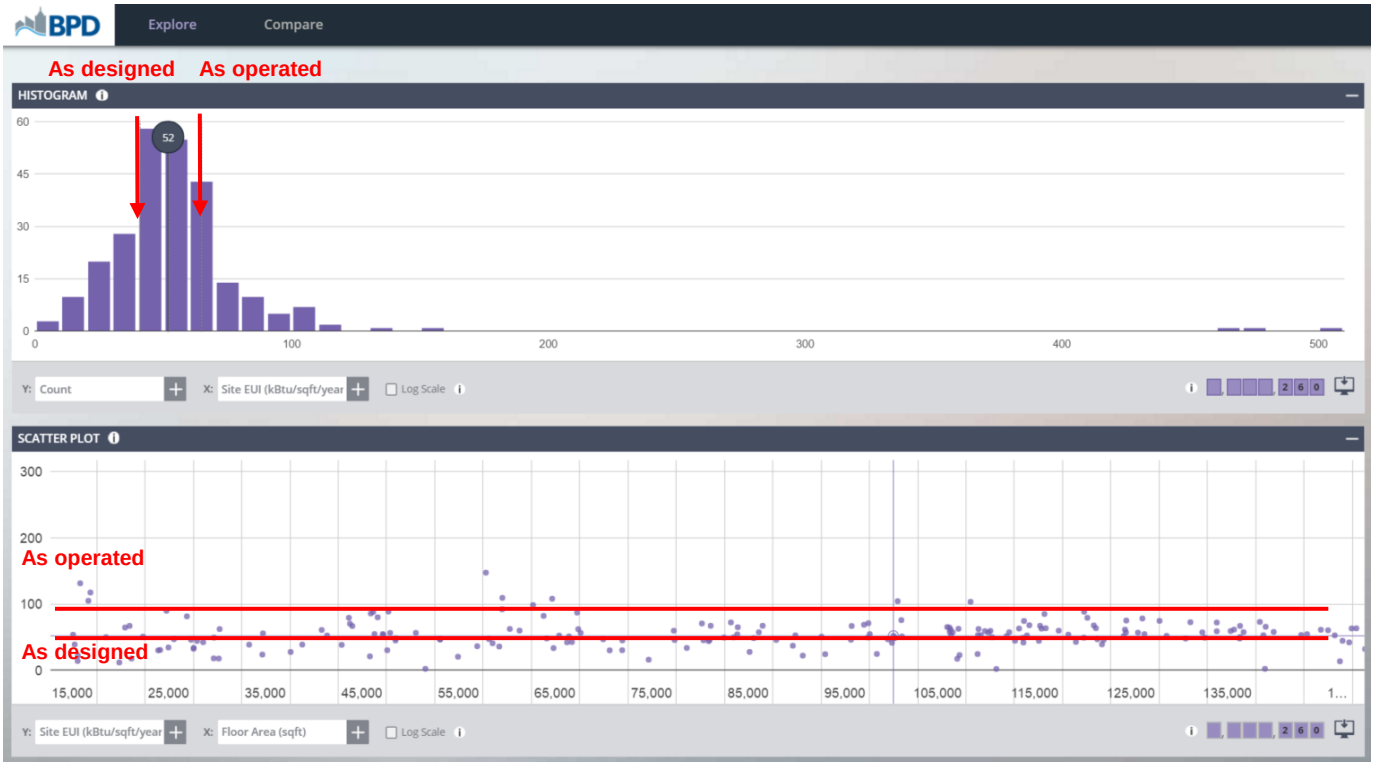
DOE Building Performance Database: Compare a Building to the Local Market

Drawing upon data from both Portfolio Manager and the Asset Score, as well as other databases, the DOE's **Buildings Performance Database** is designed to make it easy for users to make a more accurate peer and market based comparisons of the important performance factors of a building. Using

the different tools within the Buildings Performance Database, users can explore data across real estate sectors and region, and compare various physical and operational characteristics to gain a better understanding of market conditions and trends in energy performance. Filters can be used to create and save custom peer group datasets based on specific variables, including building type, location, and size. Rather than simply provide a nationally representative sample, the goal of the Building Performance Database is to provide users with as many data points as possible in order to draw accurate, localized conclusions.

The snapshot of the Building Performance Database's Compare Tool is filtered for the following points to provide comparable buildings to 122 North Elm Street:

- **Building classification:** Residential and mixed use (not enabled)
  - **Commercial:** Enabled
    - **Office:** All selected except medical non diagnostic
- **Location:** North Carolina
- **Building information:** Floor area 0-200,000



The results of this query provide two comparisons to the set of peer buildings. The *As operated* figure indicates the property's current standing compared to peers, whereas the *As designed* figure indicates the optimal position that could be achieved through operational adjustments and maximized energy efficiency at the building.

To access the Building Performance Database visit https://bpd.lbl.gov/.

Understanding the Value of Energy Efficient Building Components

While using these tools will help to provide users with the ability to track performance, understand the value of specific components, and compare their building to peers, there is further analysis needed to understand how building performance and energy efficient components impact the asset's value. 122 North Elm Street is a representative example of a typical B-class commercial office building that constitutes much of the building stock in most U.S. cities. As such, it offers lessons for how cost-effective retrofits can enhance value and improve profitability without negatively impacting rents in a market with value-conscious tenants and rents under $15-per-square-foot. According to REIS, a commercial real estate market analyst, the asking rent in the Greensboro–Winston-Salem submarket averaged $16.33 per square foot at the time of the retrofit, with 122 North Elm Street's cost-conscious non-profit tenants paying rents in the submarket's lowest quartile.

Taking into account the submarket's other fundamentals, such as a 20% vacancy rate and the fact that many office properties sold at prices below their replacement cost, Greensboro is a tenant's market, which limits an owner's ability to pass along costs or make demands of tenants. In this environment, cost-effective investments in tenant comfort and efficiency represent significant opportunities to improve asset performance: helping keep tenants in place and cutting energy costs to improve NOI.

The most immediate value that can be attributed to the retrofit is the value of avoided energy costs. In 122 North Elm's full-service lease structure, the reduced expenses accrue to the landlord's net operating income (NOI), which creates bottom-line value for the owner. In recent transactions, going-in capitalization ("cap") rates (i.e., the ratio of NOI to Asset Value) on office properties in Greensboro range from 7% to 10%, interviews with local experts suggest 122 North Elm Street's cap rate would fall into the upper portion of this range.

Using a 9% cap rate, the value creation via the income capitalization approach to value due to avoided energy costs is $90,122 ($8,011/.09). Comparison of the value creation to capital invested can be presented in two scenarios, one where the state rebates are included and another where they are excluded. Accounting for the impact of the grant, Self-Help effectively invested a total of $50,926 in HVAC and lighting retrofits and realized a multiple of 1.8 on its investment through income capitalization of energy savings alone. The retrofit also achieved an unleveraged 20 year IRR of 18%, using a 5% discount rate, a net present value (NPV) of $80,818 and an annual return on investment (ROI) of 13%.

In addition to capitalization of added NOI achieved via utility bill savings, a new appraisal on the building would show additional value creation in a detailed discounted cash flow (DCF) model. A full DCF would model property performance and account for other adjustments to the building. For instance, lower capital reserves, as a consequence of completing the retrofit, would improve the building's operating statement by reducing the need to reserve funds for replacement. The energy savings are expected to be durable, as the projected lifetime of the new HVAC equipment and lighting components are 30 and 10 years, respectively. As part of the program, other adjustments might be possible, including changes to expected

rent growth and tenant retention due to the improvements to lighting, which has resulted in improved tenant spaces. The appraiser would likely substantiate these adjustments with market observations and calls to tenants to confirm improved tenant satisfaction.

Summary

The retrofits to 122 North Elm Street facility demonstrate that building performance for 1960s and ’70s-vintage construction can be improved, as evidenced by the building’s 6.4% energy cost savings and significant improvement in its ENERGY STAR score. The annual energy savings of $8,111 contributed significantly to asset value in excess of the cost of the retrofits, leading to a more productive asset. Through Portfolio Manager, energy savings could be measured and verified not only through calculating savings, but through improvement in the ENERGY STAR score to a 55. The Asset Score of 8.5 shows how the building’s assets contribute to the efficiency of the building, and offers suggestions for improvement, letting the current owner or a prospective buyer know which projects could further the building’s efficiency. Lastly, the Building Performance Database shows how the 122 North Elm Street compares in the local market. Used together, these tools provide valuable information to help understand how the building operates, how the building’s physical assets impact efficiency, and how it compares to peer buildings nationally and locally, all of which factor into the value of the building.