Investing in Energy Efficiency is Making More Sense ; Payback Rises Along With Energy Costs

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By David Robinson

Peter R. Smith, New York's top advocate for energy efficiency, knows firsthand how saving energy at home can pay off

Smith, the president of the New York State Energy Research and Development Authority, recently had an energy efficiency spend six hours at his Capital District home to look for ways to reduce energy use.

After wrapping up the recommended improvements in January, Smith said the initial payoff came in the mail during Februar monthly heating bill dropped by $125

With energy prices soaring over the last year, Smith said Wednesday that energy efficiency is suddenly a hot topic among r and businesses And with prices so high, the payback from investing in improved energy efficiency has never been better

"People are coming around, with high energy prices," Smith said during an interview while he was in town to highlight energ improvements at the Erie County Holding Center in Buffalo and the Alden Correctional Facility that will cut the county's ener $146,500 a year.

"They're saying 'Before, I wouldn't think about this, but my energy bills are killing me,' " he said.

NYSERDA, which is funded by a charge on utility bills that averages about $10 a year for upstate residential customers, ha million a year to spend on energy efficiency projects. The authority typically combines each $1 in incentives with another $2 private investments and has cut energy bills statewide by $198 million a year since the state's Energy Smart program bega That increased efficiency has reduced the demand for electricity in New York by more than 1,000 megawatts, or about 3 pe state's peak power demand.

"What we look for in technology and innovation and people willing to partner with us," Smith said. "It's an investment in your an investment in more jobs It's an investment in energy security "

For businesses, energy efficiency projects typically need to pay for themselves in two to three years, "Our incentives help b payback down," said Smith, who also attended a pair of forums in Amherst touting the agency's programs.

While installing more efficient lighting often is a simple improvement that can pay for itself in less than a year, Smith said N focus is on more costly upgrades involving systems that otherwise might not need replacing. That often includes installing h efficiency motors, improved air conditioning and heating systems and variable speed drives.

With the Erie County project, NYSERDA provided $158,036 in incentives for a $1.3 million upgrade that installed high- effici

lighting, advanced motors and variable speed drives, along with the replacement of water-cooled air conditioning units, saic Sigurdson, who runs the authority's Buffalo office.

The authority also has worked with businesses ranging from Quebecor's Depew printing plant to the Mansion on Delaware along with Erie County Medical Center. In all, NYSERDA has provided more than $42.1 million in incentives for energy effic projects in Erie County over the last five years.

For residents, consumers meeting low-income threshholds can qualify for grants, while low-interest loans also are available

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The Energy Efficiency Technology Resource

Compared to the year 1970, changes in technology and market structure accelerated the rate of decline in the nation's energy intensity. In 1970 our economy used about 18,000 British thermal units (Btus) of total energy for every dollar of value-added produced in the United States Today we use less than 9,000 Btus. Broadly speaking, energy efficiency technologies now provide 75 percent of all U.S. demands for energy services compared to the 1970 pattern of energy use (Laitner 2006) Despite the significant contributions from these past energy efficiency gains, however, there is a tendency in economic models and conventional policy analyses to assume that any new energy efficiency investments will make only a limited contribution to our nation's energy future And even when such improvements are thought actually to be possible, the standard logic suggests that any further energy efficiency gains are not likely to be "cost-effective."

The operative assumption of this particular mindset is that we've pushed the efficiency frontier as far and as fast as it can reasonably go The good news, however, is that the evidence points to a very real prospect for new and substantially greater gains in energy efficiency—especially when one explores the role of government and industry as both innovator and champion of new and more productive energy technologies. The evidence suggests, moreover, that energy efficiency improvements do not have to be about ratcheting down the economy. Instead, they can be all about providing new services, making new products, and providing new ways to both work and play Some analysts believe, in fact, that increased energy efficiency may be critical to a long-term sustainable development path

Despite the impressive efficiency gains following the oil crises in the 1970s and early 1980s, energy efficiency resources still remain an impressive investment opportunity (McKinsey 2007, Eldridge et al. 2007, Lovins 2006, Elliott et al 2006, Shipley and Elliott 2006, Laitner 2006, and Laitner 2004)

A preliminary assessment by the American Council for an Energy-Efficient Economy (ACEEE) shows that Americans now invest about $200 billion in energy-efficient technologies each year This compares to about $100 billion annually for on-going conventional energy infrastructure and $2 trillion in total investment for all purposes While definitive estimates are premature, we scaled up our current research findings to project the impacts of accelerated market transformation through rapidly increased efficiency investment. In simple terms our findings about current investment levels assume a typical payback of about two years. In other words, in the absence of strong policy or other social incentive or motivation, businesses and consumers are unlikely to adopt a new technology unless it has roughly a 50 percent return on investment (i.e., the inverse of a two-year payback).

Assuming that policies, market forces, and new financing mechanisms facilitate substantial movement "up the cost curve" so that consumers and businesses are willing to accept longer-payback periods, we can posit a future in which businesses and consumers invest based on an average five-year payback. In that scenario, *annual investment in energy efficient technology would become a $400 billion market.* If the United States were to follow that course—and other ACEEE studies show this can be a cost-effective policy path—U S energy consumption in 2030 would not exceed the current forecast for 2013 And we can do better than that over the long haul

There are a large number of existing technologies that can be tapped to improve overall energy productivity For instance, there are near-term and highly cost-effective upgrades that might improve the new car fuel economy from 27 5 miles per gallon today to 40 miles or more per gallon by 2030. When spread throughout the full fleet of existing light duty vehicles, this single measure might reduce total transportation fuels by 20 percent

or more by 2030. These efficiency gains mean comparable reductions in air and water pollutants as well as greenhouse gas emissions—all at a net savings to consumers, businesses, and the economy.

Additionally, there are productivity gains to be made in our nation's buildings and industries. Recent estimates by the Oak Ridge National Laboratory (ORNL) and the U S Environmental Protection Agency's (EPA) Energy Star program, for example, suggest that energy and greenhouse gas emissions can be reduced by 30 percent or more with existing technologies. The savings can be provided in a way that, on net, saves even more money. Yet another study by the Lawrence Berkeley National Laboratory (LBNL) indicates that converting the energy is now wasted in our nation's industries and electric utilities might become still another source of supplemental heat and power for use elsewhere in the regional economy. In effect, the energy we now waste in the mining, refining and processing of fossil fuels, as well as in the generation of electricity, could become a source of both supplemental heat and electricity for use in our nation's industries and buildings. LBNL suggests an economic potential to provide as much as 20 percent of our nation's current electricity requirements using "waste-to-energy" technologies.

While our preliminary assessment indicates the efficiency market is already large, the more important question is how large the market can ultimately be, and how rapidly it can be developed. A new study organized by the United Nations Foundation, pulling on the expertise of some two dozen international energy experts, called energy efficiency both the largest and least expensive energy resource. The study suggested that the G-8 and other nations could double historical rates of efficiency improvement through at least 2030. The new report by McKinsey Global Insight (2007) indicated that North America could meet all future growth in energy service demands through cost-effective efficiency investments. This means that the economy would grow at current forecast rates, but that energy demand growth would flatten out.

The most hopeful observation we take from this and other research is that, because it has been invisible to many investors, efficiency may well be the sleeping giant of the clean technology spectrum. If we can craft the new financing approaches and policies needed to tap efficiency opportunities at a faster pace, we can create vibrant new markets as we make measurable progress on our energy and environmental challenges. We can also make efficiency one of the most effective resources in managing energy-related risks, as its diverse and dispersed nature cut across all areas of the economy. The core question that remains to be answered is: How do we further develop energy efficiency related investment mechanisms to capitalize on the full investment potential of the energy efficiency market? Participants in the E^3 Network are invited to join with us in seeking answers.

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INDUSTRIAL Market Trends®

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Getting Serious about Energy Efficiency

By Fred White

Accepting the current and long-term trend of oil, natural gas and coal prices, increasingly more energy-hungry businesses plan to invest in energy efficiency measures to help fight rising costs and optimize power.

Increasingly more executives are citing a desire to decrease energy expenditures within their organizations. North American executives recently surveyed by Johnson Controls, Inc. indicated they expect energy prices to continue to rise, and as such plan to invest in energy efficiency measures to help fight rising costs.

The Johnson Controls Energy Efficiency Indicator research, released in May, identified individuals from a wide range of facilities and locations who were decision-makers for energy management issues within organizations and asked how they were responding to rising energy costs (defined as electricity and natural gas costs).

More than half of respondents said cost-savings are either entirely or somewhat the driver for their decision to invest in energy efficiency measures. (About 35 percent said cost-saving and environmental factors are equal motivators.)

How serious are these buyers in using energy efficiency to help minimize cost? About half the decision-making respondents said they plan to tap both capital and operating budgets for energy efficiency improvements.

Almost 57 percent expect to make energy efficiency improvements using their capital budgets in the next 12 months, spending an average 8 percent of those budgets, while 64 percent anticipate using their operating budgets, allocating 6 percent to energy efficiency improvements, according to the survey results.

Despite the pain of rising energy costs, generally executives are limiting their investments to more conservative energy management solutions, choosing to go with basic measures:

- Seventy (70) percent educated their staff and other facility users on how to be more efficient;
- Sixty-seven (67) percent switched to energy-efficient lighting;
- Sixty (60) percent adjusted HVAC controls;
- Forty-six (46) percent installed lighting sensors; and
- Twenty-eight (28) percent installed energy-saving glass in windows.

Nothing wrong with "basic measures," though. Indeed, by implementing modest energy-saving projects, a business or manufacturing facility can reduce its energy consumption dramatically — and save millions of dollars.

According to the U.S. Department of Energy (DOE), a typical industrial facility can realize savings of up to 25 percent in process heating systems, up to 20 percent in steam systems and as much as 18 percent in motor systems — added up, savings that can reduce a company's natural gas and electric bills and, therefore, directly affect profits.

In the United States alone, commercial buildings consume about 40 percent of natural gas and 60 percent of the country's generated electricity. It comes as little surprise, then, that three-quarters of surveyed executives who have companies that are building or are planning to build new facilities, or are launching retrofits in the next year, consider energy efficiency as a priority in the design of those projects.

As far as anticipated payback periods, about 64 percent of companies have a maximum payback period of between two and five years. "Overall, only 18 percent of those surveyed say their companies would allow a longer payback period today than five years ago," according to the Johnson Controls survey results.

Johnson Controls' responses regarding payback are more optimistic than McKinsey & Company's findings.

The New York Times reported in May:

At a recent conference on energy efficiency and investment strategy, Pedro Haas, an energy expert with the company, said his consulting firm asked people worldwide what payback time they would find acceptable before investing money to save energy. One fourth of them said they would never spend any money to improve energy efficiency; 50 percent said they wanted to earn back the investment in two years or less.

"That means about 75 percent of the public will require economics that are just not there," NYT quoted Haas as having said.

Manufacturers are well aware of the affect of energy conservation on profitability. To quote (again) *Plant Services* Editor-in-Chief Paul Studebaker:

The rapid rise of energy costs over the past few years ... support the widespread conclusion that we're entering an era in which energy productivity (energy cost per unit of production delivered to the customer) will loom ever larger as a factor in the bottom line and global competition.

(Studebaker recently cited three major energy villains in the plant: electrical, boiler and compressor/pump/fan systems. Read here for ways you can "be the hero at your plant and rid your world" of these energy wasters.)

"The energy used by the American industrial sector surpasses the energy consumed by the entire Japanese economy," according to DOE Secretary Samuel Bodman, "meaning the potential for energy savings in this sector alone is tremendous."

Resources

New Research Shows Businesses Investing in Energy Efficiency Measures to Combat Rising Energy Costs
Johnson Controls, Inc., May 17, 2007

Saving Energy Saves Money
U.S. Dept. of Energy

Efficiency, Not Just Alternatives Is Promoted as an Energy Saver
by Matthew L. Wald
The New York Times, May 29, 2007

The three major energy villains keeping your plant from realizing savings
by Paul Studebaker
Plant Services, May 2007

Energy Department to Work with National Association of Manufacturers to Increase Energy Efficiency
U.S. Dept. of Energy, June 12, 2007

Remarks for Energy Secretary Samuel Bodman; Johnson Controls Energy Forum
Energy.gov, June 13, 2007

Utah Public School Energy Efficiency Fund
Zero-Interest Loan Program

State Energy Program
Utah Geological Survey

The Utah Geological Survey's State Energy Program is pleased to offer to Utah public school districts this no-interest loan program to help finance energy efficiency improvements in public school buildings. Because the program ties loan payback periods to each district's projected energy savings, there is no net cost to the district while loans are being repaid. Once the loan is repaid, the district then keeps all of the cost savings from the project. Loans may be between $5,000 and $250,000. Through this program we hope to assist public schools with upgrading their facilities, saving energy, saving on operating costs, and improving the environment in both their local communities and the state of Utah as a whole.

Background

During its 2007 General Session, the Utah Legislature in House Bill 351 established the Energy Efficiency Fund. The purpose of the fund is to provide loans to public school districts for the financing of energy efficiency projects in district buildings. The legislature provided an appropriation of $5 million to capitalize the new fund. Under the provisions of House Bill 351, the Board of the Utah Geological Survey (UGS) administers the Energy Efficiency Fund, which is managed on the Board's behalf by the UGS' State Energy Program (SEP). Under the authority of House Bill 351 and Utah Code 53A-20C-102, UGS issued rules to establish eligibility and application procedures for distributing loans from the Fund (Utah Administrative Code R638-3). These rules took effect on August 31, 2007, allowing for the initiation of this zero-interest loan program.

Who is Eligible for a Loan?

Only public school districts within the state of Utah are eligible for a loan from the Fund. This does not include private schools, parochial, or charter schools.

What Kinds of Facilities are Eligible?

Loans may be awarded for energy efficiency projects that take place only in a district-owned building. This includes not only schools but other buildings such as maintenance facilities, administrative offices, libraries, gyms, and other district-owned buildings. Projects that take place at district-owned facilities that are not buildings (e.g., athletic fields and stadiums, parking lots, etc.) are not eligible for assistance from the Fund.

What Kinds of Projects are Eligible?

Upgrades to existing buildings and efficiency measures in new buildings are both eligible for assistance:

For energy efficiency projects involving renovation, upgrade, or improvement of existing buildings, the following project measures are eligible for financing from the Fund:

- Building shell improvements
- Increase or improvement in building insulation

- Window and door upgrades
- Lighting upgrades
- Lighting delamping
- Heating, ventilation, and air conditioning (HVAC) replacements or upgrades
- Improvements to energy control systems
- Other energy efficiency projects that a district can demonstrate will result in a significant reduction in the consumption of energy within a building

Energy efficiency measures installed during new building construction are eligible when the following conditions are met:

- The building measure or system for which a loan is sought must surpass the minimum prescriptive requirements of the Utah Energy Code; and
- The completed building must exceed the minimum energy performance standards of the Utah Energy Code for its building type by at least 10%.

In such projects, however, only the additional cost associated with a "beyond code" measure is eligible for financing from the Fund.

Loans are not provided for any projects that have an energy cost payback period of less than two years or more than twelve years. (Energy cost payback period is the time is takes for the total energy cost savings realized by an energy efficiency project to equal the original costs of the project)

What Project Costs are Eligible?

The following direct costs of an energy efficiency project are eligible for financing:

- Building materials
- Mechanical systems and components including HVAC and hot water
- Electrical systems and components including lighting and energy management systems
- Labor necessary for the construction or installation of the energy efficiency project
- Design and planning of the energy efficiency project
- Energy audits that identify measures that are included in the project
- Inspections or certifications necessary for implementing the project.

The following costs are not eligible for financing from the Fund:

- The costs of a construction or renovation project that are not directly related to energy efficiency measures
- Costs incurred for the acquisition of financing for the project
- Costs for equipment or systems that reduce energy costs without also resulting in reductions in the use of energy.

For projects in which the school district receives a financial incentive or rebate from a utility or other third party, such incentives or rebates will be deducted from the costs that are eligible for financing from the Fund No loans made from the Fund may exceed the final cost incurred by the district for the project after third party financing

For an energy efficiency project undertaken as part of a new building construction, only the incremental cost of the project is eligible (Incremental cost means the portion of the overall cost of

a measure or system that exceeds the cost that would have been incurred by meeting the minimum prescriptive requirements of the Utah Energy Code.) For an energy efficiency project undertaken as part of the renovation of an existing building, building components or systems that are covered by the prescriptive requirements of the Utah Energy Code must exceed the minimum Utah Energy Code requirements in order for their costs to be eligible for a loan from the Fund.

Loan Amounts
The maximum loan amount for any single project under this program is $250,000 and the minimum loan is $5,000. A district may apply for and receive multiple loans, however, no district can be awarded a loan that would cause its total indebtedness to the Fund to exceed $500,000 at the time of the award. Loan amounts may cover all or some of the eligible projects costs, however, the value of any third-party incentives (e g , utility rebates) will be deducted from any loan awards. (The sum of the loan plus third-party incentives cannot exceed the actual incurred costs to the district)

Loan Payback Period and Amounts
As part of the application process, SEP will determine the likely energy cost payback period for a project. If approved for a loan, the district's loan payback period will then be set to be the same as the energy cost payback period. Quarterly loan repayments will also be set to be equal to the energy cost savings expected to be realized by the district for each quarter. In this way, the net cost of loan repayment to the district is zero. After a loan is repaid, the district then keeps all of the energy cost savings from the project. For the most cost-effective projects, loan repayments – and district savings – will occur within only a few years. (Note: In cases where there is a third-party incentive provided, quarterly payments will remain equal to quarterly cost savings, thus reducing the loan repayment period)

Other Loan Terms
There is no interest for loans funded under this program. However, a small administrative charge of $125 per loan per year is charged. All projects funded under this program must be completed within one year of approval of the loan; a six month extension may be requested. Loan funds are disbursed upon completion of the energy efficiency project and upon receipt by SEP of materials (e.g., paid invoices) documenting the incursion of final project costs, value of any third-party incentives, and completion of the project. After a loan has been awarded and before the project has been completed, districts will be required to submit quarterly progress reports to SEP. Once a project has been completed and loan funds have been disbursed, the district is required to provide annual reports on project success or problems and information on energy savings and consumption in the building. SEP also reserves the right to visit the site of the project both prior to and after completion to verify project progress and outcomes.

Other Incentive Programs
Though loan amounts from the program are reduced by the amount of third-party incentives, districts are urged to investigate whether other incentives can be used to increase the economic viability of projects. For example, utility cash rebates can significantly reduce loan payback periods, thus allowing for quicker realization of cost savings. Utility incentives may also allow a district to fully finance a project that would otherwise exceed the $250,000 cap on loans from the Fund.

Rocky Mountain Power's FinAnswer programs apply to commercial buildings within its service territory FinAnswer provides both project financing and free energy audits that can be used to assess project options Information and contacts may be found at http://www.rockymtnpower.net/Navigation/Navigation921.html.
Questar Gas is making plans to offer a program similar to FinAnswer for its customers (subject to regulatory approval) beginning in early 2008 Information on Questar programs may be found at http://www.thermwise.com/businesses.html.
Some municipal and rural electric providers (providers other than Rocky Mountain Power) may provide incentives for efficiency upgrades. Districts with facilities located in these service territories should contact their local utilities to determine if incentives are available to them

How Do Districts Apply for a Loan?
Prospective applicants must contact SEP at (801) 537-3300 to begin the application process SEP will provide application materials at that time and will also assist districts in preparing applications and in evaluating project options. Beginning in November 2007, SEP will provide technical assistance to districts for developing projects for potential loan funding and to assist in analyzing the energy needs and use of existing district buildings.

Loan Award Process
Applications will be received by SEP three times per year. Applications are initially reviewed by SEP for completeness before being referred to a review committee. This committee meets to evaluate loan applications and make recommendations to the UGS Board. Evaluation of applications is based upon the following criteria and scoring:

1. Feasibility and practicality of the project (maximum 30 points)
2. Projected energy cost payback period of the project (maximum 20 points)
3. Energy cost savings attributable to the project (maximum 10 points)
4. Energy savings attributable to the project (maximum 20 points)
5. Financial need of the district (maximum 10 points)
6. Environmental and other benefits (maximum 10 points)

Applicants are urged to submit carefully planned and fully developed project applications – There is no advantage gained by submitting an incomplete application quickly in order to meet the nearest deadline. The UGS Board meets three times per year to consider applications for loans from the fund.
Deadlines for 2007 and 2008 are as follows:

Application Deadline	Likely UGS Board Meeting
December 7, 2007	January 11, 2008
February 29, 2008	Mid-April, 2008
July 3, 2008	Mid-August, 2008
November 21, 2008	Mid-January, 2009

Additional detailed information on the working of the Zero-Interest Loan Program may be found by referring to the formal Rules for the Energy Efficiency Fund. These rules may be found at http://www.rules.utah.gov/publicat/code/r638/r638-003.htm