Simple Payback and Return on Investment: How Energy-Efficiency Measures Can Bring Green Results

While most organizations are conscious of their energy consumption and strive to be greener, a major catalyst for implementing energy efficiencies is saving money. If substantial improvements or upgrades are needed, companies will want to see returns on their investments. Simple payback is often the easiest barometer to use when seeking a ballpark assessment of energy-efficiency improvements.

Simple payback is a more precise calculation than return on investment. Instead of just measuring the cost savings, simple payback takes the initial cost and divides it by the cost savings each year to calculate the amount of time needed to recoup investment costs through energy savings.

NYSERDA has partnered with many companies to assist them in implementing their energy-efficiency improvements, and NYSERDA's financial incentives have helped improve their simple paybacks.

How to make the numbers work

NYSERDA recently teamed up with Uniland Development, one of the premier developers in western New York, for the new **Avant Building.** This project, with a final cost of roughly $85 million, was a major investment in Buffalo, as Uniland rehabbed the former Federal Reserve building from eyesore to hotel, office and high-end condos.

An incentive from NYSERDA of $415,000 helped the Avant Building implement high-efficiency HVAC equipment, variable-speed drives, increased insulation, high-performance glazing, reduced lighting power density and heat recovery.

AVANT BUILDING	
Efficiency Improvement	30% above NYS Energy Conservation Construction Code
Annual Energy Savings	2.2 million kWh
Annual Cost Savings	$269,798
Payback Time	3.7 years
NYSERDA Incentives	$415,000

These efficiency measures resulted in a building that is expected to be 30 percent more efficient than required by the NYS Energy Conservation Construction Code. Also, with annual energy savings of 2.2 million kWh and 274.5 kW and cost savings of $269,798, the incremental cost of all of the energy efficiencies has a simple payback of only 3.7 years. On top of that, the building will reduce CO_2 emissions by 1,400 tons of each year.

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The **Crosby Street Hotel** in New York City is another project that benefitted greatly from NYSERDA's expertise and incentives and is expected to see a relatively short simple payback. Because of an energy analysis, green building analysis and commissioning from NYSERDA, the project has an anticipated annual energy savings of $56,965 and is 18 percent more efficient than ASHRAE Standard 90.1-2004.

CROSBY STREET HOTEL	
Efficiency Improvement	18% above ASHRAE Standard 90.1-2004
Annual Energy Savings	117,391 kWh
Annual Cost Savings	$56,965
Payback Time	3.9 years
NYSERDA Incentives	$119,251

Incentives from NYSERDA for implementation, which totaled $119,251, helped to cover high-performance glazing, occupancy sensors, demand-controlled ventilation, heat recovery, domestic hot water heater, high-performance chiller, premium-efficiency motors, electronically commutated motors and variable-speed drives. These energy-efficiency measures are expected to produce an annual kWh savings of 117,391 kWh, peak demand reduction of

Overview of energy-efficiency options

Retrocommissioning and continuous-commissioning projects

Retrocommissioning is a systematic process that helps determine how well building systems perform interactively to meet the operational needs of owners and occupants. Continuous commissioning installs monitoring programs and processes within a building's systems, providing constant feedback.

Benchmarking

Benchmarking is an initial evaluation that compares energy usage to a standard. Facilities can partner with an organization that provides a factual evaluation of their utility bills, analyzes their energy usage and consumption, and creates a customized, factual report that will help them make informed decisions about reducing energy costs.

Design elements

With new construction and substantial renovations, architectural design can play a major role in making a building energy efficient. In addition, some design elements only have up-front costs or require little or no costs to maintain. These elements include the placement of windows, use of specific building materials, and heat or water recovery systems.

New equipment

One of the most common ways to become more energy efficient is by replacing outdated equipment with new, efficient equipment. This can be as simple as installing energy-efficient light bulbs, or installing new appliances. Larger, commercial buildings can make all of these improvements, but often undertake larger-scale measures, like overhauling outdated HVAC or chilling systems or even installing solar panels.

Internal policy alignment

Energy efficiencies can also be found through changes in policies. Many of these have no costs associated with implementation. Simply adjusting thermostats during non-peak times, shutting down computers at night and turning off lights in offices and rooms not in use can go a long way toward providing energy and cost savings with no upfront investment.

100 kW, and annual CO_2 reductions of 176 tons. The simple payback after incentives for the incremental cost is just 3.9 years

Irving Tissue is one of North America's leading tissue, paper towel and napkin products providers. Irving Tissue has recently undergone a major plant expansion at its Fort Edward, NY, facility. The expansion includes the construction of three new buildings, new pulp processing equipment, a new paper machine, production support equipment and a new boiler house.

In addition to the energy savings from the projects above, this construction installed premium-efficiency motors, variable-speed drives and other process-specific improvements. In total, this project is saving 14,800,000 kWh over a standard paper-producing facility, thanks to a total of $150,625 from NYSERDA for all efficiency measures.

IRVING TISSUE—COMPRESSED AIR SYSTEM	
Efficiency Improvement	New compressed air system
Annual Energy Savings	551,004 kWh
Annual Cost Savings	$55,100
Payback Time	3.03 years

Irving Tissue also addressed the lighting fixtures in one of its existing facilities. After teaming up with a local electrical supply company, Irving Tissue found a solution that would improve the lighting and save energy, all for a reasonable initial investment.

The new fixtures have a much higher efficiency and therefore can deliver more light with fewer lumens and lower wattage, and have the ability to get the light down to the warehouse floor, where it is needed. These factors result in significant energy savings. The total wattage of the system is only about 0.22 watts per square foot. Compared to a typical warehouse area at 3.0 watts per square foot, Irving Tissue will save more than $17,000 per year in lighting energy costs. At the low cost of about $0.20 per square foot for materials and excluding labor costs, Irving Tissue will see a quick return on their investment.

Lighting was not the only area where improvements were made. With an initial cost of $166,997, Irving Tissue installed a new compressed air system. The new system saved 62.9 kW and 551,004 kWh in annual operating costs, equaling $55,100 per year. This means that the entire cost would be recouped in a little over three years. In addition, Irving Tissue would reap the same savings year after year.

Fordham University is another example of implemented energy efficiencies that produced significant cost savings. The new Rose Hill Dormitories at Fordham University consist of two buildings, each approximately 83,500 square feet with multiple stories. The buildings were designed to optimize energy usage and achieve LEED energy performance credits. Computerized energy models were created to examine the interactions between various energy-efficiency measures for the buildings.

FORDHAM UNIVERSITY	
Efficiency Improvement	30% above energy code requirements
Annual Energy Savings	847,853 kWh
Annual Cost Savings	$173,712
Payback Time	10.7 years
NYSERDA Incentives	$419,919

Energy-efficiency measures included improved building envelope, high-efficiency condensing boilers, high-efficiency lighting, gas-driven chiller plant, heat recovery, occupancy sensors and programmable lighting controls.

Based on the Whole Building Analysis, the energy savings are predicted to be nearly 30 percent above energy code requirements, amounting to an annual reduction of 847,853 kWh and 530 summer peak kW. The simple payback is 10.7 years on the energy-efficiency measures for this project after the incentives.

Conclusion

All of the projects listed involved NYSERDA and its team. NYSERDA helps companies from the initial phase through final completion, and provides guidance and expertise along the way to maximize energy savings, return on investment and simple payback. NYSERDA is an eager and willing partner for any prospective energy saver. NYSERDA can work within any budget, big or small, to produce innovative energy-efficient solutions.

To learn more about NYSERDA's team and how their expertise can help a commercial facility save green in more ways than one, visit www.nyserda.ny.gov.