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Written comments in response to CEC's RFI for Building Decarbonization and EV Charging Equipment website

Attached are SRS's written comments regarding building decarbonization software, data, and analytic tools to accelerate energy efficiency, GHG emissions reduction, and electrification in the small and medium-sized buildings sector.

Additional submitted attachment is included below.



Written Comments in Response to CEC's Request for Information for Building Decarbonization and EV Charging Equipment Website Docket # 22-DECARB-02

Respectfully submitted August 6, 2022

by:



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Introduction

Sustainable Real Estate Solutions, Inc. (SRS) is pleased to submit the following information in response to the California Energy Commission's (CEC) request for information (RFI) in support of a new webpage providing resources and tools to accelerate building decarbonization and the installation of electric vehicle (EV) charging equipment. The information provided herein is derived from our broad experience developing and implementing the tools and best practices required to scale energy efficiency and decarbonization in the small and medium-sized buildings (SMB) sector.

About Sustainable Real Estate Solutions

SRS was founded in 2010 by experienced commercial real estate and energy efficiency professionals each with ~30 years' experience innovating commercial and multifamily property software, data, and analytics designed to support high efficiency HVAC equipment upgrades.

Since 2011, the company has built a nationwide reputation as the administrator of Commercial Property Assessed Clean Energy (C-PACE) programs on behalf of state and local governments. Visit the Colorado C-PACE program website for an example of a leading statewide program administered by SRS.

In support of these public-private partnerships SRS has collaborated with over 2,000 energy efficiency (EE) and HVAC professionals facilitating over \$600 million in EE project financing. This broad and deep project-level experience has given SRS a deep understanding of the "best practices" required to meet the needs of the commercial and multifamily building energy efficiency sector and a keen awareness of the tools and resources needed to support project origination, development, technical review, and financing.

Moreover, this experience provided SRS the opportunity to:

- Conduct technology-enabled analysis on thousands of commercial and multifamily EE projects
- Collect proprietary data and develop predictive analytics that forecast energy savings
- Develop SRS's Energy Performance Improvement Calculator (EPIC™) a cloud-based, easy-to-use tool that enables EE professionals, in real time, with minimal data inputs, to create the business case for commercial and multifamily building owners considering EE investments, including electrification.

The following information is in response to the RFI's Section 2:

Provide recommendations of tools, software, or resources that advance or facilitate building decarbonization and electrification that should be included on CEC's informational website. Explain how the tool, software, or resource facilitates the installation of equipment that reduces greenhouse gas (GHG) emissions in buildings.

About EPIC™: State-of-the-art software, data, and analytics tool to accelerate commercial and multifamily building energy efficiency, decarbonization, and electrification

When owners of large or institutional buildings, e.g., over 50,000 sq. ft. (many with established Environmental, Social and Governance (ESG) plans) contemplate multi-million-dollar energy efficiency and decarbonization projects, they typically contract with energy engineers who conduct a comprehensive building energy audit. This audit evaluates the business case (lifetime energy cost savings, CO₂e emissions reduction, cash flow benefits and property valuation increase) for investing in the high efficiency equipment needed to meet their ESG goals. Assuming the business case is compelling, building owners will typically proceed with the project – which is a win for their balance sheet, their ESG program and the emission reduction goals of both the local and the state agencies.

When owners of Small and Medium-sized Buildings (SMB) need to replace HVAC equipment that is at or beyond the end of its useful life, they typically seek competitive quotes from two or three contractors and purchase the lowest cost, energy code-compliant equipment¹. Contractors, lacking awareness of a better way, and working in a fiercely competitive market, routinely deliver "cost-only" minimally code compliant HVAC equipment proposals with slim margins and no consideration of the potential energy cost savings or the reduction of CO₂e emissions.

Every time this "race to the bottom" scenario plays out, the opportunity to capture significant energy savings, CO₂e emissions reduction, and create green jobs is lost for the 15-20-year average life of new HVAC equipment. Moreover, this lost opportunity is particularly troublesome in under-resourced communities that experience high energy cost burdens.

What SMB owners need is a "business case" to justify the higher upfront "Green Premium" associated with above code HVAC equipment, e.g., electric heat pump (EHP) or variable refrigerant flow (VRF) systems. Until recently this "business case" would require an audit incorporating complex spreadsheets and/or building energy simulation models. For an SMB project such audits typically cost \$1,500 - \$3,000 and take weeks to prepare – terms which are simply unacceptable to most SMB owners. Moreover, most HVAC contracting firms lack the tools and skillset to estimate the energy savings and CO₂e emissions reduction impact from their proposed equipment replacements.

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¹NYSERDA Commercial Baseline Study, HVAC Market Assessment, Volume 3, Pg. 30: Maintenance Practices: 66% of building owners reactively fix problems when the occur. This tracks with SRS experience serving state, county, and municipal energy efficiency programs / agencies nationwide.

As a result, contractors competing for the project, in a "race to the bottom", deliver proposals featuring the lowest cost code-compliant equipment. This means SMB owners seldom see the *higher lifetime savings and lower total cost of ownership* that often justifies the Green Premium for high efficiency equipment, including electrification. It is not surprising that, absent a sound "business case" that justifies the cost associated with high efficiency *above code* HVAC equipment, SMB owners routinely choose low-cost code minimum equipment.

This choice has serious consequences. Assuming 20-year average useful life of commercial HVAC equipment, ~5% of SMBs reach HVAC equipment end-of-life each year. SRS estimates that in CA over 50,000 SMBs need to replace HVAC equipment every year. As a result, the opportunity to "lock in" a significant reduction of millions of tons of CO₂e over the 20-year lifetime of the new equipment has been lost.

For example, consider three HVAC equipment replacement options and the lifetime CO₂e reduction impact (based on an average SMB, i.e., 26,000 sq. ft. office building in northern CA) assuming 50,000 CA SMBs replace HVAC systems each year:

- Electrification via Variable Refrigerant Flow (VRF) technology savings: 60 million mtCO₂e over the 20-year lifetime of the new equipment.
- Electrification via Air Source Heat Pump (ASHP) technology savings: 19 million mtCO₂e over the 20-year lifetime of the new equipment.
- High Efficiency Gas (like-for-like) Space Heating technology savings: 14 million mtCO₂e over the 20-year lifetime of the new equipment.

Scaling SMB Investment in Energy Efficiency, Decarbonization, and Electrification

While changing the behavior discussed above is challenging, SRS has learned firsthand: a) that it can be done and b) **the key** to success is empowering HVAC contractors with an easy-to-use tool that evaluates the performance of "low-cost" code-compliant vs. an investment in high efficiency equipment, including electrification.

This critical market need was the driving force behind the development of the SRS Energy Performance Improvement Calculator (EPIC™). Launched in 2020, EPIC's easy-to-use Software as a Service (app) enables a cost-benefit analyses, in real time, with minimal data inputs, for alternative equipment replacement options. See EPIC Reports (Exhibit I and II). In short, EPIC app is *the* technology breakthrough needed to help convince SMB owners to choose high efficiency equipment. As discussed in a recent SRS whitepaper² failure to successfully engage with SMB owners will make it impossible to achieve CA's emissions reduction goals.

² Unlocking the Mission Critical Building Decarbonization Opportunity in the SMB Sector. View whitepaper here.

Evaluation of alternative equipment upgrade options:

EPIC evaluates various combinations of equipment upgrades and instantly creates "comparison reports" (Exhibit III) that evaluate the annual and lifetime energy savings and CO₂e emissions reduction of multiple scenarios:

- Like-for-Like: upgrade to high efficiency HVAC, i.e., natural gas space heating
- **Electrification**: convert to electric space heating with heat pumps/VRF
- Net-Zero: right-size solar PV to post-improvement's new baseline; evaluate the benefits
 of LED.

EPIC delivers the benefits of a preliminary energy audit at a fraction of the time and cost:

EPIC's electricity and fuel savings methodology, a two-step process, is consistent with industry best practices, e.g., ASHRAE energy audit guidelines.

- EPIC compares the energy consumption of new equipment to the existing equipment and using formulae consistent with best practices in state utility technical resource manuals, calculates the percent energy consumption savings that will result from more energy efficient new equipment.
- EPIC estimates weather normalized electricity and fuel consumption associated with the new equipment's energy end-use.³ These end-use consumption values are then multiplied by the percent energy savings to calculate the annual electricity and fuel savings.

EPIC User Response

Leading energy service companies (ESCOs) currently use EPIC in support of local government energy savings performance contract project preliminary energy audit workflows. These EE project development firms report that EPIC's energy savings estimates can be completed in ~8 hours vs. the 40+ hours of data collection and manipulation needed to complete sophisticated spreadsheets or building energy simulation models. The following EPIC testimonial is from a 20+ year EE project development engineer at a leading ESCO:

"Requiring minimal data inputs, EPIC provides energy savings calculations for a wide range of energy improvements, including HVAC, EMS, and LED lighting. In comparison to traditional time and cost-intensive energy audits, EPIC's calculations are consistently within +/- 10%-20% at a fraction of historical costs.

In real time, EPIC enables the development of multiple scenarios, including electrification projects which helps maximize utility incentives and achieve significant greenhouse gas emissions reduction goals. These scenarios can be easily shared with internal and external stakeholders facilitating collaboration during the proposal development phase.

Moreover, based on our feedback, SRS has integrated new features into EPIC and provides dedicated user training and support to ensure we get the most from the tool.

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³ Based on DOE's CBECS end-use profiles per property type.

EPIC has proven to enhance our technical approach and help differentiate our proposals from the competition – all while dramatically reducing our preliminary project development costs in the municipal energy savings performance contracting sector."

Project Engineer
Leading Energy Service Company

EPIC facilitates an "Everyone Wins" outcome:

- **Building owners**: Business case analytics, including estimates of energy cost savings and CO₂e emissions reduction provide the information needed to make a confident decision to invest in high efficiency equipment.
- Equipment manufacturers & distributors: Increased sales of higher priced, high efficiency equipment while earning a greater share of their HVAC contractors' business.
- Contractors: Increased sales of high efficiency equipment drives ticket size and profit
 margin and enables the inclusion of incentives and rebates which reduces the Green
 Premium.
- Utility program administrators: Increased sales of high efficiency equipment qualifies
 more projects for rebates and helps achieve utility energy and CO₂e emissions reduction
 goals.
- **Governments:** Increased sales of high efficiency equipment helps cities and the state achieve their Climate Action Plan's CO₂e emissions reduction goals.

EPIC Subscription Fee

EPIC is a subscription product with pricing plans based on the number of buildings evaluated per month/year. The average cost per building ranges from \$30-\$50 depending on the features included in the user's subscription plan. Visit the EPIC Pricing Plans page for more information on subscription options.

The following information is in response to the RFI's Section 3:

Provide recommendations of successful or innovative financing and incentive programs or models (i.e., proposed, past, or active programs) that advance building decarbonization and electrification.

EPIC fully integrates utility rebates and financing plans:

EPIC users, in real time and with minimal data inputs, can integrate utility rebates for high efficiency equipment installation and financing plans, e.g., utility on-bill and PACE financing. Moreover, EPIC Reports fully integrate such utility rebates thereby lowering the Green Premium associated with high efficiency equipment and provide a projected annual cash flow schedule based on amount financed, term and interest rate inputs.

For SMB owners that are unable to self-finance HVAC equipment replacements, these EPIC features (utility rebates and financing plans) provide an estimate of annual net operating income over the term of financing and helps advance energy equity and reduce the energy burden for SMB owners and their tenants.

See EPIC Report (**Exhibit II**) designed to ensure the SMB owner has the information needed, i.e., estimated superior annual cash flow impact, to confidently invest in high efficiency HVAC equipment, i.e., justification of the Green Premium.

To learn more, please visit the **EPIC** website.





This summary was prepared by Trane using the Energy Performance Improvement Calculator (EPIC™) app to estimate the energy savings for your project at 1533 California Cir, Milpitas, CA.

Energy Cost Savings

CO₂e Emissions Reduction

\$24,808 \$632,765 63 1,205
First Year Savings (\$) Lifetime Savings (\$) First Year (tons) Lifetime (tons)

Project Financial Summary

\$574,369 \$632,765 \$58,396 110%

Net Installed Cost (\$) Lifetime Savings (\$) Net Gain (\$) Cost Covered by Savings (%)

Energy Improvements Summary

Estimated Energy Savings ¹

					0,		
Energy Improvements	Useful Life (Years)		Net Installed Cost	Unit Savings First Year	Demand Reduction	Cost Savings First Year	Cost Savings
Variable Refrigerant Flow	20	\$143,600	\$574,369	98,069 kWh 4,092 CCF	26 kW/yr 70 CCF/yr	\$24,808	\$632,765
Air Conditioning				42,336 kWh	295 kW/yr		
Space Heating System				-14,340 kWh 4,092 CCF	-286 kW/yr 70 CCF/yr		
Ventilation				70,073 kWh	17 kW/yr		
Project Totals (\$):		\$143,600	\$574,369			\$24,808	\$632,765

¹ Savings estimates are calculated based on industry best practice methodologies, including key assumptions for your building's weather normalized annual energy consumption and cost, existing and new equipment performance efficiency, and average annual utility cost escalation rate over the estimated life of new equipment. Where default values have been applied, they represent average values from peer buildings. Your project's actual savings may differ from estimates due to variation in building design and geometry, operating characteristics, tenant behavior, local climate, occupancy, equipment operation and maintenance, building climate control, changes in utility rates, and other factors. Savings estimates are provided as a guideline only without any warranties, expressed, or implied.

View **EPIC Report** for additional project details.



EPIC[™]Report



This report was prepared by Trane using the Energy Performance Improvement Calculator $(EPIC^{m})^{1}$ app to estimate the energy savings and calculate the financial impacts of your project.

Property Information

1533 California Cir

Building Name

1533 California Cir

Street Address

Milpitas CA 95035
City State ZIP Code



Building Characteristics

Office 26,976 2000

Type Gross Sq. Ft. Year Constructed

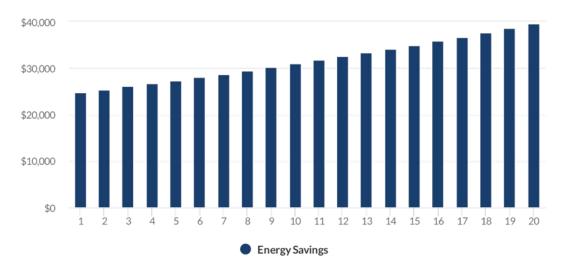
54,783 421 110

Space Cooling (kWh/yr) Space Heating (MMBtu/yr) DHW Heating (MMBtu/yr)

Project Cost Summary

\$574,369 \$632,765 \$58,396
Net Installed Cost (\$) Lifetime Savings (\$) Net Gain (\$)

Energy Savings Summary



Report-ID: 1ff5894e-5 Date: August 5, 2022



Energy Improvements Summary

			Estimated Energy Savings ²			2
Energy Improvements	Useful Life (Years) Incentives	Net Installed Cost ³	Unit Savings First Year	Demand Reduction ⁴	Cost Savings First Year	
Variable Refrigerant Flow	20 \$143,600	\$574,369	98,069 kWh 4,092 CCF	26 kW/yr 70 CCF/yr	\$24,808	\$632,765
Space Cooling - AC			42,336 kWh	295 kW/yr		
Space Heating			-14,340 kWh 4,092 CCF	-286 kW/yr 70 CCF/yr		
Ventilation			70,073 kWh	17 kW/yr		
Electricity savings:			98,069 kWh 21.06%			
Fuel savings:			4,092 CCF 69.45%			
Demand reduction:				26 kW/yr 70 CCF/yr		
Project Totals (\$):	\$143,600	\$574,369			\$24,808	\$632,765

Key Financial Metrics (Excluding finance costs)

\$143,600	\$574,369	\$632,765
Incentives	Net Installed Cost (\$)	Lifetime Savings (\$)
\$58,396	1.1	5.0
Net Gain (\$)	Savings to Investment Ratio (SIR) ⁶	Discount Rate (%)
\$379,008 Present Value ⁷ of Discounted Lifetime Savings (\$)	7.2 Capitalization Rate (%)	\$343,126 Estimated Property Value Increase ⁸ (\$)

Bank Loan Scenario

Displayed below are projected annual and cumulative cash flows over your project's estimated useful life, assuming the following project finance terms.

Finance Terms

\$574,369 5 3.00 Amount Financed (\$) Term (years) Interest Rate (%)

Project Finance Summary

\$574,369 \$44,871 \$632,765

Net Installed Cost (\$) Interest Cost (\$) Lifetime Savings (\$)

\$13,525

Net Gain (\$) Savings to Investment Ratio (SIR), including Interest Cost

Chart of Cash Flows

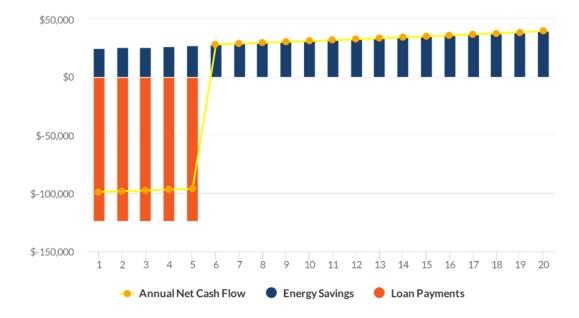


Table of Cash Flows

Net Cash Flows

			Net Ca	13111 10W3
Year	Project Savings	Loan Payments	Annual	Cumulative
Owner Contribution			\$0	\$0
1	\$24,808	\$123,848	-\$99,040	-\$99,040
2	\$25,425	\$123,848	-\$98,423	-\$197,463
3	\$26,057	\$123,848	-\$97,791	-\$295,254
4	\$26,704	\$123,848	-\$97,144	-\$392,398
5	\$27,368	\$123,848	-\$96,480	-\$488,878
6	\$28,048	\$0	\$28,048	-\$460,830
7	\$28,745	\$0	\$28,745	-\$432,085
8	\$29,459	\$0	\$29,459	-\$402,626
9	\$30,191	\$0	\$30,191	-\$372,435
10	\$30,941	\$0	\$30,941	-\$341,494
11	\$31,710	\$0	\$31,710	-\$309,784
12	\$32,498	\$0	\$32,498	-\$277,286
13	\$33,306	\$0	\$33,306	-\$243,980
14	\$34,134	\$0	\$34,134	-\$209,846
15	\$34,982	\$0	\$34,982	-\$174,864
16	\$35,851	\$0	\$35,851	-\$139,013
17	\$36,742	\$0	\$36,742	-\$102,271
18	\$37,655	\$0	\$37,655	-\$64,616
19	\$38,591	\$0	\$38,591	-\$26,025
20	\$39,550	\$0	\$39,550	\$13,525
Total	\$632,765	\$619,240	\$13,525	

Key Assumptions

Displayed below are your property's baseline (pre-energy improvements) energy cost and consumption key assumptions.

Energy Cost

\$0.186 \$15.00 3.0

Electricity Cost (\$/kWh) Electricity Demand Cost (\$/kW) Electricity Average Annual Escalation

\$1.47 \$2.25 3.0

Natural Gas Cost (\$/CCF) Natural Gas Demand Cost (\$/CCF) Natural Gas Average Annual Escalation

Energy Consumption (For the period April 2021 to April 2022)

2,192 487,228 5,140

Total Energy (MMBtu/yr) Electricity (kWh/yr) Natural Gas (CCF/yr)

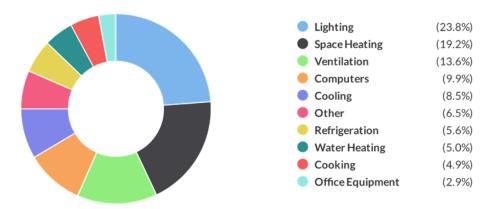
81.3 17.3 22.5
Total Energy Use Intensity (EUI) Electricity EUI Fuel EUI

Total Energy Use Intensity (EUI) Electricity EUI Fuel EUI (kBtu/SF-yr) (kWh/SF-yr) (kBtu/SF-yr)

2,568 374
Typical Heating Degree Days Typical Cooling Degree Days

(HDD/yr)⁹ (CDD/yr)⁹

The chart and table below displays your property's weather normalized energy consumption by end-use.



	Tot	tal Energy		I	Electricity		1	Natural G	as
End-use	MMBtu/yr	kBtu/SF	Percent	kWh/yr	kWh/SF	Percent	CCF/yr	CCF/SF	Percent
Lighting	523	19.4	23.8	153,314	5.7	32.9			
Space Heating	421	15.6	19.2				4,092	0.2	69.5
Ventilation	299	11.1	13.6	87,591	3.2	18.8			
Computers	216	8.0	9.9	63,404	2.4	13.6			
Cooling	187	6.9	8.5	54,783	2.0	11.8			
Other	144	5.3	6.5	19,902	0.7	4.3	735	0.0	12.5
Refrigeration	124	4.6	5.6	36,320	1.3	7.8			
Water Heating	110	4.1	5.0				1,065	0.0	18.1
Cooking	108	4.0	4.9	31,560	1.2	6.8			
Office Equipment	64	2.4	2.9	18,887	0.7	4.1			
Total	2,196	81.4	100.0	465,761	17.3	100.0	5,892	0.2	100.0

Energy Savings

Displayed below are baseline energy savings assumptions, subject to editing by the EPIC user where propertyspecific information is available.

- Your project's building is assumed to operate similarly to peer buildings in the same geographic area. Where default values have been applied, they represent average values from peer buildings.
- Baseline efficiency for existing equipment is assumed to be equivalent to ASHRAE 90.1 standard effective at the time of building construction or equipment installation, including an estimate of age-related performance degradation.
- Baseline heating equipment is assumed to be of the non-condensing type.
- Parking lot lighting/ventilation is excluded from the estimated energy use of the building.
- If the age of existing equipment is unknown and your building is >25 years old, all existing heating and cooling equipment is assumed to be 25 years old for purposes of establishing the baseline energy efficiency metrics, e.g., EER, combustion efficiency, etc., for existing equipment.
- If the age of existing equipment is unknown and your building is <25 years old, all existing heating and cooling equipment is assumed to be equivalent to the age of the building for purposes of establishing the baseline energy efficiency metrics, e.g., EER, combustion efficiency, etc., for existing equipment.
- Your building's energy consumption by end-use (space heating, cooling, DHW, lighting) is based on U.S.
 Energy Information Administration's (EIA) Commercial Building Energy Consumption Survey or U.S.
 Department of Energy's (DOE) Residential Energy Consumption Survey (for multifamily buildings of 5 or
 more units), as adjusted by EPIC to remove the influence of weather, and consider peer building's equipment
 infrastructure in the same geographic area.
- Your building's electricity cost per kWh and natural gas cost per CCF is assumed to be consistent with EIA's average retail price for peer buildings in the same geographic area.
- Your project's actual energy use and cost savings may differ from estimates due to variations in building
 design and geometry, operating characteristics, tenant behavior, local climate, occupancy, equipment
 operation and maintenance, variations in building climate control, changes in utility rates and costs, and
 other factors. Energy savings estimates are provided as a guideline only without any warranties, expressed,
 or implied.
- Energy savings estimated in this report are only applicable to the specific equipment proposed for this project and should not be assumed applicable to equipment deemed to be similar.

Performance Comparison with Peer Buildings

Your building's pre-improvements weather normalized EUI is 81.4 kBtu/SF-yr. This can be compared to the peer group median EUI range of 55.9 to 45.8 kBtu/SF-yr. Your building's post-improvements EUI is estimated at 53.4 kBtu/SF-yr.



View Performance Comparison for additional information on benchmarking methodology.

Energy Improvements Detail

Variable Refrigerant Flow:

80 903,354 100.0

Total Capacity (Ton) Total Capacity (BTUH) Total Capacity Replaced (%)

\$143,600 \$574,369 20

Incentives Net Installed Cost (\$) Estimated Useful Life (yrs)

Existing Equipment

Space Heating Systems

Heating Capacity (BTUH) Efficiency (%)
903,354 67.73

Air Conditioning

Cooling Capacity (Ton) EER

80 7.34

Energy Savings Detail

Variable Refrigerant Flow:

98,069 1,870,953 4,092

First Year Electricity Unit Savings (kWh) Lifetime Electricity Unit Savings (kWh) First Year Natural Gas Unit Savings (CCF)

78,067 \$24,808 \$632,765

Lifetime Natural Gas Unit Savings (CCF) First Year Cost Savings (\$) Lifetime Cost Savings (\$)

Monthly Demand Savings

Month	Electricity (kW)	Natural Gas (CCF)
January	-41.3	8.8
February	-40.2	8.8
March	-39.6	8.8
April	-37.7	8.8
May	1.4	8.8
June	75.1	0
July	75.1	0
August	75.1	0
September	75.1	0
October	-35.2	8.8
November	-40.5	8.8
December	-41.8	8.8
Total	25.5	70.4

Total Project Energy Savings Summary:

98,069 1,870,953

First Year Electricity Unit Savings (kWh) Lifetime Electricity Unit Savings (kWh)

\$18,627 \$475,099

First Year Electricity Cost Savings (\$) Lifetime Electricity Cost Savings (\$)

4,092 78,067

First Year Natural Gas Unit Savings (CCF)
Lifetime Natural Gas Unit Savings (CCF)

\$6,023 \$153,634
First Year Natural Gas Cost Savings (\$) Lifetime Natural Gas Cost Savings (\$)

756 14,419

First Year Total Energy Unit Savings (MMBtu) Lifetime Total Energy Unit Savings (MMBtu)

\$24,808 \$632,765

First Year Total Energy Cost Savings (\$) Lifetime Total Energy Cost Savings (\$)

Post-Improvements EUI

53.4

Total Energy Use Intensity (EUI) (kBtu/SF-yr)

6.9

Fuel EUI (kBtu/SF-yr)

Environmental and Societal Benefits:

63

First Year CO₂e Emissions Reduction (tons)¹⁰

6.6

Job-Years Created 11

13.6

Electricity EUI (kWh/SF-yr)

1,205

Lifetime CO₂e Emissions Reduction (tons)

Footnotes

- ¹ EPIC™ predictive analytics are powered by data collected by SRS over the past decade in the performance of thousands of energy improvement project analyses. EPIC's algorithms are augmented by utility energy efficiency program technical resource manuals and industry best practice energy savings calculation methodologies.
- ² Savings estimates are weather normalized. This methodology, based on typical year weather conditions over a 20-30 year period, accounts for yearly weather variations to ensure estimates are representative of your property's typical performance. Projects with multiple improvements, where applicable, include an assumption for interactive effects.
- ³ Net installed cost equals gross cost less incentives.
- ⁴ EPIC supports peak electric demand reduction estimates for lighting and air conditioning improvements, e.g., RTUs, PTACs, chiller systems, split systems and cooling associated with heat pumps. EPIC assumes the utility tariff does not include a ratchet provision. If there is such a provision, first year demand savings may not be applicable, however, there would be no impact to the savings beyond the first year.
- ⁵ Lifetime cost savings equal the estimated savings over the estimated useful life of the improvements. Estimates include annual utility price escalation factors of 3% for electricity and 3% for fuels, and an annual performance degradation factor to account for the percent by which the equipment performance is forecast to degrade each year. Present value of discounted lifetime savings are displayed in the Key Financial Metrics section.
- ⁶ SIR equals the ratio of project's estimated lifetime savings to its installed cost. Savings estimates include annual utility price escalation factors for electricity and fuels, and an annual performance degradation factor to account for the percent by which the equipment performance is forecast to degrade each year.
- ⁷ Present value is the current worth of a future stream of cash flows given a specified rate of return. Your project's cash flows are discounted at a 5% discount rate. The higher the discount rate the lower the present value of future cash flows.
- ⁸ Property value increase is calculated by dividing the estimated first year improvement in net operating income (NOI) of \$24,808 by the estimated capitalization rate of %. NOI impacts include energy savings and other recurring costs/savings, e.g., maintenance savings. Tax and finance-related items, e.g., loan payments, tax credits, and depreciation are excluded from NOI.
- ⁹ Typical HDD and CDD are based on statistically analyzed weather data for a 20-30 year historical period, and used in the weather normalization analysis to estimate energy savings that are representative of your property's typical performance.
- 10 CO₂e emissions reduction values, displayed in metric tons, are based on methodology outlined in the ASTM Building Energy Performance Assessment Standard E2797-15.
- ¹¹ Job-years created values are based on methodology outlined in the American Council for an Energy-Efficient Economy Study, Energy Efficiency Job Creation: Real World Experiences, 2012.

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EPIC Scenario Comparison



	Base Case Standard HVAC	Alternate Case High Efficiency HVAC	Difference Alternate Case Better/(Worse) than Base Case	% Difference Alternate Case Better/(Worse) than Base Case
Project Energy Savings				_
Total Energy Savings (MMBtu/yr)	166	206	40	24.0%
Electricity Savings (kWh/yr)	18,228	24,997	6,769	37.1%
Natural Gas Savings (CCF/yr)	1,013	1,175	162	16.0%
Peak Demand Reduction (kW/yr)	146.0	201.0	55.0	37.7%
Project Cost				
Gross Installed Cost	\$170,450	\$200,527	(\$30,077)	(17.6%)
Incentives/Rebates	NA	\$20,000	\$20,000	
Net Installed Cost	\$170,450	\$180,527	(\$10,077)	(5.9%)
First Year Savings (\$)	\$7,075	\$9,386	\$2,311	32.7%
Lifetime Savings (\$)	\$145,180	\$189,555	\$44,375	30.6%
Net Gain	NA	\$9,028		
NetCost	\$25,270	NA		
Key Financial Metrics				
Property Value Increase	\$97,856	\$129,820	\$31,964	32.7%
Present Value of Lifetime Savings	\$93,230	\$122,457	\$29,227	31.3%
Environmental and Societal Benefits				
First Year CO ₂ e Reduction (tons)	13	17	4	30.5%
Lifetime CO ₂ e Reduction (tons)	231	291	60	26.0%
Job-Years Created	1.5	1.9	0.4	26.2%

Base Case: Standard HVAC (view report)

 $\textbf{Alternate Case:} \ \mathsf{High Efficiency HVAC} \ (view \, report)$

