

DRIVING ENERGY REDUCTION IN A LARGE MULTIFAMILY BUILDING PORTFOLIO

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ABSTRACT

This paper describes the process of significantly reducing the energy consumption within a large portfolio of high-rise residential condos and coops in New York City. A first of its kind initiative for residential real estate properties, FS Energy and its parent company, FirstService Corporation, are accomplishing groundbreaking results as they take a multifaceted approach entailing education, benchmarking, analysis, technical expertise, innovative financing solutions and project execution capacity. This paper will also outline initial results of FS Energy's solution with select case studies.

Based in New York City and founded in 2009, FS Energy, the energy management and advisory subsidiary of FirstService Corporation, is mandated to create customized energy management strategies for FirstService's portfolio of residential properties in New York City. FS Energy began this process by becoming the first energy management company to gather energy usage data from a large multifamily property portfolio of over 450 residential buildings and using this data to determine customized cost and consumption reduction initiatives. The established leader in New York City, FS Energy is well on its way to achieving its goal of reducing energy consumption and costs by 25% across FirstService's New York City portfolio by 2013.

FirstService Corporation is a global diversified leader in the rapidly growing real estate services sector, providing services in commercial real estate, residential property management and property services. Affiliated industry-leading service platforms include Colliers International, the third largest global player in commercial real estate services; FirstService Residential Management, the largest manager of residential communities in North

America; and TFC, North America's largest provider of property services through franchise and contractor networks. FirstService generates more than US\$2 billion in annualized revenues and over 20,000 employees worldwide.

Given the size and energy footprint of FirstService's portfolio of properties worldwide, FS Energy's approach and success in New York City are of global significance and pave the way to change the standards for energy management in large multifamily buildings.

BACKGROUND

Buildings are the largest source of greenhouse gas emissions in the world. According to the American Institute of Architects, in the United States, buildings and their construction account for nearly half of all greenhouse gas emissions and energy consumption. [1] Throughout the US, there are various benchmarking efforts and regulations to track these emission and consumption figures in commercial real estate properties. In residential properties, however, especially with regards to large multifamily housing such as co-ops and condos, the ability to benchmark has been much more difficult and thus not explored in as great of detail. Like commercial properties, residential buildings have much to gain both financially and environmentally by incorporating new energy efficient practices. Moreover, municipal governments across the US are beginning to implement regulations that call for residential buildings to pursue energy efficiency initiatives through annual benchmarking and the phasing out of harmful soot-producing heating oils. Some of the most significant examples of this are the PlaNYC initiative in New York City and the San Francisco Sustainability Plan and Climate Action Plan. These programs focus on both residential and commercial properties in order to reduce

the cities' energy consumption and environmental impact. In coordination with these programs, private energy advisories and property management firms are beginning to get involved in promoting energy efficiency initiatives. FirstService Residential, the residential branch of one of the largest property managers in the world, has begun promoting such initiatives in their properties. With 500 million sq. ft. of real estate housing 3 million residents across the country, FirstService Residential recognized the ability to impart a substantial change on the energy efficiency initiatives around the country. To accomplish this FirstService Residential formed FS Energy, as it's energy management subsidiary to be at the forefront of this initiative.

LAUNCH OF FS ENERGY

FS Energy was launched in 2009 by FirstService Corporation to create customized energy management strategies for their portfolio of residential properties in New York City. Conceptualized and launched prior to city mandates such as PlaNYC, "C" level executives at FirstService anticipated the need to take a leadership role and set a higher bar for how residential buildings consume energy and impact the environment. FirstService Residential's New York City residential portfolio includes over 450 managed multifamily high-rises consuming 5.9 billion BTU annually. With energy costs of \$135 million and emissions of 284,000 metric tons of CO₂, FirstService executives saw a unique opportunity to significantly reduce greenhouse gas emissions across the city and initiate change with potential to affect the rest of the country. With the success of FS Energy in New York, FirstService can implement initiatives to cut energy usage across the entire FirstService Residential US and Canadian portfolio. The creation of FS Energy provided existing clients with a strong value add and attractive service set for potential clients of FirstService Residential.

FS Energy's stated mission is to reduce their New York clients' energy costs and consumption by 25% by the year 2013. Reaching this goal translates to savings of \$33 million across the New York portfolio, or \$471 per unit (or apartment), and a reduction in energy usage by 250 million BTU. Furthermore, the reduction of 71,000 metric tons of greenhouse gas emissions in New York City is of vast environmental importance.

FS ENERGY MARKET STRATEGY AND ORGANIZATIONAL STRUCTURE

FS Energy's strategy was to create an Energy Master Plan (EMP) for to most effectively address these issues across our managed portfolio, driving reductions in energy costs and carbon emissions by developing policies, programs &

in-house service offerings. The Energy Master Plan included the institution of benchmarking procedures, the creation of FS Energy's proprietary information database, FSdata, use of data to identify opportunities for buildings to reduce costs and improve efficiency, communication of recommendations to co-op and condo boards, implementation of solutions with financing support and finally, measuring results upon project completion.

PROBLEMS AND SOLUTIONS

The challenge undertaken by FS Energy was to work with large multifamily Condo and Co-op buildings within the New York City portfolio of FirstService Corporation to assess and determine the correct approach to maximize energy efficiency, help realize possible savings through retrofits and renovations and, where appropriate, help prepare buildings to implement mandated changes.

As FS Energy began this process, they encountered various obstacles such as the lack of education, baseline assessment data, and the lack of attractive financing options to enable project execution.

Co-ops and Condos

In addition to many of the more common challenges facing energy efficiency efforts, the energy team needs to deal with not one internal corporate management as in large centralized companies, nor even just an owner or manager at each facility like at the majority of property management concerns, but rather deal with and convince a Co-op or Condominium Board at each and every facility. These boards are made up of anywhere from 5 to 15 individuals, putting in time on a volunteer basis, few if any of whom have professional experience in real estate or technical facility related issues. They generally meet once per month and need to deal with a myriad of issues. Hence getting energy on their radar screens is difficult, and getting them to commit their focus and limited resources on making energy related changes is no small challenge. One of FS Energy's greatest obstacles is getting the Board's attention, and then having to do that for each and every client building, as each of these are separate and independent entities, each of which believes they are somewhat unique.

Lack of Education

While there are various benchmarking efforts for the category of commercial buildings such as the Department of Energy's Commercial Building Energy Consumption Survey (CBECS), there are no current [2] comprehensive databases of residential buildings' energy usage. This lack of empirical data regarding what can be accomplished through energy efficient renovations makes it difficult for buildings to understand potential savings. Co-op and condo boards often express disbelief that a capital investment in energy management will develop into real

savings for the property. Doubtful that the “green fad” will help building finances, and wary of vendors who recommend retrofits for commissions, boards need additional evidence and education as to the financial benefits of running an energy efficient property.

To address this issue, FS Energy developed FSdata, a proprietary database that compiles and compares energy usage data for the 450 large multifamily buildings under their management. This database not only allows buildings to gauge their energy efficiency in relation to others, but also enables FS Energy to target high usage sites, make quick energy assessments and recommend appropriate energy management strategies based on renovations undertaken by comparable properties. FS Energy also leverages the FSdata database to issue annual report cards with Building Energy Rating Guide (BERG) scores so building boards and superintendents are aware of how their property compares to others in the portfolio.

The energy team staff working with our property managers and operators initially collected the detailed building system characteristics or typology information. This has subsequently developed into a customized on-line typology form that is filled out by the property manager or building engineer then automatically populates our analysis tool set.

The Building Energy Rating Guide (BERG) score was developed to compare and benchmark an individual property within our portfolio against similar properties. The analysis to develop this score took into account differing facility characteristics such as age, size amenities, HVAC systems and fuel sources. The BERG score uses a scale of 0 to 10, with 0 being a real energy hog with significant potential for energy savings and 10 being the most efficient building in its class.

The BERG score is presented in the context of an Energy Report Card (Figures 1A and 1B) is issued to each building evaluated by FS Energy. It provides buildings with a comprehensive look into their energy use and cost per square foot, yearly energy use, fuel cost breakdowns, historic energy consumption and carbon footprint in terms of annual emissions. Energy Report Cards tangibly show co-op and condo boards exactly how they compare to similar buildings and proved to significantly help open dialogue between the building and FS Energy staff to improve efficiency and lower monthly operating expenses.

In addition, FS Energy frequently updates its website with press releases and case studies that highlight the achievements of its team in creating savings for buildings through various energy management strategies including

retrofits, procurements, energy bill audits and subsidized upgrades.

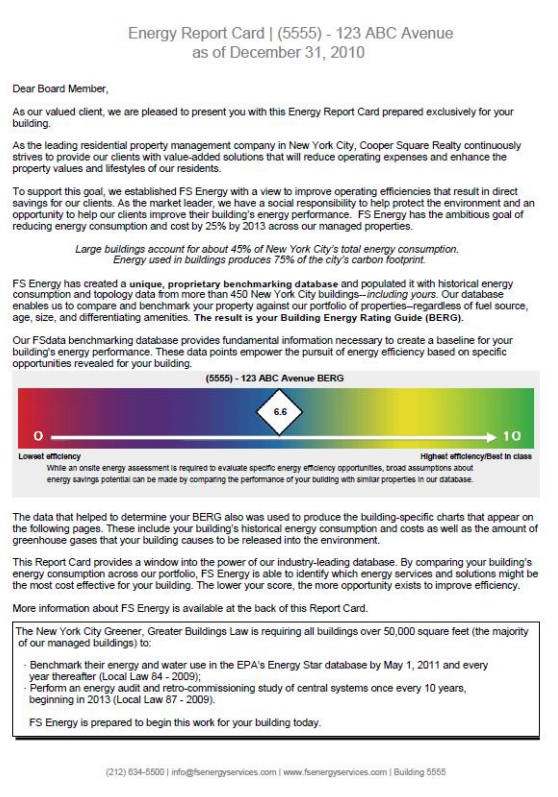
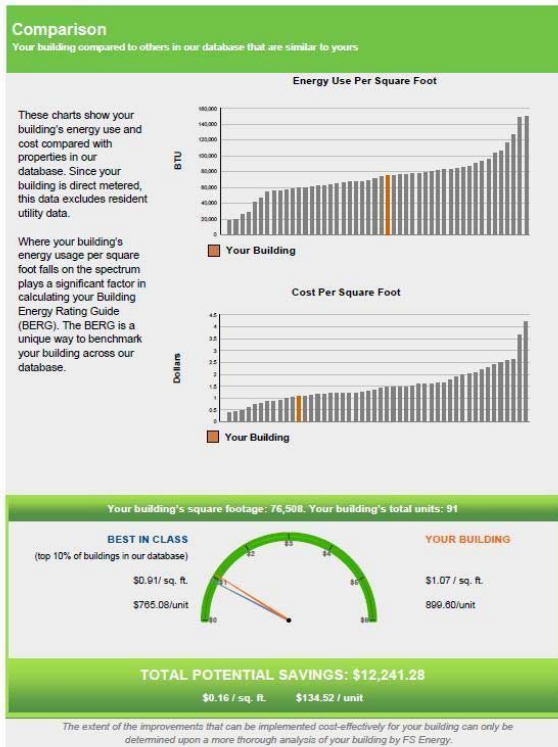


FIGURE 1A – Sample excerpt of Energy Report Card with BERG Score



FSE Energy Report Card | (5555) - 123 ABC Avenue | Report as of December 31, 2010 | Building 5555

FIGURE 1B (Above) – Energy Report Card page detailing site's energy intensity within similar buildings of the portfolio and Total Potential Savings

Baseline Assessment Data

The development of our energy accounting procedures enabled us to create portfolio wide and site specific baselines for energy utilization. The database tracks buildings' energy usage pre and post renovation and holds valuable lessons on the best way to formulate new plans for comparable buildings, greatly streamlining the assessment process for strategies that can be the most successful over time. It also allows us to monitor a building specific and portfolio level pre and post energy savings initiatives.

Since this type of data did not exist on a large scale for residential multifamily properties, FS Energy was required to start the process of recording and grading the historic energy consumption for its managed buildings. Beginning with the formation of FSdata, FS Energy has reviewed the portfolio's energy consumption and carbon emissions. FSdata also enables the issuance of aforementioned BERG scores that, in addition to educating boards and residents, can drive competition among buildings that seek to not only become more

energy efficient but also reduce operating expenses and increase property value in the process.

Lack of Attractive Financing Options

Energy renovations can be capital intensive, especially when replacing entire boiler or chiller systems. Buildings are often unable to finance major capital investments themselves and are forced to take out loans against the building's line of credit, take out a second mortgage, or borrow from an equipment vendor or energy service company. Each of those options however, can pose serious risks and drawbacks including long-term, high-interest payback periods, potential legal issues with vendor ownership of equipment and the need for a supermajority of resident support to take out a loan. As a result, many buildings choose to forego renovations or upgrades, paying the price of unnecessarily high operating expenses necessitated by inefficient or failing equipment.

FS Energy, using the clout of the larger FirstService Corporation, has responded to these obstacles by creating groundbreaking financial products to support residential buildings seeking to become more energy efficient. The first category of financial product is the FS Energy Loan developed by FS Energy in partnership with top-tier financial institutions to offer preferred financing without many of the traditional drawbacks commonly associated with loans. These loans, which feature attractive interest rates, are unsecured by the property and are paid off entirely from the savings derived from the improvement. Transaction costs and approval time are minimized. Most importantly, FS Energy Loans allows buildings to avoid increases in monthly carrying costs. To avoid long-term payback periods, the loan terms are only two years longer than the projected payback period, meaning savings will always exceed loan payments and the loan will be paid off quickly. Although the legal issues pertaining to borrowing cannot be avoided, board associations will realize immediate savings and continue to save once the loan is retired.

The second financing product created by FS Energy is CRES or Cost Reduction through Energy Savings. Under CRES, FirstService has created a fund from which the initial capital cost of the conversion will be paid. Developed specifically for oil-to-gas conversions of buildings managed by FS Residential subsidiary in NY - Cooper Square Realty, CRES is a customized shared savings program that allows a building to pay for the cost of a retrofit project directly from the savings associated with the conversion. The savings value is based largely on the recent and projected future differences in the oil and gas prices that exist in the NY market. Importantly, it requires no capital investment or increase in monthly operating expenses. Following the completion of the retrofit, the association will share the energy savings with

the fund for a predetermined period, after which the fund bows out and the savings go completely to the association.

CRES also solves one of the biggest challenges faced by FS Energy in getting approval for energy projects—the supermajority vote. Unlike rental properties, co-ops and condos have a vested interest in the success and value of the property. As such, they elect members to the building’s board to help mediate decisions on behalf of the building. Rather than a landlord-tenant relationship, elected members to the board are subject to the approval of the residents for certain financial matters such as acquiring a loan, sometimes requiring a supermajority (66 2/3 percent) vote to pass decisions. Because of the nature of this financial agreement, the project can move forward solely with board approval; there is no need for a supermajority vote and underlying mortgages are not affected.

Lastly, any board reluctance due to skepticism of the energy savings is eliminated as FS Energy takes assumes the financial risk.

OTHER EMP COMPONENTS

Beyond energy accounting and the related Energy Report Cards, and developing innovative approaches to finance major capital retrofits, the EMP employs a variety other tools and programs that can be integrated in each customized energy management plan for buildings seeking to reduce their energy efficiency. As illustrated in Figure 2 we use the database to identify and drive specific energy efficiency opportunities in buildings.



FIGURE 2 – Energy accounting database and analysis acts as the hub from which the Energy Master Plan deploys the appropriate tools to assist properties within the portfolio.

Maintenance and Operations Programs & Training

Very often significant improvements to both energy efficiency and building comfort can be achieved by simply putting in place (and carrying out) more formal Operation, Maintenance & Management (OM&M) programs/procedures. For these sites we prepare the OM&M plans, logs and procedural sheets. Many of these buildings that are looking to improve their energy efficiency while using existing equipment often require additional training. FS Energy staff directly, and in concert with equipment manufacturers provide tailored for property managers and maintenance staff to help them learn to carry out these OM&M plans, and identify & correct common problem areas to maximize energy efficiency.

Combustion Efficiency Testing

As the vast majority of facilities in at least the New York portion of the portfolio have central boilers and having this equipment operate at its optimal level is such a critical component of the overall energy picture, combustion efficiency (CE) testing is an inexpensive service that can pay big dividends. Most often these tests are either not being done, or are conducted by providers with an inherent disincentive to such equipment running at high efficiency levels (such as the fuel supplier). FS Energy offers its client portfolio the independent CE testing and reporting that can yield high returns for sites.

Retro-commissioning

For buildings with no need to replace heating or cooling systems or those that simply want to increase the performance of existing equipment, FS Energy conducts retro-commissioning projects.

Energy Audits

Both first cut assessment and comprehensive energy auditing services are provided to those facilities that have expressed interest in reducing their energy costs. In markets such as New York City, where all buildings over 50,000 square feet will be required to have Level 2 energy audits over a ten year span, beginning in 2013, FS Energy will assist compliance with such statutes.

Energy Retrofit Projects

Energy retrofit projects are the most costly capital improvements yet yield the highest return in the long run. While the desire it to work with our buildings to perform comprehensive energy retrofit projects, we recognize that many board neither have the resources or desire to make that big step, at least initially. When such opportunities exist we nurture them and work with the board to develop such holistic efforts. In practical terms, however, we have found that it is sometimes more feasible to help implement individual upgrades on equipment or systems, and then build upon that success and in our long term

property management relationship with the site follow up with additional improvements. In both cases FS Energy works to provide viable suggestions for the coop and condo boards seeking to improve efficiency and reduce costs. The numerous financing options discussed previously are utilized to help fund capital-intensive improvements.

Energy Bill Audits

Audits of both past and present energy bills determine if a building as been over charged for their energy or are allocating too much energy for their needs. FS Energy maintains strong relationships with energy service providers to advocate on behalf of clients to renegotiate the terms for energy costs and can earn buildings the overcharges in the form of energy credit for future energy bills.

Raising Awareness for Energy Efficiency

Committed to reducing clients' operating expenses and environmental impact, FS Energy places a high value on educating residents, workers, and board members on the energy efficiency options available to their building. Through direct communication with the staff and residents, we keep boards and residents informed in order to allow them to determine what is best for their building. Examples of this include the Energy Report Cards, periodic newsletters, and the planned installation of informational kiosks (LCD screens) in entrance lobbies posting graphically communicated consumption data and conservation suggestions.

RESULTS

The following are case studies of several facility projects completed since startup of the EMP effort:

University Towers

The University Towers comprise of three 16 story buildings that were burning No. 6 heating oil. FS Energy facilitated the conversion of six boilers from No. 6 oil to natural gas, a fuel with much greater efficiency and reduced environmental impact. This conversion also provided improved system efficiency with the incorporated use of new parallel positioning burners and an upgraded burner control system. The property is expected to save \$130,000 annually as a result of the oil-to-gas conversion.

Gramercy Condo

FS Energy performed another oil-to-gas conversion on the Gramercy Condo. This No.6 oil to natural gas conversion was also completed holistically with an upgraded boiler control system, a cogeneration system, and a lighting efficiency upgrade. The linkage-less control system allows greater control and energy management of the new

boiler system while the 75 kW cogeneration system improves efficiency by using gas to produce both heat and electricity. The retrofit project resulted in a 19 percent reduction in energy usage and an estimated energy savings of \$240,000. FS Energy recommends buildings approach energy efficiency in a holistic approach and the Gramercy Condo will experience savings from increased efficiency for years to come.

Carlton Regency

The Carlton Regency is undergoing major renovations to their cooling and heating systems in a two-phase effort to improve efficiency and dramatically reduce their operating expenses. The first renovation is an upgrade of the chiller system from a Two-Stage Steam Absorption chiller to a new multiple compressor electric chiller. The second phase is the installation of a high efficiency condensing boiler system to eliminate the use of utility supplied district steam fired heating.

Aggregate Energy Purchasing Program

The size of the FirstService portfolio of managed properties enables FS Energy to negotiate an Aggregate Energy Purchasing Program with an energy service provider. This energy procurement of electric and natural gas resulted in 135,000 MW of electric energy and 6,000,000 Therms of natural gas procured in a single RFP. This bulk procurement program allows each FirstService managed building to save between 5 and 15% on energy costs. This type of expansive action exhibits the strength of organizing the vast portfolio of FirstService Residential in New York City.

LOOKING FORWARD

Following the success in New York City, FirstService Residential is preparing a rollout of energy management services into other major markets throughout the US. FS Energy is planning an aggressive expansion of EMP activities into both Miami and Chicago, followed by the remaining 5,300 properties in the FirstService portfolio. With a national portfolio of that size, FirstService Residential feels it has the power to make a significant impact on a greener environment for the United States.

CONCLUSION

Although there is a historic lack of information available on residential multifamily buildings' energy consumption, companies such as FS Energy are leading the way in forging new energy efficiency initiatives to make buildings and cities more energy efficient and less harmful to the environment. With a large multifamily building portfolio of over 450 buildings in New York City, FS Energy has been able to achieve significant energy reduction results through a holistic approach to energy management. By developing innovative ways to educate, benchmark and finance energy renovations, FS

Energy is working under the structure of its Energy Master Plan to develop a full suite of solutions for co-op and condo associations that make increased energy efficiency an option difficult to refuse. With the strategic foresight and support of the corporation's uppermost management FS Energy has been able to leverage their innovative solution and their customized approach to energy management to redefine how management companies assist their multifamily property clients in reducing energy expenses and make a sizable impact on lowering energy consumption and carbon emissions.

ABOUT THE AUTHORS

Ron Merhige, a Registered Professional Engineer and a LEED Accredited Professional, oversees the management, operations, data analysis, and sales functions of FS Energy while working to ensure client satisfaction. Ron has more than 20 years experience in creating and implementing energy solutions that meet diverse technical challenges. He earned an M.B.A. from Loyola University and a B.E. from SUNY Maritime College.

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Fredric Goldner in his role as Principal of EMRA has worked with FS Energy since its inception and has been responsible for developing the FS Energy's industry-leading FSdata benchmarking database, which comprises years of historical consumption data for hundreds of residential and commercial buildings. In addition to conducting facility audits and use analyses, his extensive research in the area of multifamily building DHW loads and systems resulted in his authoring a new set of DHW sizing guidelines. Fred also is an adjunct professor at the

Center for Energy Policy & Research at New York Institute of Technology, and has received numerous awards for his work. Fred was inducted into the Energy Managers Hall of Fame for his lifetime achievement in promoting the practices and principles of energy management. He sits on numerous engineering and industry committees and boards, including the CEM Board and has served as International President of the Association of Energy Engineers (AEE).

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http://filelibrary.associationsites.com/aia/collection/Walk_the_Walk/Supporting_Docs/architectsandclimatechange.pdf

[2] The Building Energy Use Tracking System (BUETS) study done in the late 1980s examined and analyzed over 900 facilities of different building ages, sizes, HVAC, construction and other characteristics in NYC. This study, still one of the most extensive energy benchmarking studies ever done in the multi-family building sector, focused the benchmarking primarily on the heating and DHW portion of the consumption at these sites. FS Data and the BERG scores discussed in this paper examine all energy usage in the subject buildings. The citation for the BUETS study is as follows:

Goldner, F.S. and P. Judd. Building Energy Usage Tracking System - Final Project Report. N.Y.C. Department of Housing Preservation and Development - Energy Conservation Division / New York State Energy Research & Development Authority. New York. 1989.