[Sept.2020]

Request for Proposals

For Energy Assessment for Non-Profit Organizations and Government Agencies Program Impact Evaluation

RFP Coordinator: Athena Bi
DELAWARE SUSTAINABLE ENERGY UTILITY
500 W. LOOCKERMAN ST, SUITE 400
DOVER, DE 19904

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I. Introduction

A. Purpose

Delaware Sustainable Energy Utility ("DESEU") is currently seeking proposals in response to this Request for Proposals ("RFP") from qualified organizations or individuals interested in providing assistance in conducting an impact evaluation of the Energy Assessment Program for Non-profit Organizations and Local Government Agencies ("Program"). Impact evaluation would provide analysis for the 2016-2019 program years. DESEU also seeks assistance with an evaluation of the ongoing monitoring and evaluation approach and metrics.

B. Program Background

Energy Assessment Program for Non-Profit Organizations

Through the Program, DESEU funds energy assessments for non-residential buildings operated by nonprofits or local government agencies. The DESEU partners with the University of Delaware's Mid-Atlantic Industrial Assessment Center ("IAC") to deliver the program. Students, under the supervision of the center's directors, perform the energy assessments and identify opportunities for energy savings within the facilities. DESEU covers 90% of the audit cost and provides information on grants and low-interest financing options (through the Revolving Loan Program) for participants who make recommended improvements. An example of the energy assessment report can be found in Attachment A. IAC conducts a one-year follow-up survey for the implemented energy saving measures. An example of the one-year follow-up survey can be found in Attachment B.

For more information about the operational details of the program, please refer to Attachment C.

C. DESEU Background

The DESEU is a 501c (3) non-profit organization that serves Delawareans by promoting the use of affordable, reliable clean energy and energy efficiency through its Energize Delaware initiatives. Energize Delaware operates as the premier one-stop shop for connecting and empowering energy consumers with the resources to reduce costs, improve the environment and ensure energy independence for future generations.

Energize Delaware develops and implements energy efficient solutions as well as clean energy and air pollution reduction programs. These programs include funding, financing and educational programs. In addition, the DESEU provides highly valuable technical and

financial services to its clients so that they can make informed decisions regarding their energy future.

Energize Delaware offers programs by fully utilizing the authority granted the DESEU by the State of Delaware to issue tax-exempt bonds, use Regional Greenhouse Gas Initiative (RGGI) funds and bank solar renewable energy credits (SREC). Energize Delaware also utilizes private sector entrepreneurial strategies.

Energize Delaware focuses on building relationships with residents and businesses so that they are motivated to use less energy, generate clean energy and reduce harmful emissions. Energize Delaware serves people of all incomes and housing styles. The organization also serves businesses, industries and institutions from all sectors. The Energize Delaware programs apply to new construction projects, the rehabilitation of existing buildings, transportation projects and innovative technologies.

Respected as an accountable, transparent, effective and nimble non-profit organization, the DESEU operates at the highest standards recognized in its industry.

II. Scope of Work

A. Key Objectives

The key objectives of the impact evaluation include:

- Verify the energy (kWh, kW, MMBtu) impact attributable to the 2016-2019 programs.
- Provide credible and reliable program energy and non-electric impact estimates and ex-post realization rate attributed to each program year. In the budget and work plan provide a separate estimate for including non-energy benefits estimates as an option.
- Report findings and observations, and provide recommendations that enhance the effectiveness of future ex-ante saving analysis and the accurate and transparent reporting of the program savings.

The key objectives of the ongoing monitoring and evaluation approach analysis:

- Review existing evaluation approach
- Analyze evaluation metrics and summarize findings
- Provide recommendations on overall approach to evaluation and metrics.

B. Key Tasks

It is anticipated that, at a minimum, the selected contractor will be required to undertake the following tasks. Proposal should address these tasks in detail:

Task 1: Statement of Work Meeting

Contractor will meet with DESEU staff within 1 week of contract signing and present proposed evaluation methodologies, data collection plan, analysis, report preparation and delivery, and any other activity contractor and DESEU feel pertinent to the evaluation. A final statement of work will be developed based on outcomes from this meeting. This statement of work will become part of the contract and will become the basis for this evaluation.

Task 2: Work Plan

The contractor will develop a detailed work plan based on the Statement of Work. The work plan will include evaluation goals, a schedule of tasks and delivery dates, evaluation goals, evaluation methodologies, and a sampling plan. This plan must be approved in writing by DESEU prior to contract beginning further evaluation.

Task 3: Site Visits and Participant Interviews

Where appropriate, the contractor will verify installation of energy efficiency measures and associated energy impact including kW, kWh, MMBtu, by conducting sample site visits to program participant locations. Contractor should recommend and propose the appropriate number of site visits based on their experience and expertise with similar evaluations.

It's necessary that the contractor coordinate efforts with the IAC regarding customer contact and conduct research in such a manner as to minimize the time impact on DESEU's customers participating in this evaluation. Information provided by program participants will be considered confidential in terms of attribution and shall not be shared with any other party.

Task 4: Impact Analysis

The contractor will analyze the data collected from previous tasks to develop estimated energy and environmental impact at the program and measure levels. Contractor will provide these estimates by comparing calculated or deemed energy savings values to the sources, data collected from site visits, desk review, customer interview, and the "best practices" engineering methods. Contract will provide an estimation of program realization rate to assist in determining ex-ante gross energy savings. It's necessary that the contractor explore issues of attribution and net impact of the program.

Task 5: Assessment of On-going Monitoring and Evaluation Approach & Metrics

The contractor will review existing evaluation instruments and data collection tools (project status tracking spreadsheet, follow-up meetings, post-assessment survey and Energy Orbit Energy Database for Savings tracking) to identify priority information needs and data gaps. Contractor will establish measures or performance target/benchmark to help us effectively monitor our own progress.

Task 6. Reporting

The contractor will be required to provide to the DESEU point of contact bi-weekly status reports detailing progress toward completion and any obstacles encountered. These status reports will be due by the 1st and 15th of each month and will include an updated schedule of future activities.

The contractor will provide a draft final report to the DESEU point of contact upon completion of all tasks. This draft will be reviewed by DESEU and comments will be provided to contractor for clarification as necessary. The contractor will provide to the DESEU point of contact, the final version of the report. Graphs, tables and excel spreadsheets are recommended for information not easily conveyed in narrative form. The draft and final report is required to contain, at a minimum, sections containing; an executive summary, evaluation methodologies, and findings and conclusions.

III. General Information for Respondent

DESEU at its sole discretion, reserves the right to alter the dates listed below and/or add to or remove scheduled activities.

A. Accessing the RFP

Entities with an interest in responding to this RFP can download a PDF copy of this document online at https://www.energizedelaware.org/home/rfps/ . Submitted questions and answers can be find at the same location.

B. RFP Schedule

Event	Estimated Completion Date
RFP Issued	Sept. 9, 2020
Final Day for Respondent to Submit Questions and Notice of Intent to Apply	Sept. 23, 2020
RFP Responses Due	Sept. 30, 2020
RFP Review and Evaluation Complete	Oct. 14, 2020
Contractors Presentations, if any	Oct. 19 - 23, 2020
Contract Signing	Nov. 6, 2020
Project Start	Nov. 15, 2020

Entities with an interest in responding to this RFP Must submit a notice of intent to apply via email, with contact information in the body and "Notice of Intent to Apply" in the subject line, to RFP Coordinator before the date specified on the RFP schedule. The purpose of this notice is to inform DESEU of interested applicant so that any additional information about the RFP may be provided, including responses to written questions. Submission of a “Notice of Intent to Apply” email is not a promise or obligation to submit a

proposal, but a lack of submitting an "Intent to Apply" does disqualify or preclude an applicant from submitting a proposal in response to this RFP.

Applicants who have questions about information contained in this RFP may submit questions via email with "Energy Assessment Program Evaluation RFP Question" in the subject line on or before the date specified on the RFP schedule. The Questions submitted and DESEU's responses will be posted at https://www.energizedelaware.org/home/rfps/. All proposals must be received through email on or before the date specified on the RFP schedule.

C. RFP Coordinator

Athena Bi
500 W. Loockerman St, Suite 400
Dover, DE 19904
Email: Athena.bi@deseu.org

D. Content of Proposals

Respondents submitting a proposal shall use the following outline and criteria:

- A description of the firm's qualifications to measure the energy impacts of the Energy Assessment Program
- A technical proposal must include the following elements, and may be provided in outline or chart format:
    - Evaluation activities to be conducted and the purpose/rationale for each activity
    - Person(s) responsible for each activity
    - The time frame for completion of each activity
    - Type of data to be collected and method of analysis
    - Progress report to DESEU as indicated in the Task 6. Reporting.
- A management plan and proposed schedule of deliverables including a kickoff meeting scheduled within 1 week of contract signing.
- Response to each objective and task listed in Section II.
- An estimated budget broken out by task and by individual. Key individuals should be identified by name, with billing rates for each. Budget should also include any travel costs. In addition, the applicant must provide a budget narrative that details each budget category for which funding is allocated, what each expenditure includes and how each of these costs was calculated.
- Resumes of key staff and subcontractor qualifications.
- Three references from previous impact evaluation clients [if available] with contact information.
- One example of previous impact evaluation reports [if available].

- Supplemental Information – Include any additional information including resumes, client reference information, and any other material that demonstrates your company's qualification for successfully completing this project. General information provided by Respondent that is not specifically requested in this RFP should be attached separately and clearly labeled "Supporting Materials".

E. Selection Criteria for Applicant Responses

Proposal Components	**Maximum Points**
1. Applicant Capacity to Conduct the Evaluation	10
2. Experience in Evaluating the Impact of Energy Assessment Program	5
3. Evaluation Design and Implementation Plan	30
4. Data Analysis and Conclusion	15
5. Key Staff	10
6. Budget and Budget Narrative	30
Total Point Possible	100

IV. Proposal Submission and Review Process

A. Submission

Respondents who wish to compete for funding for the Energy Assessment Program Evaluation contract must submit **ALL** of the following:

1. An electronic copy of the entire application
2. Three paper copy of the entire application with original signatures

All proposals (electronic and paper) must be submitted to the DESEU office by 4:30 PM EST on **Sept. 30, 2020.** Proposal received after this time will not be accepted, reviewed or evaluated.

Email the electronic copy to: Athena.bi@deseu.org.

Mail or Deliver the original signed paper copy to:

Delaware Sustainable Energy Utility

500 W. Loockerman Street, Suite 400

Dover, DE 19904

B. Format and Length of the Proposal

Proposal should be formatted to letter size, with one-inch margins on all sides, using a font of not less than 12 points. The suggested maximum length of the technical proposal is not more than 40 double spaced pages.

C. Application Review and Award Process

Proposals received by the submission deadline will be reviewed first for technical compliance with the RFQinstructions and completeness of the application in responding to all required information. Application that pass the initial technical compliance screening will then be read by a team of DESEU staff and rated according to the scoring criteria provided in this RFP.

A recommendation for awarding the contract will be made to the Executive Director and will result in a contract award letter from the DESEU and contract acceptance conditions to be signed and returned by the contractor. The DESEU reserves the right to negotiate the final contract. Further information about the contract process will be provided to the successful applicant following the awarding of the contract.

Attachment A: Program Background

Energy Assessment Program for Nonprofit and Government Agencies

Please Note: This section is for informational purpose only and it's originally from the Program Portfolio handbook updated in 2018.

Through the Energy Assessment Program for Nonprofits and Local Governments , the SEU funds energy assessments for nonresidential buildings operated by nonprofits or local government agencies. The SEU partners with the University of Delaware's Mid-Atlantic Industrial Assessment Center (IAC) to deliver the program. Graduate students, under the supervision of the Center's directors, perform the energy assessments and identify opportunities for energy savings within the facilities. The DESEU covers 90% of the assessment cost and provides information on low-interest financing options (through the Revolving Loan Program) for participants who make recommended improvements.

Additional program information can be found on the program website: https://www.energizedelaware.org/nonresidential/public-nonprofit/energy-assessment-program/

Operations Steps

The following steps provide an overview of the program delivery approach:

1. Agency contacts the DESEU or University of Delaware IAC to inquire about an assessment.
2. University of Delaware IAC provides program information and collects basic information on the facility and utility costs. University of Delaware IAC sends this information to the DESEU.
3. University of Delaware IAC provides the customer with a program application and a data request for 12 months of energy bills, and schedules the assessment.
4. University of Delaware IAC conducts a full-day, half-day or quarter-day assessment (depending on the size and needs of the facility), including diagnostic testing of lighting, HVAC systems, and the building envelope, and performing preliminary energy savings calculations on identified upgrades while on site.
5. Customer pays the DESEU for the assessment (approximately 10% of the audit cost: $250, $400 or $800 for a quarter-day, half-day or full-day audit, respectively[1]).
6. University of Delaware IAC provides a full assessment report to the customer that includes final upgrade recommendations, estimated upgrade installation costs and refined energy savings calculations.

[1] Audit cost is dependent upon the size of the facility. Customers with annual utility costs exceeding $40,000, and thus larger facilities, typically require a full-day audit.

7. University of Delaware IAC notifies the DESEU that the assessment was conducted and sends a copy of the customer's full assessment report to the customer and the DESEU.
8. The SEU, University of Delaware IAC, and customer meet to discuss results of the assessment report and available technical and financial assistance (including through the Revolving Loan Program, other applicable DESEU programs, and/or state incentives, when applicable).
9. The DESEU pays the University of Delaware IAC for the remaining 90% of the assessment cost.
10. University of Delaware IAC conducts a survey one year after the assessment is complete to assess whether the customer completed any of the recommended projects since the audit.
11. University of Delaware IAC uses survey information to re-calculate savings projections based on installed ECMs and report the data back to the DESEU via energyOrbit.

Program Eligibility

As shown in Table 1, nearly all public agencies and nonprofits within Delaware are eligible to receive this reduced-cost assessment.

Table 1. Participant Eligibility Parameters for the Nonprofit Energy Assessment Program

Eligibility Component	Requirements
Customer Type	Local governments and nonprofits
Building Type	All
Building Vintage	Existing buildings
Geography	State of Delaware
Building Ownership	Owned by or under long-term lease to a nonprofit organization or local government that pays for utility bills (and with owner approval)
Other	Building must have a least $40,000 a year in utility bills

Program Offering

Through this program, the DESEU offers nonprofit and public agencies a low-cost energy assessment by covering 90% of the assessment cost. [2] Customers generally pay $400 for a half-day assessment or $800 for a full-day assessment. Typical assessments are comprehensive and include the following:

- Utility bill analysis
- Complete light level testing
- HVAC systems analysis
- Building envelope and insulation inspection
- Thermal imaging analysis
- Operations and maintenance plan review

[2] The SEU reserves the right to adjust these incentive levels at any time.

- Measure energy usage analysis
- Data logging

Upon completion, participating agencies receive a comprehensive assessment report that includes energy upgrade recommendations ranked by rate of return and include no-cost energy savings options, if found.

Marketing and Outreach Strategy

The DESEU promotes the Nonprofit Energy Assessment Program on its website, as well as through a brochure targeting both local goverment agencies and nonprofits that is distributed through the website and upon request. The DESEU also markets the Nonprofit Energy Assessment Program through earned media and print advertisements.

Additionally, the DESEU conducts in-person presentations at eligible organizations and government entities describing the program and its benefits. The DESEU also presented the program to attendees of the Delaware Alliance for Nonprofit Advancement Conference.

Delivery Partners

Program delivery is performed through the University of Delaware IAC. The DESEU augments the existing University program to target nonprofits with DESEU funding and marketing. The Mid-Atlantic Industrial Assessment Center is funded by the U.S. Department of Energy to assist large industries in reducing energy use and utility costs.

QA/QC Protocols

The University of Delaware IAC students perform program assessments with the supervision and training from a University of Delaware IAC Program Director.

A third-party evaluation contractor should coordinate the recommended data collection, analysis, and reporting tasks for this program. Table 2 lists these and other QA/QC activities already underway by the DESEU.

Table 2. Nonprofit Energy Assessment Program Verification and Inspection Procedures

Inspection Point	Sampling Percentage	Inspection Method	Inspector
Verify student compliance with program guidelines	100%	Professor trains and reviews all activities conducted by students	University of Delaware IAC Program Director
Monitor ongoing energy savings	100%	Telephone and/or on-site verification	University of Delaware IAC
Verify estimated energy savings	100%	Energy simulation modeling	EM&V contractor

EM&V Approach

The primary data collection, analysis, and reporting tasks for this program are listed in Table 42. The impact evaluation tasks listed in Table 3 are only relevant for those projects for which the participant did not receive any financial incentives. Any savings derived from projects that were incented through another DESEU program (i.e., Revolving Loan Program) or other entity's program will be captured as part of the impact evaluation of those other programs.

Table 3. Summary of Nonprofit Energy Assessment Program Evaluation Activities*

Essential	Beneficial	Evaluation Activity	Process	Impact
■		Program staff interviews	✓	
	■	Materials review	✓	
	■	Market actor interviews (i.e., field auditors)	✓	
■		Participant surveys	✓	✓
	■	Secondary research	✓	✓
■		Database and data collection review		✓
■		Engineering savings analysis		✓
	■	Energy simulation modeling		✓
	■	Site visit verification and/or monitoring		✓
■		Reporting	✓	✓

* Items indicated as **Essential** are minimally required to complete an evaluation, while those marked **Beneficial** are useful to enable a more comprehensive and informative evaluation (but are not required to complete a basic evaluation).

Key Performance Indicators

The DESEU will measure program performance during the three-year planning period by monitoring and comparing historical trends against program benchmarks (or KPIs), such as:

- Number of assessments conducted
- Number of applicants (to ensure that demand is being met)
- Number of students trained through University of Delaware IAC to conduct assessments
- Program cost to the DESEU
- Conversion rates (i.e., assessment to project ratio)
- Types of projects conducted (e.g., lighting, HVAC)
- Program acquisition cost (kWh/therm savings per dollar of investment)
- Participant satisfaction
- Achievement of program participation goals
- Amount of greenhouse gas reductions through unfinanced energy saving upgrades (in metric tons of carbon dioxide)

- Energy savings or clean energy generated through unfinanced energy saving upgrades (kWh, thermos, other fuels)

Summary of Program Targets

Table 4 shows the projected participation for the Nonprofit Energy Assessment Program.

Table 4. 2016-2018 Nonprofit Energy Assessment Program Participation Targets

Project Type	2016	2017	2018
Total Audits	14	15	17

After an assessment is conducted, a portion of recommended measures may be installed by the participant.[3]

Table 5. shows projected program impacts for the Nonprofit Energy Assessment Program.

Table 5. 2016-2018 Nonprofit Energy Assessment Program Impacts

Savings	2016	2017	2018
Energy Savings (kWh)	1,059,261	1,140,742	1,222,224
Peak Demand Reduction (kW)	389.875	419.865	449.856
Gas Savings (thermos)	37,534	40,422	43,309
Propane/ Oil Savings (MMBtu)	22.30	24.01	25.73
Total Energy Savings (MMBtu)	**7,390**	**7,958**	**8,527**

Table 6 outlines the program-level budget including loan administration, marketing, implementation, and other costs, as well as the incentive budget for the Nonprofit Energy Assessment Program.

Table 6. 2016-2018 Nonprofit Energy Assessment Program Budget*

Budget Category	2016	2017	2018
Incentives	$7,560	$8,100	$9,180
Program Management**	$61,932	$61,932	$61,932
Marketing	$5,000	$5,000	$5,000
EM&V	$30,000	$30,000	$30,000
Implementation	$0	$0	$0
Total Budget	**$104,492**	**$105,032**	**$106,112**

* Totals may not sum exactly due to rounding.

** Program revenue offsets program administration costs.

[3] Based on DESEU -annual follow up surveys most participants install a portion of measures that are recommended during the audit.

Table 7 provides cost-effectiveness results for the Nonprofit Energy Assessment Program.

Table7. 2016-2018 Nonprofit Energy Assessment Program Cost-Effectiveness

Budget Category	2016	2017	2018
Total Resource Cost Test			
Total Discounted Costs ($)	453,810	479,384	505,557
Total Discounted Benefits ($)	1,731,828	1,227,383	1,341,530
Net Benefits ($)	1,278,019	748,000	835,973
Benefit/Cost Ratio	**3.82**	**2.56**	**2.65**
Societal Cost Test			
Total Discounted Costs ($)	453,810	479,384	505,557
Total Discounted Benefits ($)	2,633,281	1,953,750	2,124,475
Net Benefits ($)	2,179,471	1,474,366	1,618,918
Benefit/Cost Ratio	**5.80**	**4.08**	**4.20**

Attachment B.

Energy Assessment Report Example

Mid-Atlantic Industrial Assessment Center

Departments of Electrical/Computer Engineering and Mechanical Engineering
Center for Energy and Environmental Policy
A Program Sponsored by the Department of Energy (DOE)

Delaware City Community Center and Town Hall

University of Delaware
Mid-Atlantic Industrial Assessment Center
Department of Electrical & Computer Engineering
Dr. Keith Goossen
107 Evans Hall
Newark, DE 19716
302-831-0590

UNIVERSITY OF DELAWARE INDUSTRIAL ASSESSMENT CENTER

Report Number:	SEU088
Assessment Date:	March 10th, 2020
Plant Location:	Delaware City, DE
Submitted Date:	March 24th, 2020

Dr. Keith Goossen, Director	John Grayo, Lead Student
Samuel Matylewicz, Student Analyst	Sam Romano, Student Analyst

UNIVERSITY OF DELAWARE INDUSTRIAL ASSESSMENT CENTER PERSONNEL

Dr. Keith Goossen
Ralph Nigro, PE
Keith Gallagher
Jimmy Schneider
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RJ Dawson
Teddy Lambert
Kristina Kowal
Liam Kelley
Ryan Purnell
Samuel Matylewicz
Alexander Barry
Rose Zappacosta
Daniel Pileggi
Benjamin Shopp
Sean Frazee
Elizabeth Alban
John Grayo
Pasquale Zingo
Nicolette Bugher
Samuel Romano
Andrew Sayanlar
Matthew Sayanlar

PREFACE

The work described in this report was performed by the University of Delaware Mid-Atlantic Industrial Assessment Center (IAC) under contract with the Sustainable Energy Utility. The objective of the IAC program is to identify and evaluate opportunities to conserve energy, minimize waste, and improve productivity. Analyses and recommendations are based upon observations and measurements made during a one-day site visit and are restricted in detail and completeness by limitations on available time at the site. In cases where assessment recommendations (ARs) involving engineering design and capital investment are deemed attractive, it is recommended that the services of an engineering consulting firm, in-house specialist, or equivalent expert be engaged to do detailed engineering design and to estimate implementation costs. Questions and comments regarding this audit report and details about specific assessment recommendations should be directed to the Director or Assistant Director of Mid-Atlantic Industrial Assessment Center at the University of Delaware.

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DISCLAIMER

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EXECUTIVE SUMMARY

Report No:	SEU088	# of Employees:	~25
Assessment Date:	March 10th, 2020	Operating Hours Library:	3,000 hours per year
		Operating Hours Town Hall:	5,844 hours per year
Location:	407 Clinton St, Delaware City DE	Facility Size (sf):	~25,000/10,000 square feet

RECOMMENDATIONS AND RESULTS

Implementation of **all** the assessment recommendations (ARs) in this report would:

- Reduce electric energy consumption by **156,389kWh** or **25.2%** per year.
- Reduce Natural Gas consumption by **1,575 MMBTU**** or **75.2%** per year (dependent on recommendations 2&6).
- Reduce carbon dioxide emission from electricity generation and heating by **378,720 lbs.** per year. This equates to a **37.42% reduction in the projected facility carbon footprint**.
- Produce a total cost savings of **$18,510** per year, a reduction of **33.7%.**
- The total implementation cost of all recommendations is **$15,115** with an average payback of **1.04 years**

TABLE I: SUMMARY OF ASSESSMENT RECOMMENDATIONS

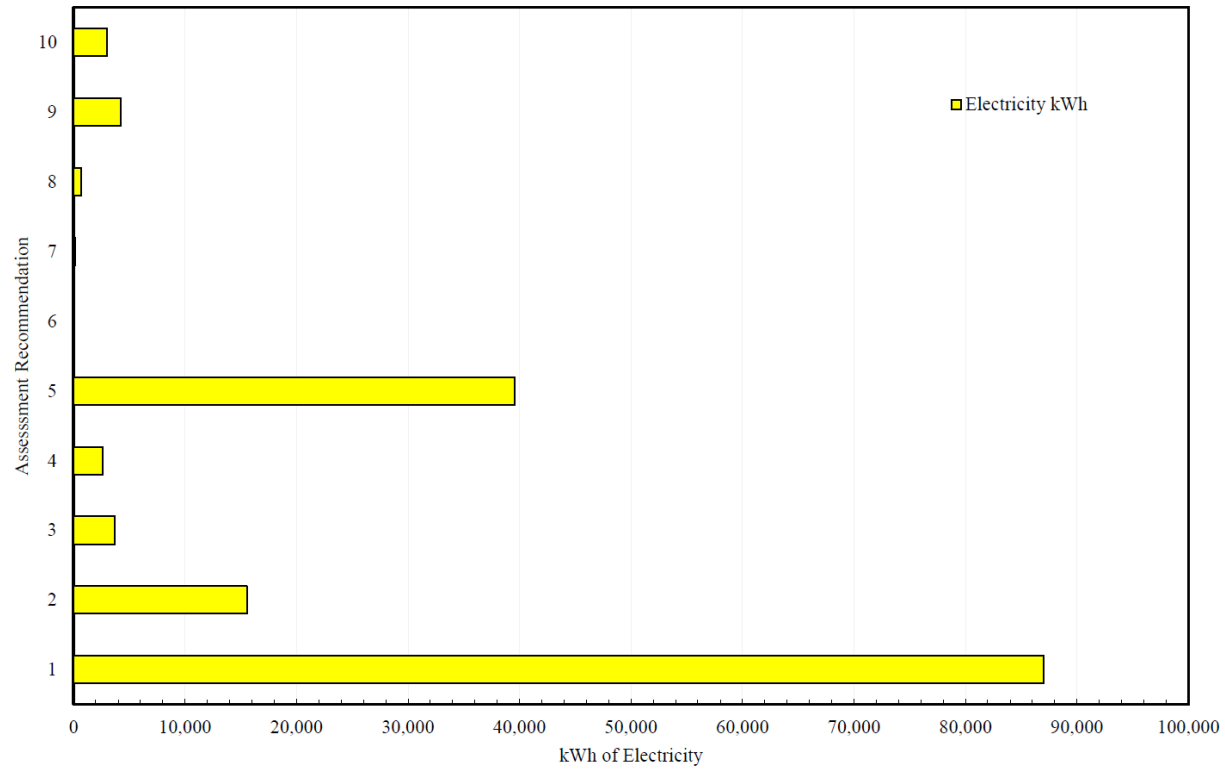
This table summarizes the energy savings of each individual assessment recommendation.

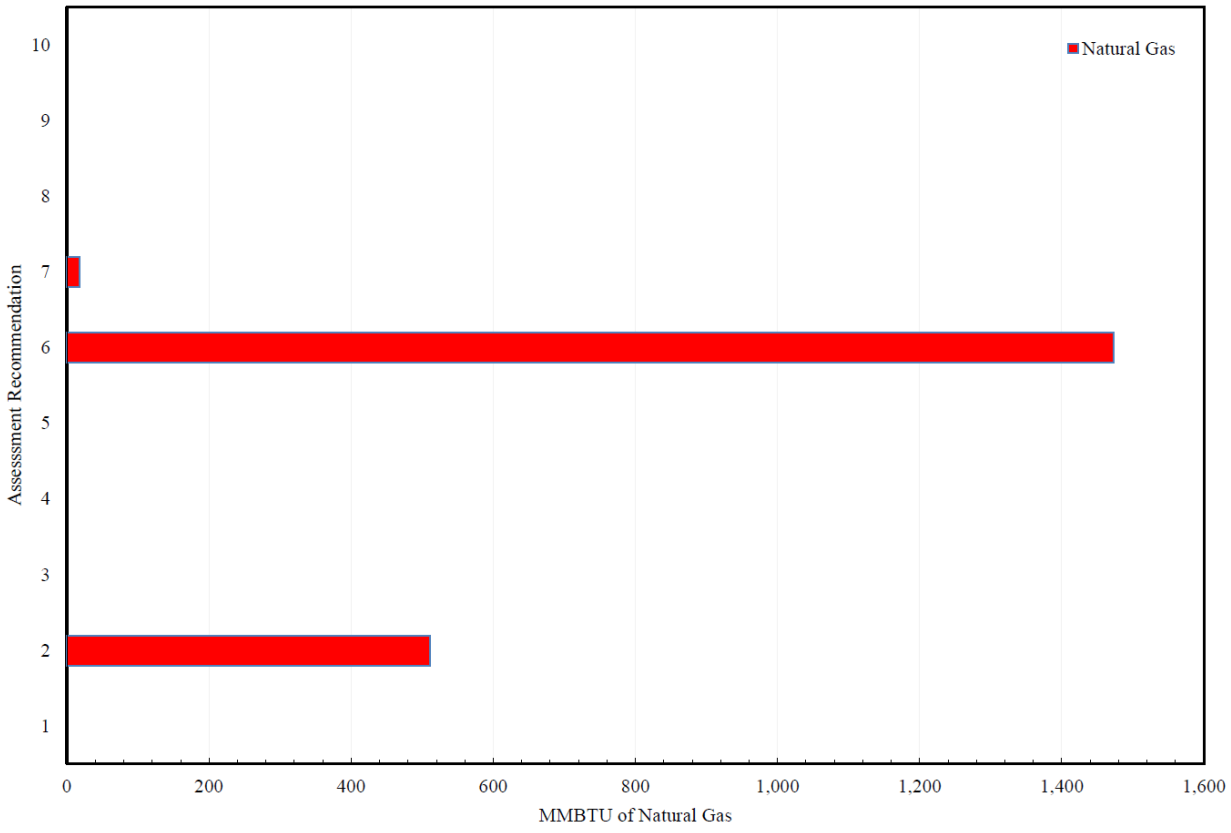
Assessment Recommendation Summary

AR No.	Description	Electricity kWh	Natural Gas MMBtu	Cost Savings $	Implementation Cost $	Payback Period years
1	Switch RTUs to Fan-Auto Mode	86,995	0	$3,478	$0	0.00
2	Reduce Thermostat Set Points 8 Degrees During Unoccupied Times**	15,531	511	$4,517	$0	0.00
3	Plug Computers Into Outlet Timers	3,691	0	$148	$40	0.27
4	Uograde 24/7 Interior Lighting to LED Bulbs	2,630	0	$105	$0	0.00
5	Upgrade Interior Lighting to LED Bulbs	39,540	0	$1,582	$4,211	2.66
6	Experiment with Electric Winter Heating**	0	1,473	$11,225	$10,000	0.89
7	Reprogram Town Hall Thermostats	117	18.5	$147	$0	0.00
8	Install Dimmer Switches in the Main Office of the Town Hall	658	0	$36	$80	2.22
9	Upgrade the Town Hall Second Floor Lighting to LED	4,208	0	$227	$262	1.15
10	Upgrade the Town Hall First Floor Lighting to LED	3,019	0	$163	$522	3.20
Total Savings		**156,389**	**1,593.5**	**$18,150**	**$15,115**	**1.04**
Current Consumption		**621,621**	**2,119.0**	**$53,914**		
% Reduction		**25.2%**	**75.2%**	**33.7%**		

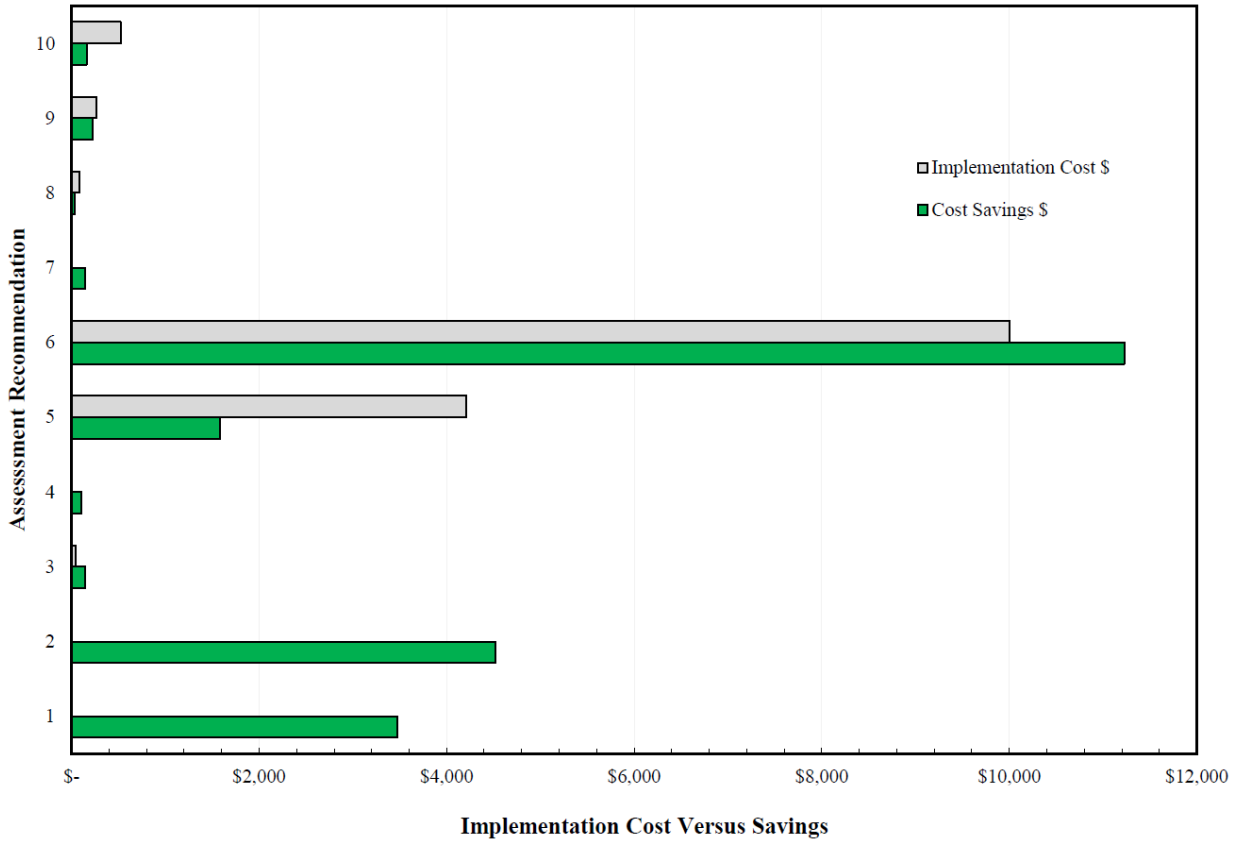
****Please note that although there are natural gas savings listed for both AR2 & AR6, but because these effect each other, the actual gas savings of these two measures is 1,841*(1-(1-27.8%)*(1- 80%))=1,575 MMTU/year. This number is used to calculate total natural gas savings**

ANNUAL RESOURCE SAVINGS

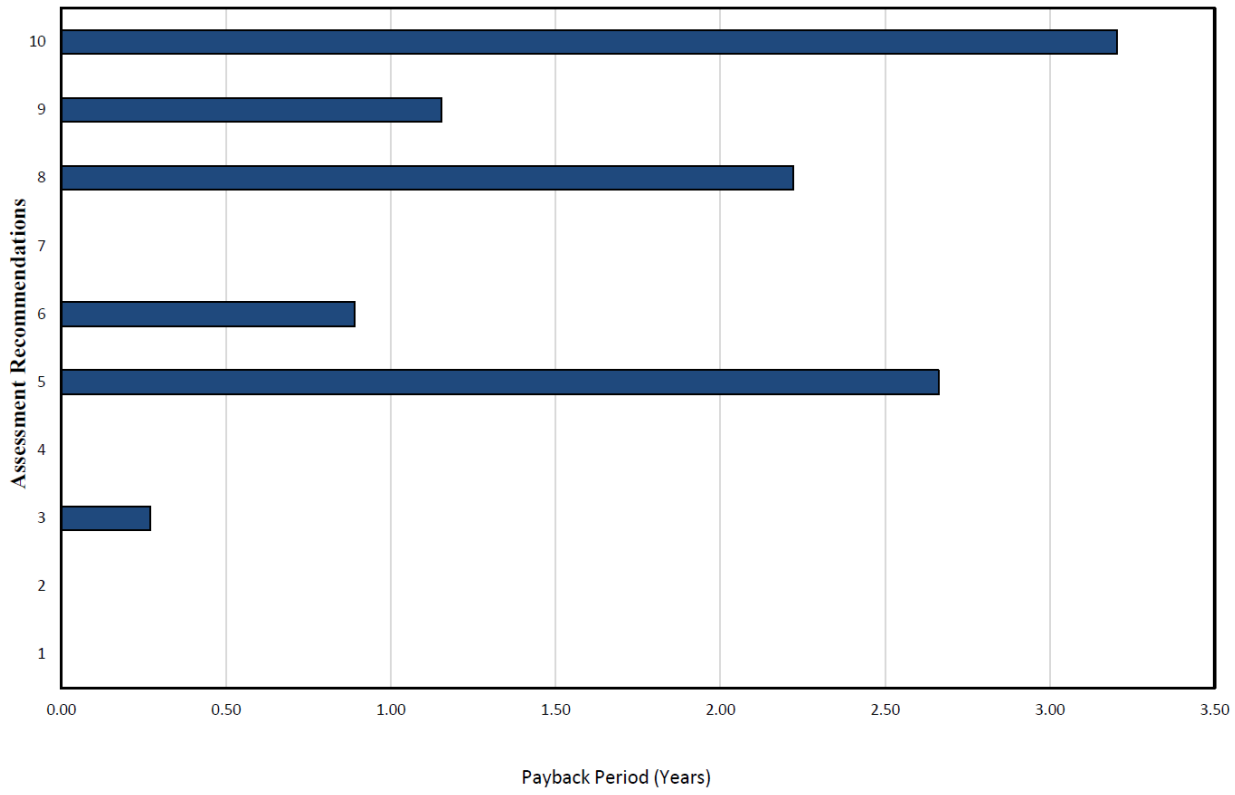




IMPLEMENTATION COST VERSUS SAVINGS



PAYBACK PERIOD



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CURRENT FACILITY OPERATIONS

FACILITY DESCRIPTION

Community Center:

The ~ 25,000 ft2 building houses a library, gymnasium, and several rooms used for community center type activities. Library hours are M-Th noon-8p, Sa 11a-4p, and Su noon-3p, and allowing for staff to arrive an hour early to start things up, weekly lighting hours are 9x4 + 6 +4 = 46, and using 50 weeks/year taking into account holidays, annual hours for the library side are 46x50 = 2,300/year. For the gym side, facility personnel report ~ 60 hours/week, and so 3,000/year will be used. Thus the lighting survey for this building is:

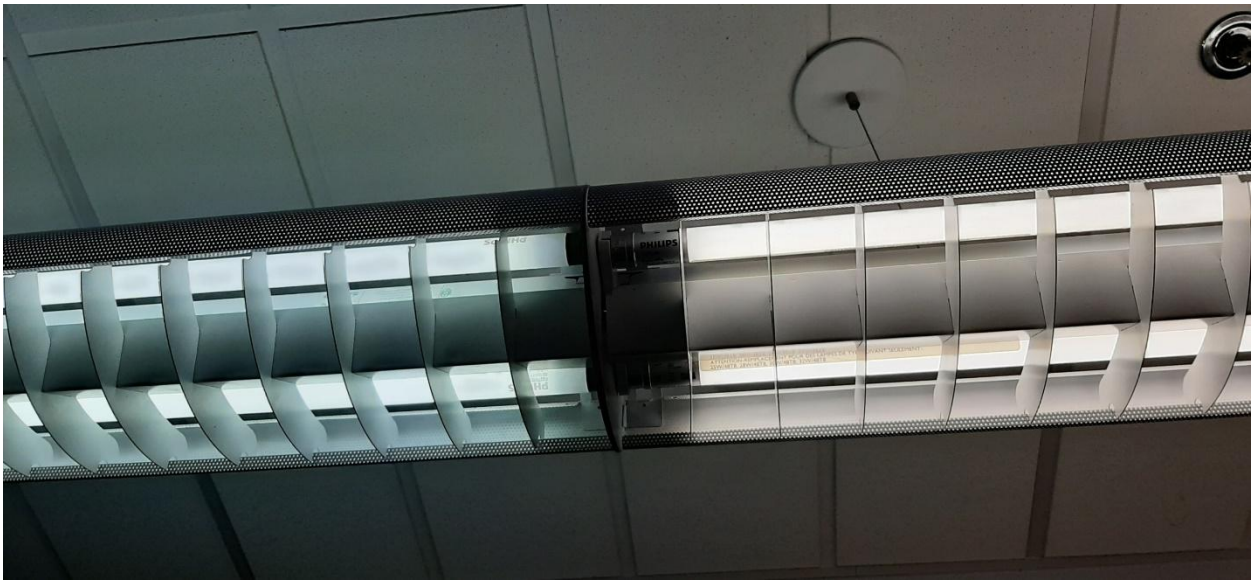
Room	hour/year	32W T8 Tube	32W T8 U Tube	400W HID	kWh/year		# of Fixtures
Main Hall	2300	86			6329.6		48
Book Shelf 1	2300	102			7507.2		51
Book Shelf 2	2300	106			7801.6		53
Skylight	2300	18			1324.8		9
Café	2300	26			1913.6		16
Book Shelf 3	2300	40			2944		20
Reading/Local Hist	2300	36			2649.6		9
Tutoring Center	2300	24			1766.4		6
Office and Storage	2300	36			2649.6		9
Meeting Room	2300	28			2060.8		7
BR 4	2300	8			588.8		2
Craft Room	2300	24			1766.4		6
Computer Training	2300	40			2944		10
BR 1	2300		10		736		5
BR 2	2300		2		147.2		1
BR 3	2300		2		147.2		1
Day Care 1	2300	36			2649.6		9
Day Care 2	2300	36			2649.6		9
Fitness Room	2300	36			2649.6		9
Storage	2300	36			2649.6		9
Hall1	2300	4			294.4		2
Hall 2	2300	12			883.2		3
Hall 3	3000	8			768		2
Hall 4	3000	8			768		2
Gymnasium	3000			5	6900		5
Activity Room	2300	36			2649.6		9
Stage	2300	0			0		0
BR1	2300		10		736		5
BR2	2300		8		588.8		4
					67463.2		

Not listed are lights that are on 24/7: 10 tubes in five 2-tube fixtures in the Main Hall, 6 tubes in 3 2-tube fixtures in the "café" area between the library and the cafeteria-type room (there is a

kitchen but it is not used), and 4 tubes in the connecting hall between the library and gym sides in a single fixture. Thus 24/7 interior lighting consumes 20x0.032x8760 = 5,606 kWh/year.

During the assessment, 20 17W LED tubes were donated that happened to match the number of 24/7 tubes. 18 were installed, while the last fixture between the library and cafeteria area could not be opened:

Part of the 24/7 lighting



The fixture on the right (center fixture of the 3) has been updated with 17W LED tubes as a service during the assessment. The fixture on the left could not be updated because we could not remove the grate cover.

Two excess LED tubes were left and it is assumed that facility personnel will perform the replacement at a later time, for instant savings from the assessment of 20x(0.032 – 0.017)x8766 = 2,630 kWh/year ($105/year, at the facility's rate of $0.04/kWh, more on that below).

In addition there is a display case at the entrance that appears to have 2 34W T12 tubes, that apparently operate 24/7, that thus consume 2x0.034x1.2 (T12 ballast factor)x8766 = 715 kWh/year.

The building is heated and cooled by 4 gas-fired Rooftop Units (RTUs). (Gas consumption for the building is 1,841 MMBTU/year @ $7.62/MMBTU, apparently all for the RTUs for space heat.) (There are boilers in the basement, but they appear decommissioned). The RTUs are controlled by a Building Automation System (BAS) according to facility personnel, but it could not be examined during the assessment. The RTUs appeared to be maintaining temperature set points, but it is unknown if there are unoccupied set backs. Also, all 4 RTUs were found with their fans operating continuously, so-called "fan-on" mode, as opposed to "fan-auto" mode where the fans only come on when heating or cooling. The RTUs were measured and the fans were found to consume:

RTU1 3.316 kW

RTU2 2.753 kW

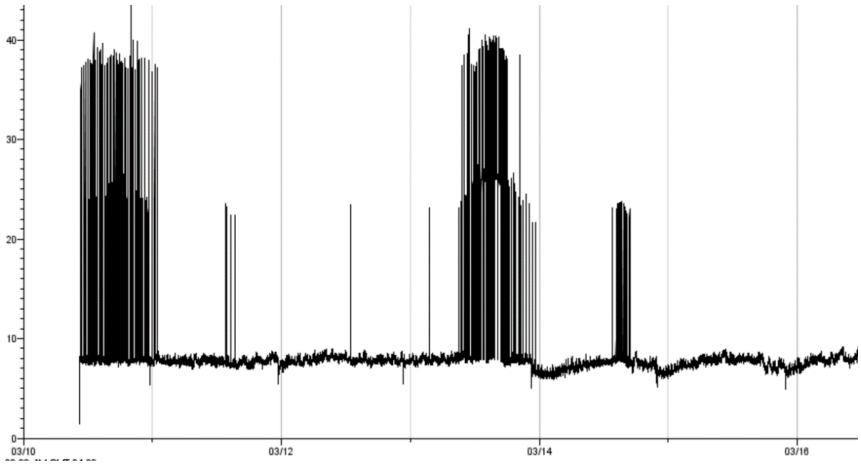
RTU3 2.842 kW

RTU4 2.759 kW

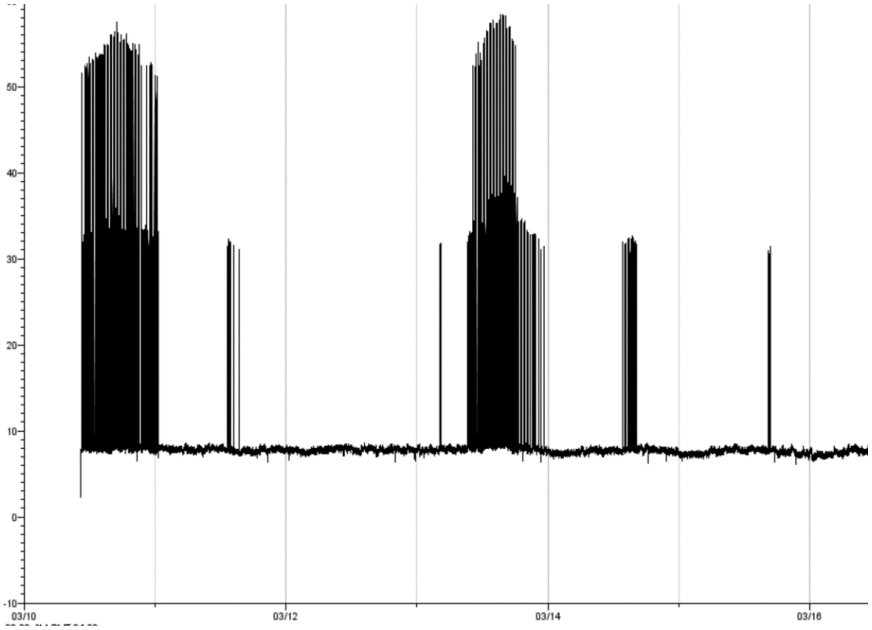
Total 11.67 kW

Data loggers have been left on all 4 RTUs to determine if the fans are on 24/7. Assuming that they are, their consumption is 11.67x8766 = 102,300 kWh/year. **Logger data:**

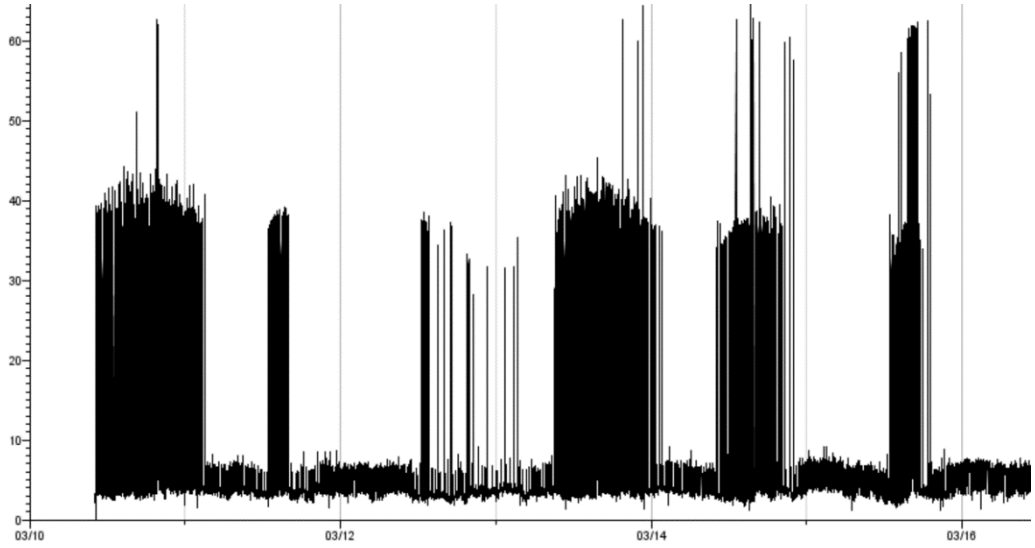
RTU2:



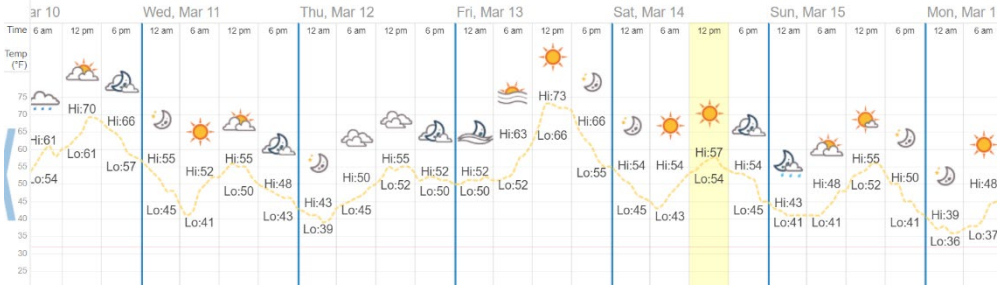
RTU3:


50
40
30
20
10
0
-10
03/10
03/12
03/14
03/16

RTU4:

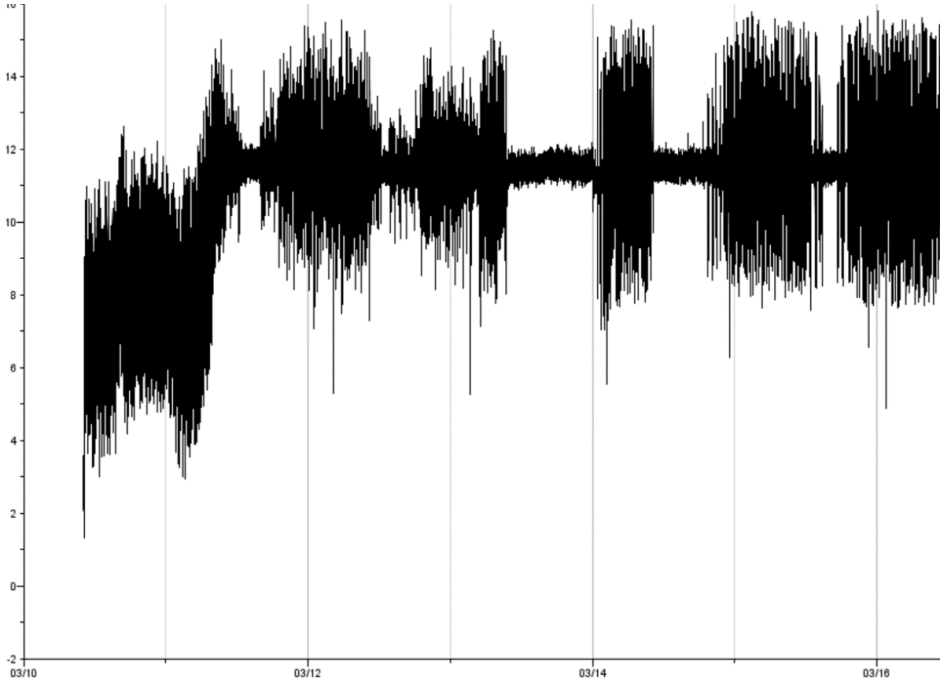

60
50
40
30
20
10
0
03/10
03/12
03/14
03/16

Here is the weather during the logging period:



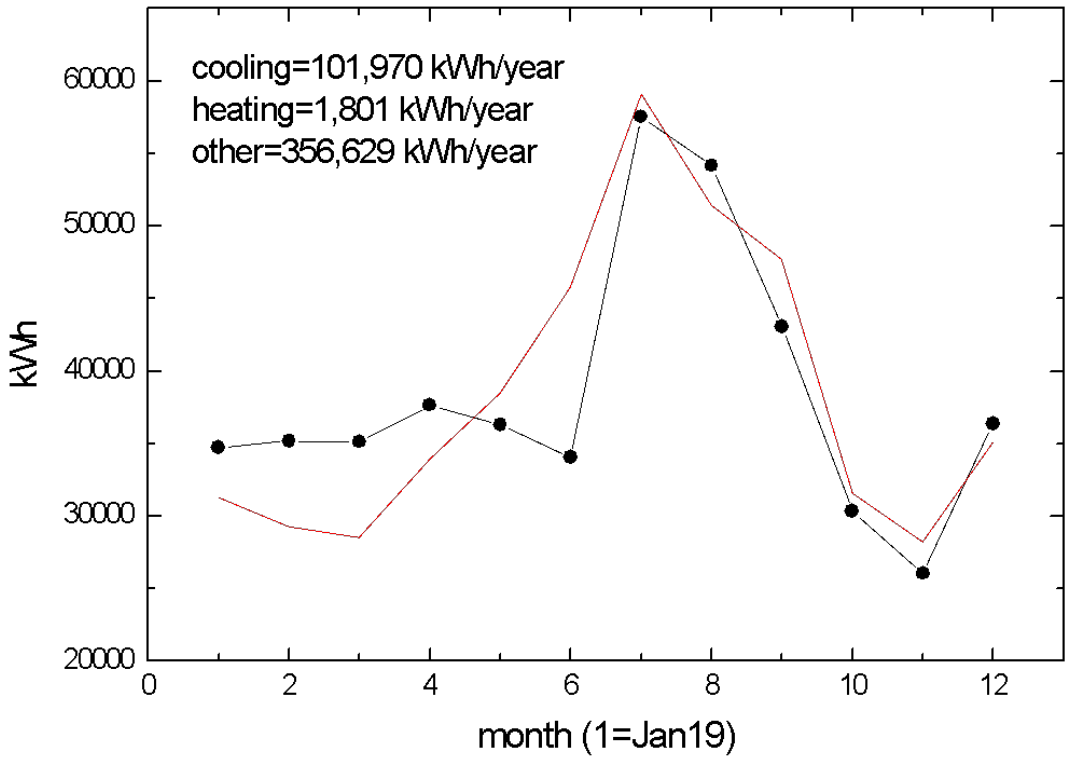
It can be seen that the RTU fans are on continuously as assumed. That is the baseline in the plots. The higher levels are the RTU air conditioning compressors coming on. It can be seen that they correlate with higher temperatures. It can be observed that the same level of air conditioning occurs night or day, so evidently there are no unoccupied thermostat set backs and that recommendation is now added below.

RTU1:



This RTU is weird and not showing a normal plot. It could require maintenance.

The building has a solar array, and net metering, so that building consumption can be obtained from the meter input, and here is plotted vs. month with seasonal analysis:



Note that the 12-month billing period supplied was 370 days, so prorating to average 365.25 (taking into account leap year), annual cooling consumption is 100,661 kWh/year, heating consumption 1,778 kWh/year, and total annual consumption is 454,489 kWh/year.

In addition to lighting and HVAC, 16 computers were found in the library section, apparently on 24/7. A bank of 5 were measured and found to consume 1,730 kWh/year, and thus extrapolating all 16 are approximated to consume 5,536 kWh/year.

There is also a refrigerator in the kitchen that was measured to consume 147 kWh/year.

Thus a partial breakdown of annual electric consumption is:

Space cooling	100,661 kWh/year (RTU compressors only because RTU fans on 24/7)
Heating	1,778 kWh/year (RTU combustion fans only because RTU fans on 24/7)
RTU fans	102,300 kWh/year (24/7 fan operation)
Occupied lighting	67,463 kWh/year

24/7 interior lights	5,606 kWh/year (before donation)
Display case lights	715 kWh/year
Computers	5,536 kWh/year
Refrigerator	147 kWh/year
Other	170,283 kWh/year

The facility has a solar array and net metering as noted. The facility is billed by Tesla for the array production, and was billed by Tesla for 582,204 kWh/year during the billing period @ $0.058/kWh. Note that solar production exceeds building consumption (the solar production is apparently also counted against town hall consumption, and exceeds the total consumption of both buildings). Thus Delmarva has not billed for kWh during the billing period (except a small amount the first month of the billing period supplied). The Tesla bill is independent of building consumption. Thus, the electric savings of any measure is based only on what Delmarva charges for delivery, which is primarily demand charges. Thus the $ savings of any electric savings recommendation (for the community center) is $0.009/kWh, and $0.04/kWh including demand charges.

It must be noted here that the solar array appears too small to account for the production billed for. It appears less than 50x50'. Assuming 20 % module efficiency and 2500 ft2 (232 m2), using the horizontal insolation factor of 4 kWh/m2/day for northern DE, expected annual output is 0.2x232x4x365.25 = 67,790 kWh/year, far, far less than the 582,204 kWh/year being billed for. **There is something very weird going on here. Tesla is billing for a far greater amount than the array can possibly produce. However, Delmarva is apparently net metering the amount Tesla is billing for. It's not clear to this auditor what to do here, or whether anything should be done about the billing discrepancy, since if the Tesla bill is corrected, then Delmarva will start billing higher. It's as if the facility is receiving the benefit of a much larger array than actually exists on the community center. Perhaps there is another "section" of the array at a different location?**

This report will proceed with the billing facts as known, that the solar production being accounted-for exceeds the consumption of the community center (and town hall) by ~ 88,000 kWh/year (currently, before implementation of electric savings measures in this report). This overproduction is sent back to Delmarva and there is no recompensation known by this auditor. If there is recompensation for the solar "overproduction" it is probably at much less than retail rates. Thus, it would be best to "dump" the overproduction in the facility by displacing other energy uses. The only such use is space heat. Thus, paradoxically, it appears the facility may have the opportunity to actually save money by using electric heat.

Town Hall:

The town hall houses administrative offices and meeting rooms on the 1st floor and the police station on the 2nd floor. First floor hours are 8:30a-4:30p M-F with approximately 1.5 2-hour evening meetings per week, or using 50 hours/week taking into account holidays, (8x5 + 1.5x2)x50 = 2,150 hours/year. The police station is occupied roughly 8am-midnight every day, or 16x365.25 = 5,844 hours/year. There is a mixture of fluorescent, incandescent, and CFL lighting, and this is the lighting survey:

Room	hour/year	32W T8 Tube	9W LED Bulb	60W INC	43W INC	19W CFL BULB			# of Fixtures
Back Conference Room	2150	32					2201.6		8
Side Offices	2150	32					2201.6		8
Front Office/Reception	2150		4	2			335.4		2
Storage	2150	4					275.2		2
Connecting Hall	2150	10					688		3
Back Room	2150					3	122.55		1
Front Office	2150		3				58.05		1
Lobby	2150		1			3	141.9		2
Bathroom	2150				1		92.45		1
Police Lobby	5844	2					374.016		1
Police Main Room	5844	32					5984.26		16
Police Front Office	5844	4					748.032		2
Police Evidence	5844	2					374.016		1
							13597.1		

The building is heated by a steam boiler routing low pressure steam to radiators in a 1-pipe system, so cannot be refitted for hot water without completely new plumbing. A single thermostat appears to maintain setpoint by regulating steam pressure, increasing pressure by firing as temperature drops below set point. Gas consumption is 278 MMBTU/year @ $7.64/MMBTU, and from summer consumption appears to be 274 MMBTU/year for the boiler and 4 MMBTU/year for a gas-fired, pressure fed Domestic Hot Water (DHW) heater.

The building is cooled via residential-style split condenser units routing refrigerant to fan coil units.

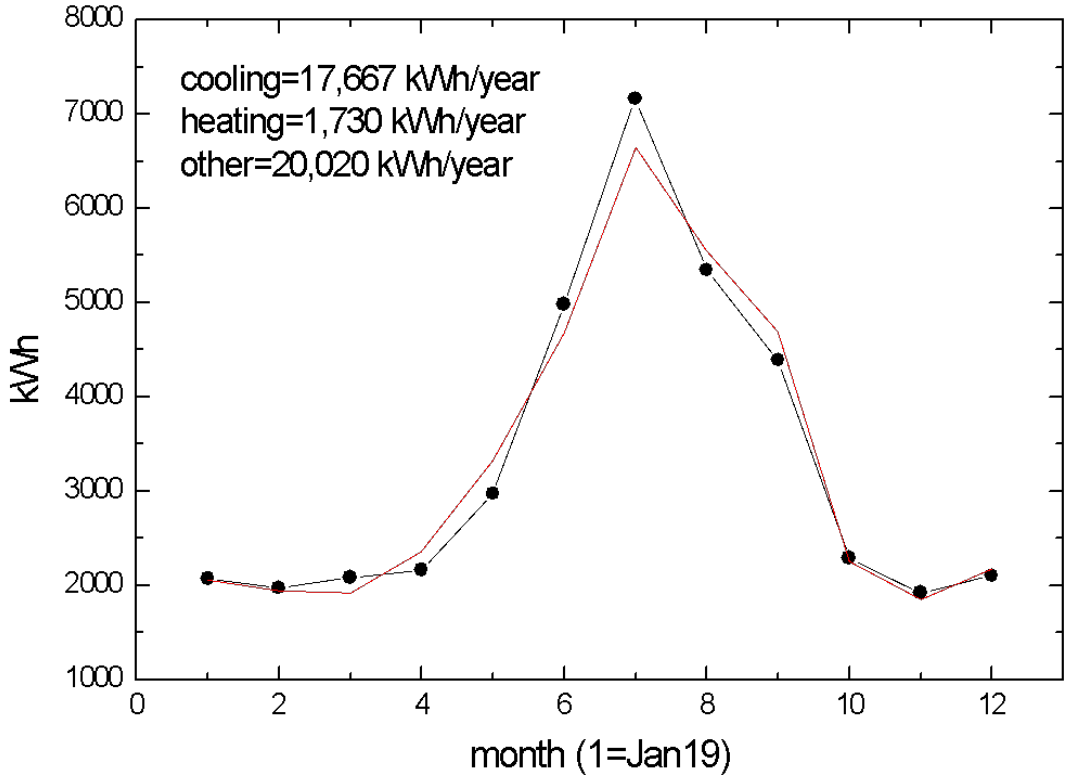
The 1st floor thermostat (which governs heat for the entire building and cooling for the 1st floor) was programmed to (winter/summer):

M-Su: 7a – 73/73 F – 8p – 73/75

At the assessment it has been reprogrammed with a nightly set back, recommendation 1 below.

The 2nd floor thermostat which regulates 2nd floor cooling only is programmed to 74 F continuously.

Here is the monthly electric consumption showing the seasonal fit:



Thus the annual town hall electric consumption of 39,417 kWh/year appears to have this breakdown:

Space cooling	17,667 kWh/year
Boiler combustion fan	1,730 kWh/year
Interior lighting	13,597 kWh/year
2nd floor refrigerator	607 kWh/year
Other	5,816 kWh/year

The other component is primarily computer and copy machines.

It appears from the billing that the "overproduction" of the solar array is also applied to the town hall, so that Delmarva does not bill for kWh (except a small amount the first two months of the billing period). Thus like for the community center, the main electric charges are for delivery from Delmarva, which is $0.017/kWh, and $0.054/kWh including demand charges.

Building existing Best Practices include fan-auto programming of the thermostats.

Note that replacement of the 33 40x84" (23.3 ft2) single-pane windows with double-pane was discussed at the assessment. On an R-value alone, the savings would be approximately 33x23.3x(73 F – 43 F (average winter outside temperature) x(1 – ½) x 8766/2 /0.75 (eff) = 49.9 MMBTU/year. Additionally facility personnel report that the existing windows leak. The building is in a higher windage area, and estimating an average flow of 10 cfm/window, there is additional savings of the measure of 33x10x60 min/hr x0.018 (BTU/ft3/F) x (73 – 43) x8766/2/0.75 = 62.5 MMBTU/year, for total gas savings of 112.4 MMBTU/year ($859/year). However, it is estimated that each window will cost $800 - $1000 to replace, for implementation cost of about $29,700, leading to a payback of 35 years. Thus unless there are other reasons to replace the windows, it does not appear to be a good recommendation on economics alone.

Building existing Best Practices include fan-auto programming of the thermostats.

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ENERGY AND WASTE ACCOUNTING

ENERGY MANAGEMENT

One of the most practical strategies to analyze and control costs is an effective energy management program. Keeping up-to-date records of monthly energy consumption and associated costs using spreadsheets and bar charts can help track energy usage and identify opportunities to increase production efficiency and reduce energy costs. Separate analyses should be carried out for each primary energy type and all units should be converted to a common basis for easy interpretation and comparison.

The primary electric unit used in this report is kilowatt-hours per year (kWh/yr); electric demand savings are reported in kilowatts per year (kW/yr). The primary gas energy unit used is therms of natural gas (thm). The energy units used for liquid fuels (diesel, propane, gasoline) is British Thermal Units (Btu) per unit volume. All electric energy and gas energy savings are also reported in the common unit of Btu/yr), or million Btu's per year (MMBtu/yr). Some common conversion factors are listed below.

Energy Unit	Equivalent Value
GENERAL	
1 MMBtu	1,000,000 BTU
1 gallon of water	8.33 lbs
1 Kilojoule	0.94782 BTU
ELECTRICITY	
1 kWh	3,413 Btu or 0.003413 MMBtu
1 MMBtu	293.0 kWh
1 hp-h (electric)	2,545 Btu or 0.002545 MMBtu
1 hp (electric)	0.746 kW
1 kW	1.341 hp (electric)
NATURAL GAS	
1 therm (thm)	100,000 Btu
1 decatherm (Dth)	10 therms = 1,000,000 Btu = 1 MMBtu
100 cu. ft. natural gas (ccf)	~92.02 therms = 9.202 MMBtu*
1 hp-h (boiler)	33,500 BTU
OTHER	
1 gallon No. 2 Fuel Oil (Diesel)	140,000 BTU*
1 gallon No. 4 Fuel Oil	144,000 BTU*
1 gallon No. 6 Fuel Oil	152,000 BTU*
1 gallon gasoline	130,000 BTU*
1 gallon propane	92,000 BTU*
1 ton Coal	20,000,000 BTU*
1 Ton Refrigeration	12,000 BTU/hr

* Energy content varies with supplier

DETAILED ELECTRICITY CONSUMPTION SUMMARY

For the Town Hall the facility electric consumption is 39,417 kWh/year @ $0.017/kWh, and $0.054/kWh including demand charges. For the Community Center the facility electric consumption is 582,204 kWh/year @ $0.009/kWh, and $0.04/kWh including demand charges. Note that in savings calculations below, demand charges are included for interior lighting, but not for exterior lighting since that occurs at night when demand is low. A partial rough breakdown is then:

Community Center:

Space cooling	100,661 kWh/year (RTU compressors only assuming RTU fans on 24/7)
Heating	1,778 kWh/year (RTU combustion fans only assuming RTU fans on 24/7)
RTU fans loggers)	102,300 kWh/year (assuming 24/7 fan operation, being checked by
Daily interior lights	67,463 kWh/year
24/7 interior lights	5,606 kWh/year (before donation)
Display case lights	715 kWh/year
Computers	5,536 kWh/year
Refrigerator	147 kWh/year
Other	170,283 kWh/year

Town Hall:

Space cooling	17,667 kWh/year
Boiler combustion fan	1,730 kWh/year
Interior lighting	13,597 kWh/year
2nd floor refrigerator	607 kWh/year
Other	5,816 kWh/year

Community Center Electricity Consumption:

Month	kWh	$/kWh	Monthly Total ($)
JAN	2,067	$0.055	3,375
FEB	1,971	$0.058	3,536
MAR	2,080	$0.058	4,835
APR	2,160	$0.058	5,076
MAY	2,969	$0.059	4,794
JUN	4,979	$0.059	5,657
JUL	7,159	$0.059	6,219
AUG	5,342	$0.059	3,461
SEPT	4,388	$0.059	5,004
OCT	2,286	$0.059	3,652
NOV	1,917	$0.059	3,594
DEC	2,099	$0.059	2,681
TOTALS:	**39,417**	**$0.058**	**$51,883**

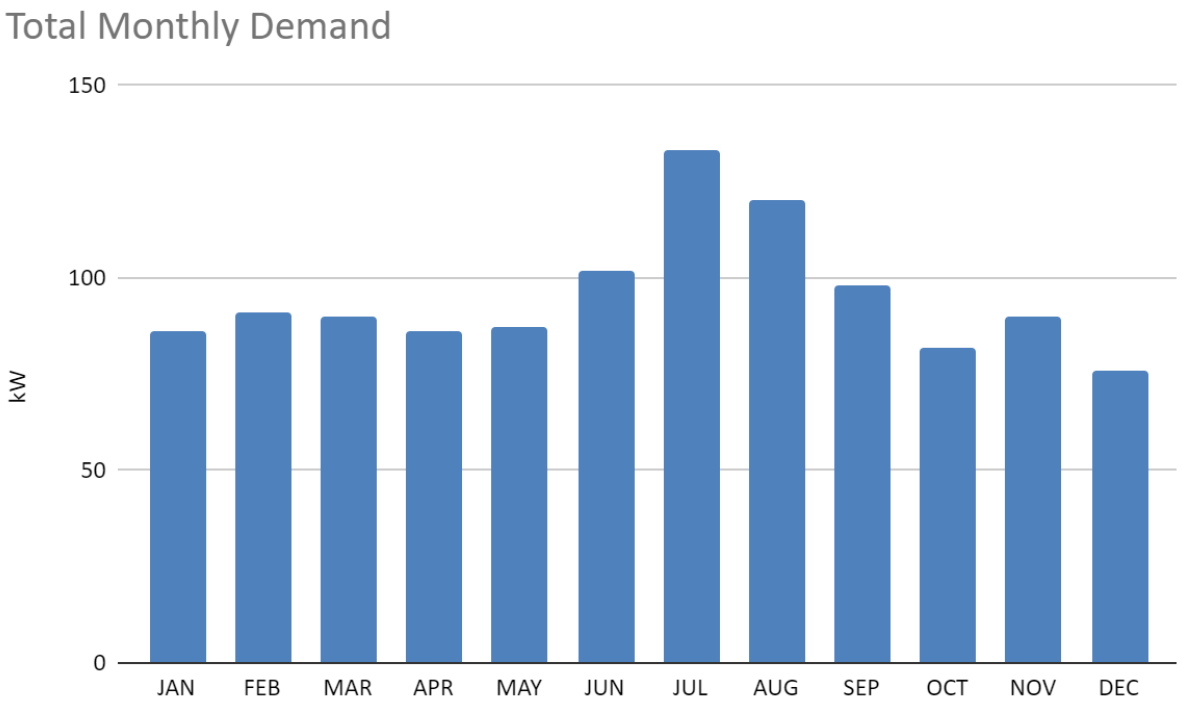
Town Hall Electricity Consumption:

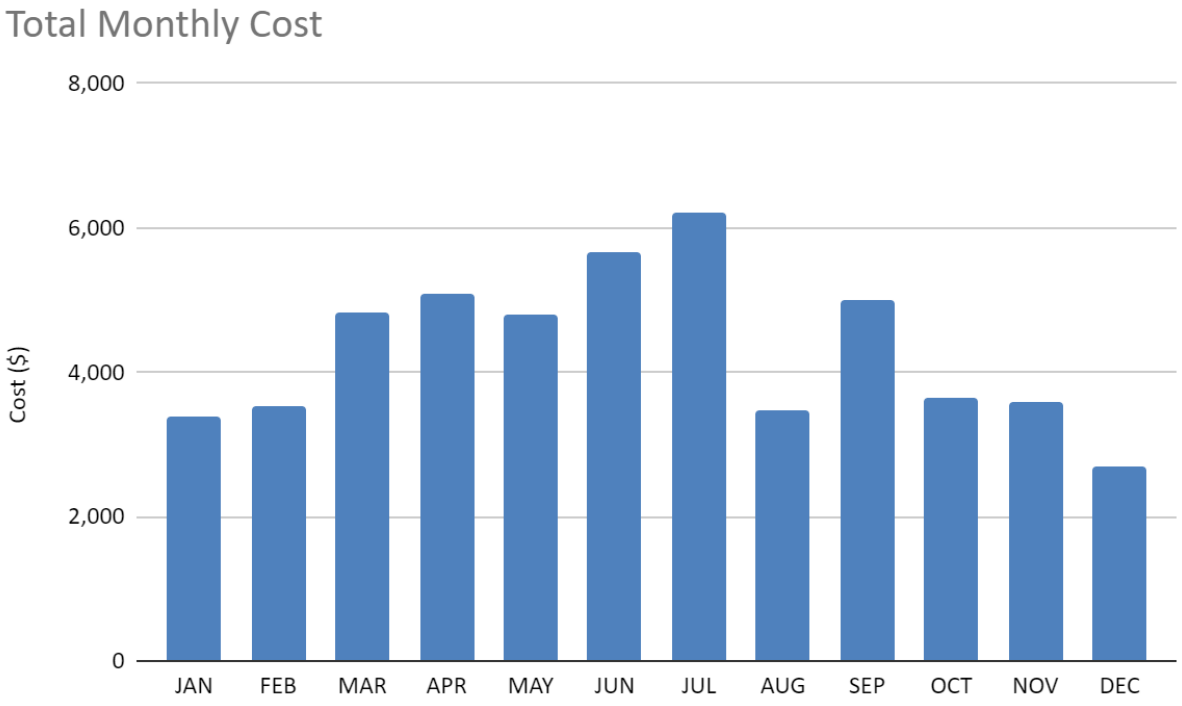
Month	kWh	$/kWh	Monthly Total ($)
JAN	36,829	$0.066	280
FEB	37,135	$0.068	277
MAR	59,838	$0.017	179
APR	64,812	$0.016	213
MAY	58,308	$0.012	270
JUN	67,840	$0.009	300
JUL	70,903	$0.006	299
AUG	26,910	$0.008	301
SEPT	57,540	$0.008	269
OCT	40,131	$0.019	266
NOV	37,472	$0.023	205
DEC	24,485	$0.021	184
TOTALS:	**582,204**	**$0.017**	**$3,044**

Charts for the total site electric consumption and costs are shown on the following page:

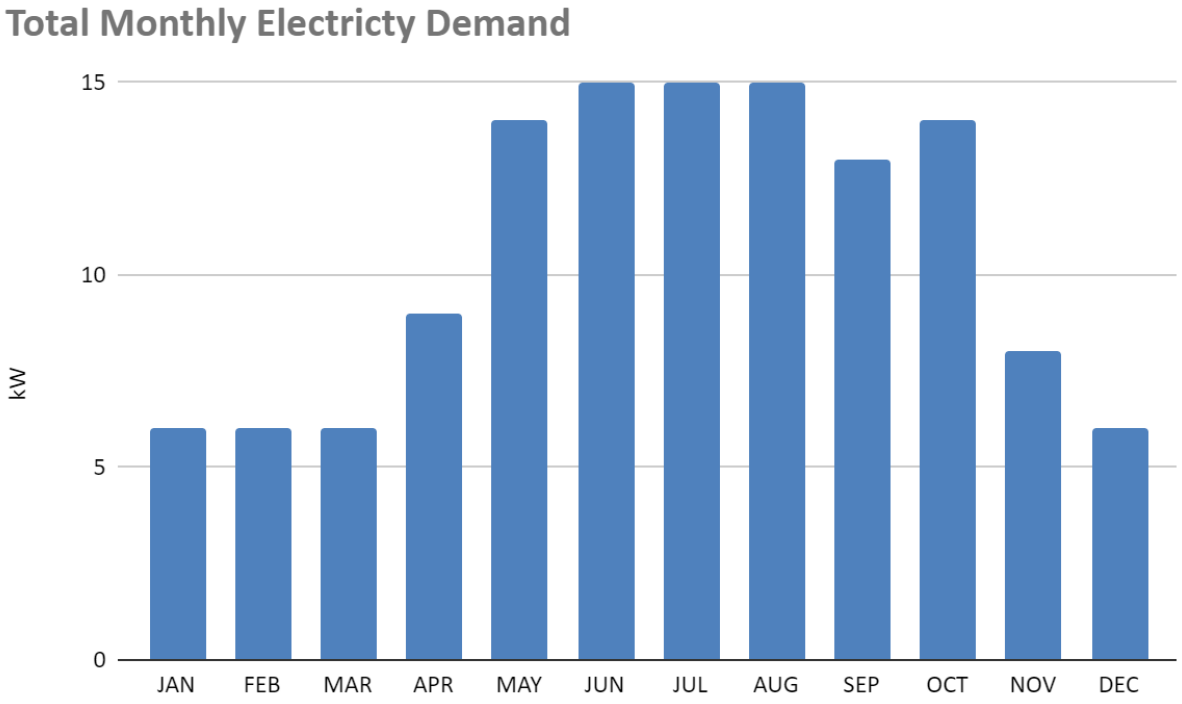
ELECTRICITY COST AND CONSUMPTION GRAPHS

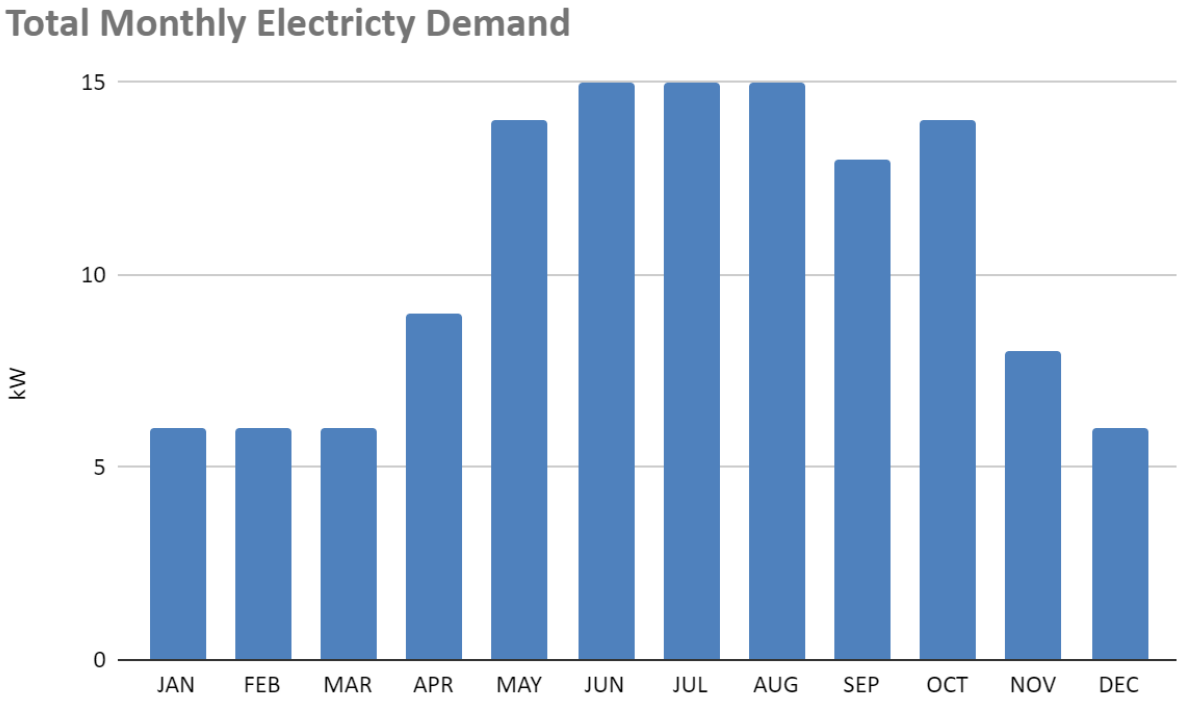
Community Center:





Town Hall:


Total Monthly Electricty Demand
15
10
5
0
kW
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC


Total Monthly Electricty Demand
15
10
5
0
kW
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

DETAILED NATURAL GAS CONSUMPTION SUMMARY

Facility gas consumption for the Community Center is 1841 MMBTU/year @ $7.62/MMBTU, the Town Hall uses 278 MMBTU @ $7.64. A monthly breakdown of gas consumption is shown in the chart below:

Community Center Gas Consumption:

Month	MMBtu	$/MMBtu	Monthly Total ($)
JAN	434	$7.39	$3,260
FEB	338	$7.39	$2,549
MAR	264	$7.39	$2,007
APR	82	$7.40	$661
MAY	34	$7.41	$306
JUN	3	$7.36	$76
JUL	0	$7.31	$54
AUG	0	$7.34	$56
SEP	5	$7.35	$94
OCT	65	$7.48	$537
NOV	234	$8.05	$1,934
DEC	380	$8.09	$3,130
TOTALS:	**1,841**	**$7.62**	**$14,665**

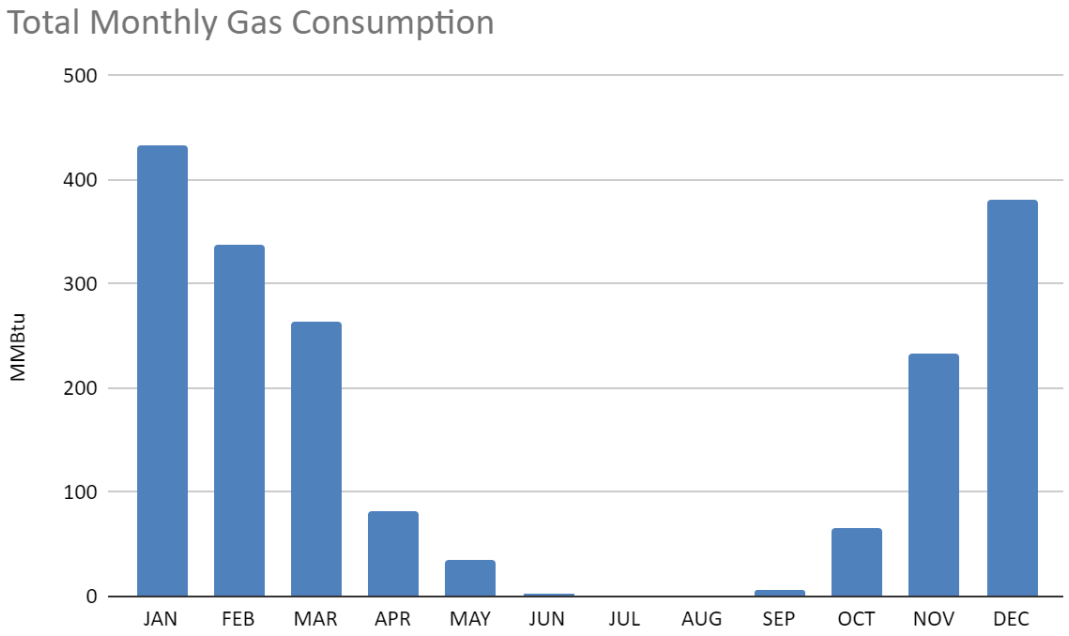
Town Hall Gas Consumption:

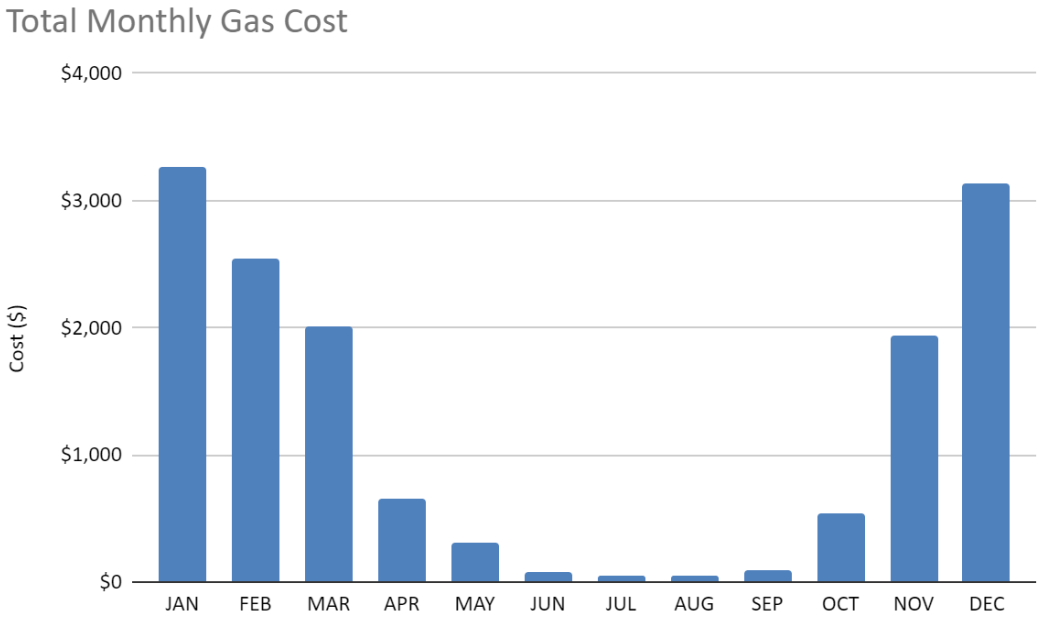
Month	MMBtu	$/MMBtu	Monthly Total ($)
JAN	64	$7.40	$527
FEB	59	$7.40	$491
MAR	40	$7.40	$349
APR	10	$7.36	$126
MAY	3	$7.36	$73
JUN	1	$7.35	$56
JUL	0	$7.34	$56
AUG	0	$7.34	$56
SEP	1	$7.33	$58
OCT	4	$7.35	$86
NOV	34	$8.10	$329
DEC	62	$8.12	$553
TOTALS:	**278**	**$7.64**	**$2,760**

Charts for the total site Natural Gas consumption and costs are shown on the following page:

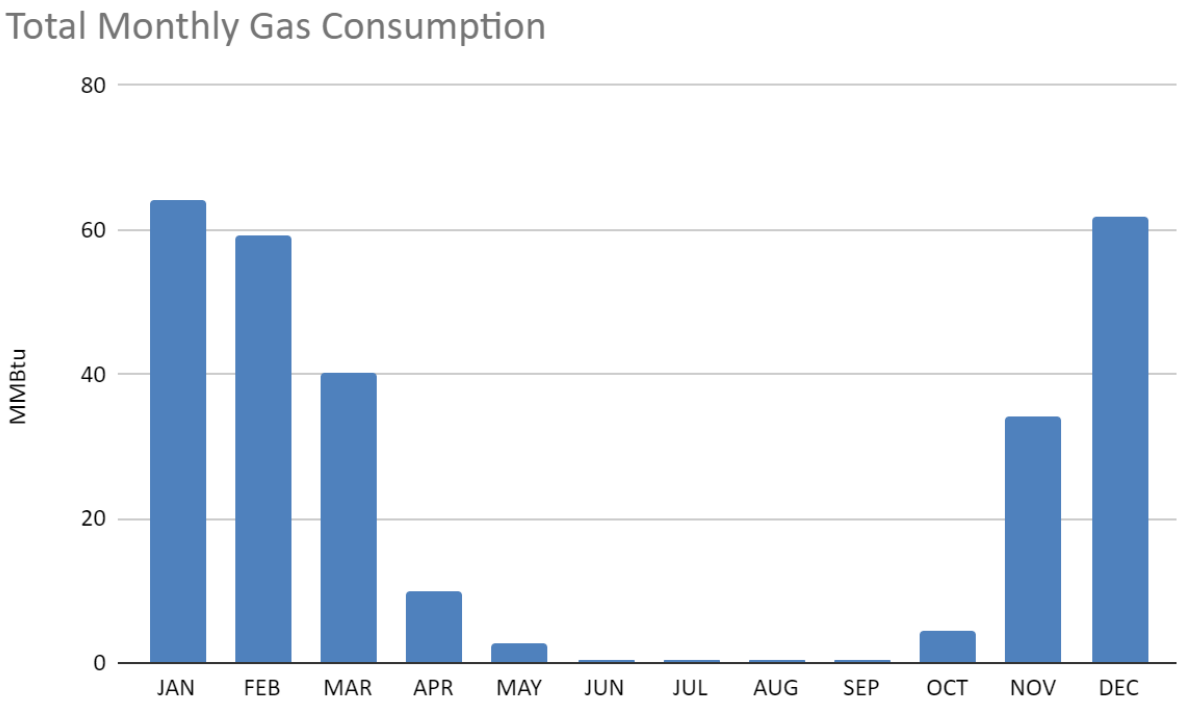
NATURAL GAS COST AND CONSUMPTION GRAPHS

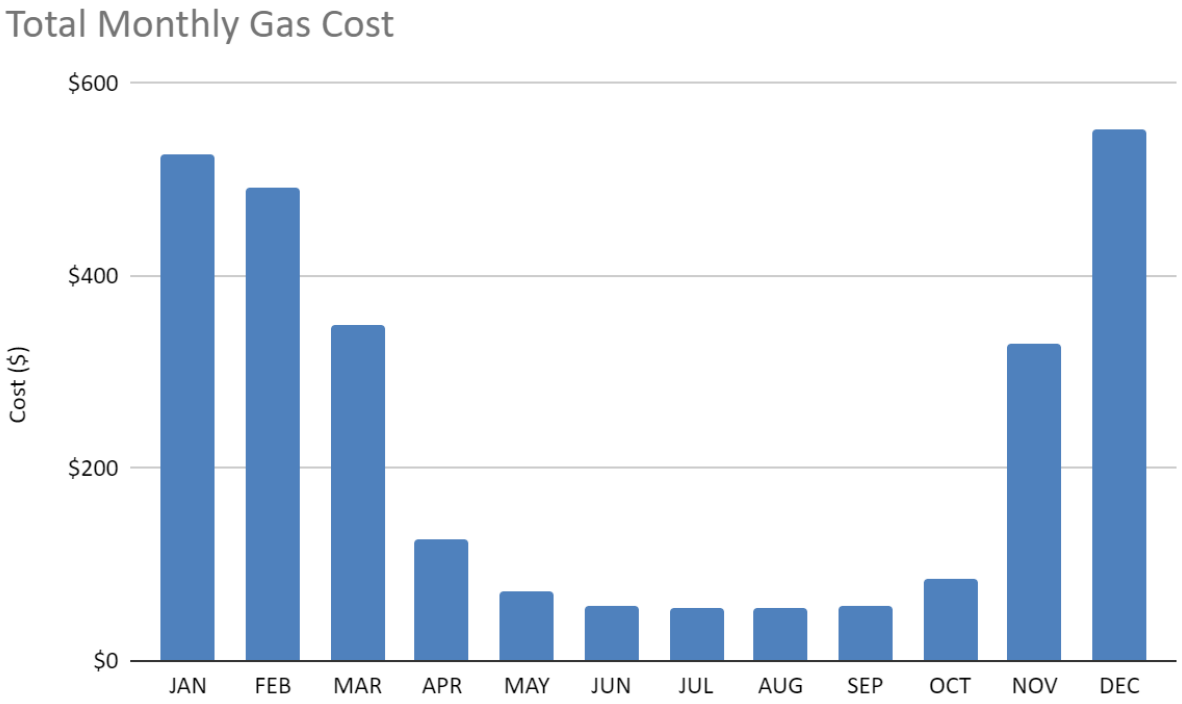
Community Center:





Town Hall:


Total Monthly Gas Consumption
MMBtu
80
60
40
20
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC


Total Monthly Gas Cost
Cost ($)
$600
$400
$200
$0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

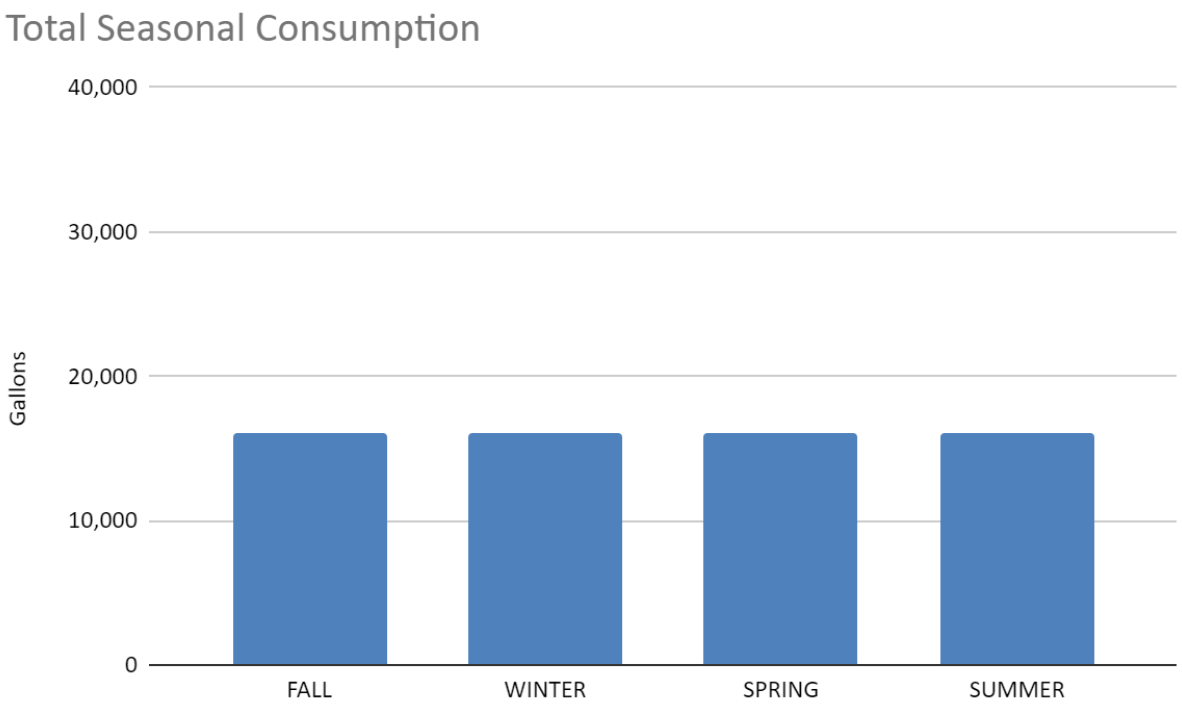
WATER CONSUMPTION SUMMARY

Between the facilities the yearly water consumption is 64,000 gal/year. This is mainly used for bathrooms and other personal uses. A monthly breakdown of water usage is shown in the table below:

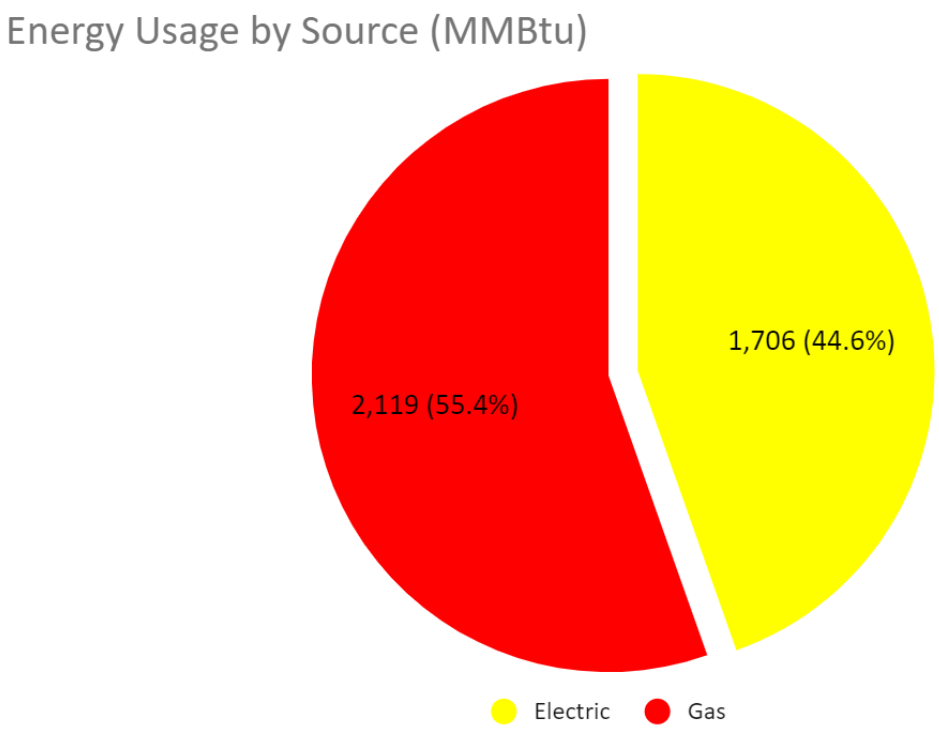
Month	Gallons	$/Thous Gal	Monthly Total ($)
FALL	16,000	$6.43	$102.87
WINTER	16,000	$6.43	$102.87
SPRING	16,000	$6.43	$102.87
SUMMER	16,000	$6.43	$102.87
TOTALS:	**64,000**	**$6.43**	**$411.48**

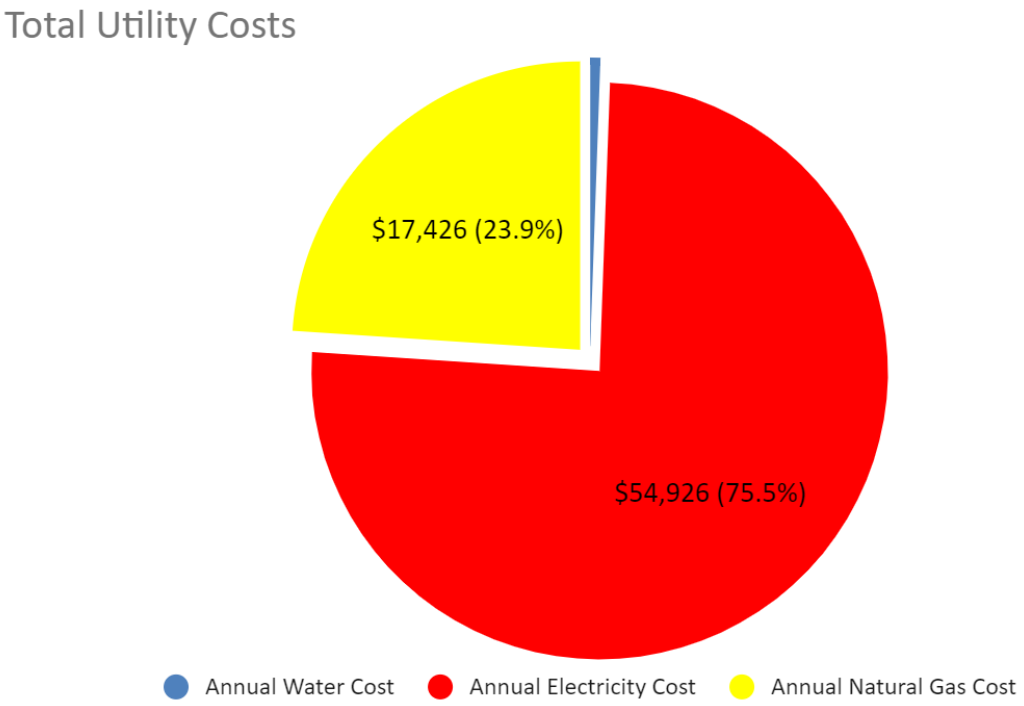
Charts for the total site Water consumption and costs are shown on the following page:

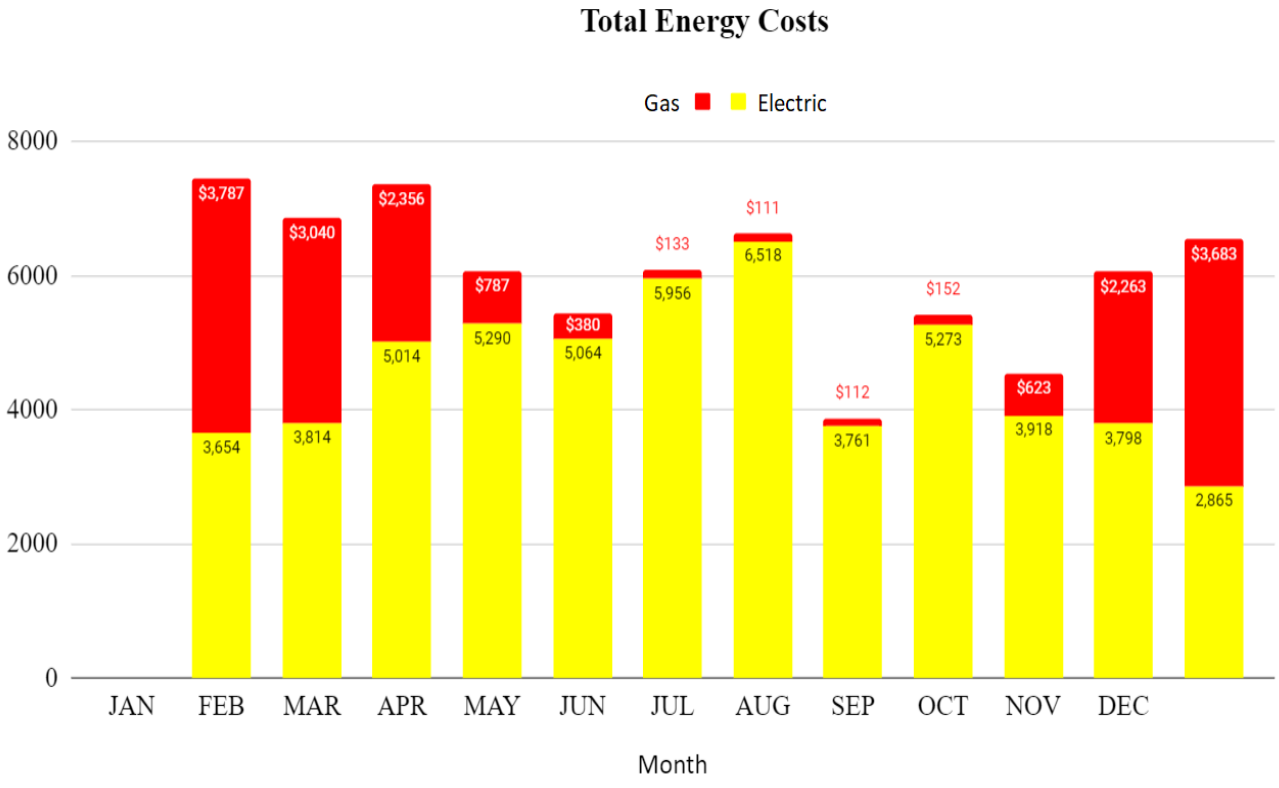
DETAILED WATER COST AND CONSUMPTION GRAPHS



ENERGY USAGE AND COST CHARTS




Total Utility Costs
$17,426 (23.9%)
$54,926 (75.5%)
Annual Water Cost
Annual Electricity Cost
Annual Natural Gas Cost


Total Energy Costs
Gas
Electric
8000
6000
4000
2000
0
$3,787
3,654
$3,040
3,814
$2,356
5,014
$787
5,290
$380
5,064
$133
5,956
$111
6,518
$112
3,761
$152
5,273
$623
3,918
$2,263
3,798
$3,683
2,865
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Month

ASSESSMENT RECOMMENDATIONS

ASSESSMENT RECOMMENDATION #1
SWITCH RTU's TO FAN-AUTO MODE

Annual Resource Savings			Annual Cost Savings	Implementation Costs	Simplified Payback Period
Electricity	**86,955**	**kWh**	**$3,478**	**$0**	**IMMEDIATE**

RECOMMENDATION:
Switch RTU's from fan-on mode to fan-auto mode. This is so the fan motors will only consume electricity while the RTU's are cooling or heating, which is on average only 15% of the time.

CURRENT PRACTICE:
Currently the RTU's appear to be operating on fan-on mode, so it is presumed that the fan motors are operating 24/7 and are consuming a total of 102,300 kWh per year.

ANTICIPATED SAVINGS:
At the time of the assessment the power consumed from each RTU was measured and is listed below,

RTU1 3.316 kW

RTU2 2.753 kW

RTU3 2.842 kW

RTU4 2.759 kW

Total 11.67 kW

Multiplying the total 11.67 kW consumed by the RTU's by the total hours per year shows the fans consuming 102,300 kWh per year,

$$11.67\,kW * 8766\,hr = 102{,}300\,kWh$$

By switching them to fan-auto mode they should effectively only operate 15% of the time (cooling and heating cycles), so the total consumption should be reduced by 85%,

$$102{,}300\,kWh * 0.85 = 86{,}955\,kWh\,per\,year$$

Resulting in a savings of,

$$86{,}955 * \$0.04 = \$3{,}478\,per\,year$$

The payback period for the implementation of the recommendation is instantaneous.

Annual Reduction in Electricity: 86,955 kWh
Annual Savings: $3,478

IMPLEMENTATION COSTS:

Material and Labor Costs			
Item Description:	**Quantity:**	**Unit Cost:**	**Total Cost:**
Labor	0	0	$0
Parts	0	0	$0
Total Implementation:			$0

Total Implementation Cost: $0
Calculated Payback Period: IMMEDIATE

ASSESSMENT RECOMMENDATION #2
REDUCE THERMOSTAT SET POINT 8 DEGREES DURING UNOCCUPIED TIME

Annual Resource Savings			Annual Cost Savings	Implementation Costs	Simplified Payback Period
Electricity	**15,531**	**kWh**	**$621**	**$0**	**IMMEDIATE**
Gas	**511**	**MMBTU**	**$3,896**		

RECOMMENDATION:
Reduce thermostat set point by 8 degrees during unoccupied time to reduce costs in electricity and gas.

CURRENT PRACTICE:
Currently the thermostats are not on a controlled schedule.

ANTICIPATED SAVINGS:
The savings anticipated from implementing this recommendation are found in both gas and electric savings, in regards to gas the savings can be found by multiplying the total consumption of 1841 MMBTU by 8 degrees, which will have a savings of 5.4% per degree, which is then multiplied by the fraction of hours per week there will be reduction,

$$1841\ MMBTU * 8 * 0.054 * (108/168) = \mathbf{511\ MMBTU} * \$7.62 = \mathbf{\$3,896}$$

$$\frac{511\ MMBTU}{1841\ MMBTU\ (total\ heating\ consumption)} = 27.8\%\ reduction\ in\ heat\ consumption$$

Leaving the new heat consumption as:

$$1 - 27.8\% = 72.2\%$$

The reduction in electricity costs can be found by taking the annual cooling electricity consumption of 100,661 kWh multiplied by 8 degrees at 3% savings per degree, which is then multiplied by the fraction of hours per week there will be reduction,

$$100{,}661\ kWh * 8 * 0.030 * (108/168) = 15{,}531\ kWh$$
$$15{,}531\ kWh * \$0.04 = \$4{,}517$$

Annual Reduction in Electricity = 15,531 kWh
Annual Reduction in Gas = 511 MMBTU
Annual Savings: $4,517

IMPLEMENTATION COSTS:

Material and Labor Costs			
Item Description:	**Quantity:**	**Unit Cost:**	**Total Cost:**
Labor	0	0	0
Parts	0	0	0
Total Implementation:			0

Total Implementation Cost: $0
Calculated Payback Period: IMMEDIATE

ASSESSMENT RECOMMENDATION #3
PLUG COMPUTERS INTO OUTLET TIMERS

Annual Resource Savings			Annual Cost Savings	Implementation Costs	Simplified Payback Period
Electricity	**3,691**	**kWh**	**$148**	**$40**	**<4 Months**

RECOMMENDATION:
Plug computers into an outlet timer so that they are not left on and continue to consume power during unoccupied time. The computers will have to be manually powered on by users at the time of use.

CURRENT PRACTICE:
Currently it is presumed that the computers are left on 24/7.

ANTICIPATED SAVINGS:
Setting the timers so that the computers are only powered from 12pm-8pm, reduces the time powered from 168 hours per week down to 56 (112 hr for both sets of computers). At the time of the assessment we logged the computer outlet and determined they consumed 5536 kWh, resulting in a savings of,

$$(112/168) * 5536\,kWh = 3691\,kWh\,per\,year$$
$$3691\,kWh * \$0.04 = \$147.62\,per\,year$$

Upon research you can purchase outlet timers online at amazon for approx $20.00 per unit, totaling $40.00 for both sets of computers, therefore the payback period for this recommendation is,

$$(\frac{\$40.00}{\$147.62} * 365)/30\,days\,per\,year = 3.3\,Months$$

Annual Reduction in Electricity: 3,691 kWh
Annual Savings: $147.62

IMPLEMENTATION COSTS:

Material and Labor Costs			
Item Description:	**Quantity:**	**Unit Cost:**	**Total Cost:**
Labor	0	0	0
Parts	2	$20.00	$40.00
Total Implementation:			$40.00

Total Implementation Cost: $40.00
Calculated Payback Period: < 4 Months

ASSESSMENT RECOMMENDATION #4
UPGRADE 24/7 INTERIOR LIGHTING TO LED BULBS

Annual Resource Savings			Annual Cost Savings	Implementation Costs	Simplified Payback Period
Electricity	**2,630**	**kWh**	**$105**	**$0**	**IMMEDIATE**

RECOMMENDATION:
Upon observation a 20 of the lighting fixtures in the library are wired to stay on 24/7, at the time of the assessment we replaced these 32W bulbs with 17W LED bulbs. Additional savings can be achieved by wiring those select fixtures so that they are able to be turned off during unoccupied time. Note that one 24/7 fixture located directly in front of the cafeteria was not able to be replaced because the shroud on the light was not able to be removed like the others, so the bulbs were left for maintenance personnel to replace themselves.

CURRENT PRACTICE:
Currently there are a select handful of lighting fixtures in the library that are wired to stay on 24/7.

ANTICIPATED SAVINGS:
The anticipated savings from this recommendation are found by multiplying the number of light fixtures by the difference in kW between the bulbs and then multiplying by the total number of hours in a year,

$$20\ fixtures\ (0.032kW - 0.017kW) * 8766\ hr\ per\ year\ =\ 2630\ kWh\ per\ year$$

Resulting in a savings of,

$$2630\ kWh\ * \$0.04\ = \$105\ per\ year$$

The payback period for this implementation is instantaneous considering these upgraded bulbs were provided during the assessment. It is possible to further increase the savings by wiring the lighting so that the bulbs that are currently 24/7 can be shut off during unoccupied time,

$$8766\ kWh\ per\ year - 2300\ kWh\ per\ year\ =\ 6466\ kWh\ per\ year$$

$$20\ fixtures * 0.017kW *\ \$0.04\ per\ kWh * (6466) = \$88.00$$

But the savings is relatively minimal and the lighting can help deter intruders, so it is probably best to leave the 24/7 lighting as is.

Annual Reduction in Electricity: 2,630 kWh
Annual Savings: $105

IMPLEMENTATION COSTS:

Material and Labor Costs			
Item Description:	**Quantity:**	**Unit Cost:**	**Total Cost:**
Labor	0	0	$0
Parts	0	0	$0
Total Implementation:			$0

Total Implementation Cost: $0
Calculated Payback Period: IMMEDIATE

ASSESSMENT RECOMMENDATION #5
UPGRADE INTERIOR LIGHTING TO LED BULBS

Annual Resource Savings			Annual Cost Savings	Implementation Costs	Simplified Payback Period
Electricity	**39,540**	**kWh**	**$1,582**	**$4211**	**<3 Years**

RECOMMENDATION:
Upgrade the remaining interior lighting to new plug and play LED bulbs to reduce power consumption.

CURRENT PRACTICE:
Currently the building is using mainly fluorescent bulbs.

ANTICIPATED SAVINGS:
During the time of the assessment we conducted a lighting survey and concluded that if all of the interior lighting was used during occupied time, there would be a total of 67,463 kWh consumed yearly. By replacing 32W T8 4' tubes with 14W such as at https://www.amazon.com/AmazonBasics-Commercial-Compatible-24-Pack-Renewed/dp/B07XG2BZN4/ref=sr_1_16?keywords=T8+LED+plug-and-play&qid=1583873736&sr=8-16, and 32W T8 U with 13W LED such as at https://www.homedepot.com/p/Philips-32-Watt-Equivalent-Linear-T8-U-Bend-InstantFit-LED-Tube-Light-Bulb-Daylight-5000K-10-Pack-544882/308351401?mtc=Shopping-B-F_D27L-G-D27L-27_1_Light_Bulbs-Generic-NA-Feed-PLA-NA-NA-LIGHT_BULBS_LEDBulbs&cm_mmc=Shopping-B-F_D27L-G-D27L-27_1_Light_Bulbs-Generic-NA-Feed-PLA-NA-NA-LIGHT_BULBS_LEDBulbs-71700000052750134-58700005050897395-92700048704073475&gclid=EAIaIQobChMI6oOA-uWQ6AIVhY3ICh1NCA6yEAQYASABEgJVEvD_BwE&gclsrc=aw.ds. Replace 400 W gym lights with 100W LED such as https://www.amazon.com/JESLED-Equivalent-AC100-277V-Replacement-Warehouse/dp/B077TTW8YC/ref=pd_sbs_60_t_0/144-9665091-8577068?_encoding=UTF8&pd_rd_i=B077TTW8YC&pd_rd_r=024e9ac1-3891-496e-b78f-ec79ce2edade&pd_rd_w=939vB&pd_rd_wg=7CnF8&pf_rd_p=5cfcfe89-300f-47d2-b1ad-a4e27203a02a&pf_rd_r=E0A1FWZT8X8QHJR5F76D&psc=1&refRID=E0A1FWZT8X8QHJR5F76D, by replacing these bulbs the new lighting survey is shown below to consume only 27,923 kWh per year.

Room	hour/year	14W LED	13W LED tube	100W LED	kWh/year		# of Fixtures
Main Hall	2300	86			2769.2		48
Book Shelf 1	2300	102			3284.4		51
Book Shelf 2	2300	106			3413.2		53
Skylight	2300	18			579.6		9
Café	2300	26			837.2		16
Book Shelf 3	2300	40			1288		20
Reading/Local Hist	2300	36			1159.2		9
Tutoring Center	2300	24			772.8		6
Office and Storage	2300	36			1159.2		9
Meeting Room	2300	28			901.6		7
BR 4	2300	8			257.6		2
Craft Room	2300	24			772.8		6
Computer Training	2300	40			1288		10
BR 1	2300		10		299		5
BR 2	2300		2		59.8		1
BR 3	2300		2		59.8		1
Day Care 1	2300	36			1159.2		9
Day Care 2	2300	36			1159.2		9
Fitness Room	2300	36			1159.2		9
Storage	2300	36			1159.2		9
Hall1	2300	4			128.8		2
Hall 2	2300	12			386.4		3
Hall 3	3000	8			336		2
Hall 4	3000	8			336		2
Gymnasium	3000			5	1500		5
Activity Room	2300	36			1159.2		9
Stage	2300	0			0		0
BR1	2300		10		299		5
BR2	2300		8		239.2		4
					27922.8		

The total reduction in power consumption is,

$$67{,}463\ kWh - 27{,}923\ kWh = 39{,}540\ kWh\ per\ year$$

$$39{,}540\ kWh\ per\ year * \$0.04\ per\ kWh = \$1582\ per\ year$$

Annual Reduction in Electricity: 39,540 kWh
Annual Savings: $1,582

IMPLEMENTATION COSTS:
The cost of implementing this recommendation is found by multiplying the number of each type of bulb needed by their unit cost, which resulted in a total price of $3,671 for a full upgrade, this price can be minimized if there are specific rooms that do not get used often; they do not need to be upgrade because you will not redeem any impactful savings.

The payback period for this implementation is,

Estimated labor: 5 Min per fixture @ $20/h

$$\mathbf{321}\ \boldsymbol{total\ fixtures}\ *\ \mathbf{5}\ \boldsymbol{min}\ =\ \mathbf{1605}\ \boldsymbol{min}\ /\ \mathbf{60}\ \boldsymbol{min\ per\ hour}\ =\ \mathbf{27}\ \boldsymbol{hours}$$

$$\mathbf{27}\ \boldsymbol{hours}\ *\ \mathbf{\$20}/\ \boldsymbol{hour}\ =\ \mathbf{\$540}$$

$$Total\ Cost\text{: }\$540 + \$3671\ =\ \$4211$$

$$\frac{\$4211}{\$1582} = 2.66\ years$$

Material and Labor Costs			
Item Description:	**Quantity:**	**Unit Cost:**	**Total Cost:**
Labor	27 H	$20.00/h	$540
14 W Tube	786	$3.78	$2971.08
13 W U-Tube	32	$12.58	$402.56
100W LED	5	$59.39	$296.95
Total Implementation:			$4211

Total Implementation Cost: $4211
Calculated Payback Period: <3 years

ASSESSMENT RECOMMENDATION #6
EXPERIMENT WITH ELECTRIC WINTER HEATING

Annual Resource Savings			Annual Cost Savings	Implementation Costs	Simplified Payback Period
Gas	**1,473****	**MMBTU**	**$11,225****	**$10,000**	**<2 Years**

**These numbers assume that recommendation #2 has not been implemented.

RECOMMENDATION:
Given the apparent, at least billed, overproduction of the solar array, and the apparent lack of re-compensation for overproduction, electric heat can be implemented to save on gas. Since this measure is somewhat experimental and bills should be examined for actual savings, it is probably best to first experiment with inexpensive floor heaters in winter.

CURRENT PRACTICE:
Currently the Community Center is heated with 4 gas fired RTU's, the buildings total gas consumption is 1,841 MMBTU per year at $7.62/MMBTU.

ANTICIPATED SAVINGS:
If measures 1-4 are implemented, then the facilities total electric savings will be 133,000 kWh/year, so the overproduction would rise to 221,000 kWh/year. The potential savings of implementing electric heating during the winter months can be found by dividing the total overproduction in kWh by the total natural gas use, that is then divided by the efficiency of gas heating (0.85), and then multiplied by 0.5 which represents half the year.

$$((\frac{221{,}000\ kWh}{293\ MMBTU})/0.85) * 0.5 = 444\ MMBTU$$

Resulting in a total savings of,

$$444 MMBTU * \$7.62/MMBTU = \$\ 3{,}383\ per\ year$$

These savings can be increased through the use of heat pumps. Ductless heat pumps can achieve performance of as high as a factor of 5 resulting in a savings of

$$444\ MMBTU * 5 = 2220\ MMBTU/year$$

This is higher than the buildings yearly gas consumption, roughly 80% of current gas consumption can be displaced, resulting in a savings of,

$$(0.80) * 1841\ MMBTU = 1{,}473\ MMBTU$$

$$1473\ MMBTU * \$7.62/MMBTU = \$11{,}225\ per\ year$$

Annual Reduction in Gas: 1,064 MMBTU
Annual Savings: $8,108

IMPLEMENTATION COSTS:

Material and Labor Costs			
Item Description:	**Quantity:**	**Unit Cost:**	**Total Cost:**
Labor		$4000	$4000
Parts		$6000	$6000
Total Implementation:			$10,000

Total Implementation Cost: $10,000
Calculated Payback Period: < 2 Years

ASSESSMENT RECOMMENDATION #7
TOWN HALL THERMOSTAT REPROGRAMMING

Annual Resource Savings			Annual Cost Savings	Implementation Costs	Simplified Payback Period
Electricity	**117**	**kWh**	**$6**	**$0**	**IMMEDIATE**
Gas	**18.5**	**MMBTU**	**$141**	**$0**	**IMMEDIATE**

RECOMMENDATION:
Reprogram town hall thermostat to lower to 68 degrees between midnight and 6AM. Thermostat was programmed by the audit team during the assessment.

CURRENT PRACTICE:
The thermostat was programmed to a schedule, but that schedule held a constant temperature 24/7.

ANTICIPATED SAVINGS:
The anticipated savings from this measure can be found by assuming a savings of 5.4% per degree, and multiplying that by the number of hours the thermostat will be lowered from the occupied setting; resulting in a savings of,

$$5\ degrees\ *\ 0.054\ *\ (6hr/24hr)\ *\ 274\ MMBTU\ =\ 18.5\ MMBTU\ per\ year$$
$$18.5\ MMBTU\ *\ \$7.62\ =\ \$141\ per\ year$$

There is also a concurrent savings from the mimized use of the boilers combustion fan; resulting in a savings of,

$$\left(\frac{18.5\ MMBTU}{274\ MMBTU}\right)\ *\ 1730\ kWh\ =\ 117\ kWh/\ year$$
$$117\ kWh\ *\ \$0.054 = \$6.00$$

$$Total\ Savings\ =\ \$147\ per\ year$$

Annual Reduction in Electricity = 117 kWh
Annual Reduction in Gas: 18.5 MMBTU
Annual Savings: $147

IMPLEMENTATION COSTS:

Material and Labor Costs			
Item Description:	**Quantity:**	**Unit Cost:**	**Total Cost:**
Labor			$0
Parts			$0
Total Implementation:			$0

Total Implementation Cost: $0
Calculated Payback Period: IMMEDIATE

ASSESSMENT RECOMMENDATION #8
INSTALLING DIMMER SWITCHES IN MAIN OFFICE

Annual Resource Savings			Annual Cost Savings	Implementation Costs	Simplified Payback Period
Electricity	**658**	**kWh**	**$36**	**$80**	**<3 years**

RECOMMENDATION:
Install light switches with a dimmer function to operate the lights on the hanging ceiling fans in the main lobby, the staff states that sometimes the LEDs flicker, and need to be replaced with incandescent bulbs, we measured the buildings voltage to be slightly higher than standard (124V) and believe it may be the cause of the flickering, being able to slightly dim the bulbs should fix the flickering issue.

CURRENT PRACTICE:
Currently some bulbs are being replaced by incandescents when they flicker or burn out, which is not an efficient source of lighting.

ANTICIPATED SAVINGS:
The anticipated savings from implementing the recommendation are found by multiplying the 6 incandescent bulbs by the difference in power consumption between the LED and incandescent bulbs, which is then multiplied by the total yearly hours of usage,

$$6 * (0.06\ kW - 0.009kW) * 2150 = 658\ kWh\ per\ year$$
$$658\ kWh\ *\ \$0.054/\ kWh\ =\ \$36$$

Dimming switches can be found for around $20.00, and could easily be installed in less than an hour of labor; resulting in a payback period of,

$$\frac{\$80.00}{\$36.00} = 2.22\ years$$

Annual Reduction in Electricity = 658 kWh
Annual Savings: $36

IMPLEMENTATION COSTS:

Material and Labor Costs			
Item Description:	**Quantity:**	**Unit Cost:**	**Total Cost:**
Labor	1 hr	$60.00/h	$60
Parts	1	$20.00	$20
Total Implementation:			$80

Total Implementation Cost: $80
Calculated Payback Period: < 3 years

ASSESSMENT RECOMMENDATION #9
2nd FLOOR LED UPGRADE

Annual Resource Savings			Annual Cost Savings	Implementation Costs	Simplified Payback Period
Electricity	**4,208**	**kWh**	**$227**	**$262**	**<2 years**

RECOMMENDATION:
Replace 2nd floor lighting with upgraded plug and play LED bulbs.

CURRENT PRACTICE:
Currently the 2nd floor is using t8 compact fluorescent tubes.

ANTICIPATED SAVINGS:
The anticipated savings from implementing the recommendation are found by multiplying the 40 fluorescent bulbs by the difference in power consumption between the LED and fluorescent bulbs, which is then multiplied by the total hours of usage,

$$40 * (0.032\ kW - 0.014kW) * 5844 = 4{,}208\ kWh\ \ per\ year$$
$$4{,}208\ kWh\ *\ \$0.054/\ kWh\ =\ \$227\ per\ year$$

The 14W bulbs can be purchased for $98 for 20 bulbs, 40 bulbs total $196, and labor @ 5 min per bulb for a total of 3.33 hr @ $20/h; resulting in a payback period of,

$$\frac{\$262}{\$227} = 1.15\ Years$$

Annual Reduction in Electricity = 4,208 kWh
Annual Savings: $227

IMPLEMENTATION COSTS:

Material and Labor Costs			
Item Description:	**Quantity:**	**Unit Cost:**	**Total Cost:**
Labor	3.33 hr	$20.00/h	$66.66
Parts	40	$4.90	$196
Total Implementation:			$262

Total Implementation Cost: $262
Calculated Payback Period: < 2 years

ASSESSMENT RECOMMENDATION #10
1st FLOOR LED UPGRADE

Annual Resource Savings			Annual Cost Savings	Implementation Costs	Simplified Payback Period
Electricity	**3,019**	**kWh**	**$163**	**$522**	**<4 years**

RECOMMENDATION:
Replace 1st floor lighting with upgraded plug and play LED bulbs.

CURRENT PRACTICE:
Currently the 1st floor is using t8 compact fluorescent tubes.

ANTICIPATED SAVINGS:
The anticipated savings from implementing the recommendation are found by multiplying the 78 fluorescent bulbs by the difference in power consumption between the LED and fluorescent bulbs, which is then multiplied by the total hours of usage,

$$78 * (0.032\,kW - 0.014kW) * 2{,}150h = 3{,}019\,kWh\ \ per\ year$$
$$3{,}019\,kWh\ *\ \$0.054/\,kWh\ =\ \$163\,per\ year$$

The 14W bulbs can be purchased for $98 for a 20 bulb pack, 78 bulbs rounded to 80 bulbs total $392, and labor @ 5 min per bulb for a total of 6.5 hr @ $20/h; resulting in a payback period of,

$$\frac{\$522}{\$163} = 3.2\,Years$$

Annual Reduction in Electricity = 3,019 kWh
Annual Savings: $163

IMPLEMENTATION COSTS:

Material and Labor Costs			
Item Description:	**Quantity:**	**Unit Cost:**	**Total Cost:**
Labor	6.5 hr	$20.00/h	$130
Parts	80	$4.90	$392
Total Implementation:			$522

Total Implementation Cost: $522
Calculated Payback Period: < 4 years

ADDENDUM

APPENDIX I: SECONDARY EFFECTS OF ENERGY EFFICIENCY ON AIR POLLUTION

Implementing the proposed energy efficiency recommendations will decrease the amount of electricity that must be generated and fuel that must be consumed and contribute directly to reductions in common air pollutants. Reducing energy consumption will decrease carbon dioxide (CO_2), sulfur dioxide (SO_2) and nitrogen oxides (NO_x) emissions directly from plant fuel consumption as well as indirectly at power generating stations. The table below shows the emission factors of each air pollutant based on each fuel source (see footnote references for emission factor sources).

Emissions Factors	_ftn1	_ftn2	_ftn3	No 6 Fuel Oil (lbs/mmBTU)3	_ftn4
CO2 Factor	1.2295	117	160.4317	179.8561	137.3626
SO2 Factor	0.0072	0.0006	1.1295	1.1295	0.0011
NOX factor	0.002	0.092	0.1727	0.3957	0.1429

If all of the recommendations in this report were implemented, electricity consumption would be reduced by **156,389 kWh**. Carbon dioxide emissions would decrease by **378,720 lbs/year**, sulfur dioxide emissions by **1,127 lbs/year**, and nitrogen oxide emissions by **459 lbs/year**. Total carbon footprint reduction is **37.42%,** total SO_2 reduction would be **25.17%,** and total NO_x reduction would be **31.92%**. The table on the following page provides a breakdown of how air emissions are reduced for each assessment recommendation:

AR No.	Assessment Recommendation	Energy Savings	CO_2 Reduction (lbs/yr)	SO_2 Reduction (lbs/yr)	NO_x Reduction (lbs/yr)
1	Switch RTUs to Fan-Auto Mode	86995 kWh	106,960	626.4	174.0
2	Reduce Thermostat Set Points 8 Degrees During Unoccupied Times**	15531 kWh 511 MMBTU	78,882	112.1	78.1
3	Plug Computers Into Outlet Timers	3691 kWh	4,538	26.6	7.4
4	Uograde 24/7 Interior Lighting to LED Bulbs	2630 kWh	3,234	18.9	5.3
5	Upgrade Interior Lighting to LED Bulbs	39540 kWh	48,614	284.7	79.1
6	Experiment with Electric Winter Heating**	1473 MMBTU	172,341	0.9	135.5
7	Reprogram Town Hall Thermostats	117 kWh 18.5 MMBTU	2,308	0.9	1.9
8	Install Dimmer Switches in the Main Office of the Town Hall	658 kWh	809	4.7	1.3
9	Upgrade the Town Hall Second Floor Lighting to LED	4208 kWh	5,174	30.3	8.4
10	Upgrade the Town Hall First Floor Lighting to LED	3019 kWh	3,712	21.7	6.0
TOTALS			**378,720**	**1,127**	**459**
CURRENT EMISSIONS FOOTPRINT			**1,012,206**	**4,477**	**1,438**
TOTAL % REDUCTION OPPORTUNITY			**37.42%**	**25.17%**	**31.92%**

****Please note that although there are natural gas savings listed for both AR2 & AR6, but because these effect each other, the actual gas savings of these two measures is 1,841*(1-(1-27.8%)*(1- 80%))=1,575 MMTU/year. This number is used to calculate total emissions reduction from the facility**

APPENDIX II: INFORMATION ABOUT ENERGY EFFICIENCY INCENTIVES IN DELAWARE

There are various incentives available from the federal government and State of Delaware that could help to defray the costs of implementing the energy efficiency recommendations provided in this report. Additionally, the facility can understand federal financial incentives for installation and use of renewable energy technologies. Although this assessment did not include a review of renewable energy technology opportunities, large environmental footprint reductions can be made through use of non-fossil fuel energy and there are excellent federal incentive opportunities to assist with costs of renewable energy. To understand the most current incentives, the facility should consult the following websites:

Federal Incentives:

- US DOE Office of Energy Efficiency and Renewable Energy: https://www.energy.gov/energy-economy/funding-financing
- Energy Star Tax Deductions for Commercial Buildings: https://www.energytaxincentives.org/resources/federal-tax-incentives

State of Delaware:

- Delaware Sustainable Energy Utility: https://www.energizedelaware.org/
- DNREC Renewable Energy Assistance: https://dnrec.alpha.delaware.gov/climate-coastal-energy/renewable/assistance/
- Database of State Incentives: https://programs.dsireusa.org/system/program

END OF REPORT

Attachment C. Example of Project Level Data Reported

408 E 8th Street - Wilmington - New Castle - 004500

Record Name	408 E 8th Street - Wilmington - New Castle - 004500	**Project ID**	SEU003
Client Name	People's Settlement Assoc	**Program**	SEU Energy Assessments for Non-profits
Project Address	408 E 8th Street	**Sector**	Non-Profit
Project City	Wilmington	**Facility Type**	Office
Project Zip	19801	**Funder**	DESEU
Project County	New Castle	**Funding Source**	RGGI
Electric Utility		**Incentive Power Source**	
Gas Utility		**Project Type**	Energy Assessment - Comprehensive
Other Utility		**Incentive Type**	Grants

Assessment Details

Assessment Date	10/2/2013	**Award Date**	
Implementation Estimate ($)	$30,040.00	**Total Project Costs**	
Incentives ($)	$8,000.00	**Potential Annual Energy Savings ($)**	$24,319.00
		Potential Payback	1.2 Years

Assessment Energy Savings

Potential Savings - All Sources (MMBTU)	970.3		
Potential Annual Electric Savings (kWh)	92,400.00	**Potential Annual Gas Savings (MMBTU)**	655.00
Potential Propane Annual Savings(MMBTU)	0.00	**Potential Oil Annual Savings (MMBTU)**	0.00
Potential Annual Propane Saved (Gallons)		**Potential Annual Oil Saved (Gallons)**	

Assessment Green House Gas Savings

Potential Total GHG Avoided (mt)	103.94	**Potential CO2 Avoided GHG (mt)**	103.59
Potential NO2 Avoided GHG (mt)	0.13	**Potential SO2 Avoided GHG (mt)**	0.22

Implemented Project Details

Follow-up Survey Date			
Annual Energy Savings ($)	$769.00	**Contractor Hours**	

Leveraged Funds	$0.00
Payback	Immediate

Implemented Energy Savings

Total Savings - All Sources (MMBTU)	23.9		
Gross Annual Electric Savings (kWh)	7,000.00	**Gross Annual Gas Savings (MMBTU)**	
Propane Gross Annual Savings (MMBTU)	0.00	**Oil Gross Annual Savings (MMBTU)**	0.00
Gross Annual Propane Saved (Gallons)		**Gross Annual Oil Saved (Gallons)**	

Implemented Green House Gas Savings

Total All Emissions Avoided GHG (mt)	5.23	**Carbon Dioxide Avoided GHG (mt)**	5.21
Nitrogen Oxides Avoided GHG (mt)	0.01	**Sulfer Dioxide Avoided GHG (mt)**	0.02

System Information

Owner	Keith Goossen	**Last Modified By**	Bob Higbie, 6/15/2017, 6:17 PM
Program Code	IAC-SEU	**Record Type**	DESEU - SEU Energy Assesments Project Layout

Attachment 5. Example of Program Level Data Reported

Project: Record Name	Implementation Estimate ($)	Potential Savings - All Sources (MMBTU)	Potential Total GHG Avoided (mt)	All Funders-Total Emissions Avoided (m	Potential CO2 Avoided GHG (mt)	Potential Annual Propane Saved (Gallons)	Potential Annual Oil Saved (Gallons)	Potential Annual Gas Savings (MMBTU)	Gross Annual Gas Savings (MMBTU)	Potential Annual Electric Savings (kWh)	Gross Annual Electric Savings (kWh)	Potential Annual Energy Savings ($)	Follow-up Survey Date
101 Middleford Road - Seaford - Sussex -	111615	4672.6	364.62		364.2			3516		338970		64640	
2301 Kentmere Parkway -	120405	9920.1	839.55		838.64			6810		911510		142960	
300 Lea Boulevard - Wilmington - New	23702	382.8	58.66		58.62					112180		9260	
901 East Basin Road - New Castle - New	313682	1505.2	169.5		169.35			612		261775		33400	
220 South Main Street - Newark -	152401	5331	740.93		740.38			761		1339395		111966	
82 Possum Park Road - Newark - New	63032	1664.8	124.28	0	124.13			1309		104270		23800	
201 Central Avenue - Ocean View - Sussex -	6544	193.2	29.61	0	29.58					56617		4991	
20684 State Forest Road - Georgetown -	8864	231.4	35.47	0	35.44					67824		7275	
1001 Locust Street - Seaford - Sussex -	22524	591.4	37.36	0	37.31			533		17120		8340	
1842 Otts Chapel Rd. - Newark - New Castle -	15001	117.4	15.56	0	15.55		48	19		26789		4691	
866 North Dupont Hwy - Dover - Kent -	78030	750.9	67.4	0	67.33			477		80280		12925	
32051 Long Neck Road - Millsboro -	5148	443.4	66.91	0	66.86	125				126606		14782	
102 Fleming St. - Harrington - Kent -	13332	149.3	13.48	0	13.47	0	0	94		16204		3081	
710 North Lincoln Street - Wilmington -	107243	1304.1	147.07	0	146.94			528		227449		28475	
31768 Legion Rd - Millsboro - Sussex -	13242	250.1	38.3	0	38.27	3.22				73201		7803	
1124 E 7th St. - Wilmington - New	27475	255.7	37.04	0	37.01			21.5		68642		5502	
2400 W 17th St - Wilmington - New	9257	303.7	21.76	0	21.73			248		16337		4137	
499 W 6th St - Laurel -	1726900	1867	126.38	0	126.22			1598		78829		24680	
403 N. Van Buren St. - Wilmington - New	27188	1219	153.17	0	153.05			336.6		258614		30810	
2311 S duPont Hwy - Dover - Kent - 014831	14643	449.6	33.84	0	33.8			350.8		28956		6738	
407 Clinton St - Delaware City - New	15115	2127.1	166.7	0	166.51			1593.5		156389		18150	
500 McKennans Church Rd -	15305	993.7	68.67	0	68.58			836.6		46056		10750	
18500 S Dupont Hwy - Harrington - Kent -	297350	15649	2529.8		2519.69			5413	-315	3000000	1762800	300905	
1121 Forrest Ave -	134450	1614.8	207.45		206.69			882	859.8	214760	187000	46914	
3701 Philadelphia Pike - Claymot - New	9375	110.5	24.21		24.1			0		32400	22000	3894	
408 E 8th Street - Wilmington - New	30040	970.3	103.94		103.59			655		92400	7000	24319	
18500 S Dupont Hwy - Harrington - Kent -	51478	1809	179.24		178.66			1309	85	146536	2688	23491	

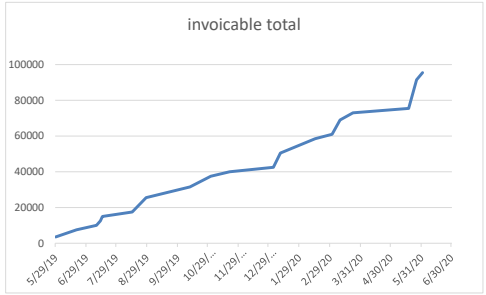
761 S. Little Creek Road - Dover - Kent -	38299	466.3	46.2		46.05			337.4		37770	18690	9515	
301 Rehoboth Blvd - Milford - Kent -	49344	626.7	94.64		94.27			257		108346	21000	17062	
27 Market Street Plaza - Smyrna - Kent -	16465	156.8	34.34		34.2			0		45970	27792	5287	
1107 Kirkwood Hwy - Elsmere - New Castle -	37140	802	60.14		59.99			697		30785	1	10255	
3030 Bowers St. - Wilmington - New	42393	1263.5	149.43		148.9			768	768	145233	44173	21248	
200 Whitechapel Dr - Newark - New Castle -	49569	2896.1	241.32		240.63			2371	733	153884	30660	44340	
719 N. Shipley Street - Wilmington - New	51695	536.3	61.75		61.54			336	436	58691	19720	10307	
331 Main Street - Little Creek - Kent -	9410	242	23.41		23.33			178.6		18590	18590	9081	
420 Willa Road, Newark, DE 19711 -	7022	46	9.25		9.21			5	5	12024	10825	1789	
14 Garfield Way - Newark - New Castle -	104200	1072.2	214.57		213.67			122		278500	24890	30685	
3120 Barley Mill Road - Hockessin - New	36653	601.8	77.77		77.48			326		80841	38892	15426	
26633 Zion Church Road - Milton -	27245	888	74.15		73.94			726	123	47465	16010	23560	
600 N Market Street - Wilmington - New	134000	3013.1	374.64		373.27			1721	0	378690	1	50680	
500 Duncan Rd. - WIlmington - New	23950	989.3	81.28		81.04			817	0	50510	1	12375	
1314 Foulk Rd. - Wilmington - New	15745	735.6	62.67		62.48			594		41510	5210	11480	
4701 Weldin Rd. - Wilmington - New	108180	1166.6	184.54		183.8			428		216470	127870	23460	
709 N. Madison St. - Wilmington - New	118320	570.1	78.78		78.48			278	66	85620	73650	11841	
292 W Main Street - Newark - New Castle -	109650	634.8	70.4		70.16			414	414	64704	45072	14074	
100 Municipal Blvd. - New Castle - New	8190	207.3	27.17		27.07			110		28517	6910	3407	
105 NE Front Street - Milford - Sussex -	37513	193.5	26.14		26.03		793.1	0		23001	4341	5570	
1 Municpal Blvd. - New Castle - New	5000	101.2	15.87		15.81			38		18530	0.01	1930	
900 Wilmington rd - New Castle - New	23100	217.1	33.61		33.48			84		39000	0.01	4110	
705 N Market Street - Wilmington - New	24070	59.7	9.44		9.4			22		11060	0.01	1740	
519 N Market Street - Wilmington - New	24070	59.7	9.44		9.4			22		11060	0.01	1740	
661 S DuPont Hwy - New Castle - New	81700	553.1	43.74		43.62			467	467.1	25230		7061	
215 Pennsylvania Ave - Bethany Beach -	4760	71.3	7.83		7.8			47		7122	7002.6	3373	
805 N Broom St - Wilmington - New	16250	1234.6	96.25		96.14			930		89284		17821	
2200 W 4th Street - Wilmington - New	382915	1713.5	366.9		365.33			50	50	487530	487530	54095	

600 North Market Street - Seaford -	17065	606.5	94.87		94.5			229	229	110650	90490	15545	
305 East 7th Street - Wilmington - New	32505	871.6	117.45		117.01			443		125607		17395	
300 W Main St - Newark - New Castle -	16877	415.8	47.8		47.63			261		45363		8404	
505 E. Buck Rd. - Wilmington - New	48700	868.4	111.28		110.87			476		115000		14710	
3301 Green Street - Claymot - New Castle	846785	2933	286.02		285.1			2150		229476		40319	
101 School Rd - Wilmington - New	254707	1450.2	161.98		161.41			939		149824		20102	
101 Garden of Eden rd - Wilmington -	76097	2216.1	261.92		260.99			1348		254425		29970	
180 Vickers Drive - Milford - Sussex -	9170	356.8	45		44.83			200		45961		6349	
701 N Clayton St - Wilmington - New	1682638	22268	1783.67		1781.66			16296		1750293		272622	
Weyandt Hall, 5 East Reed Street - Dover -	312357	3925	601.51		601.1	0	0	0		1150341		119494	
19 Lambson Lane New Castle, DE 19720	47670	1857.6	194.82		194.64			899		280948		30599	
116 American Legion Rd., Lewes DE 19958 -	66247	936.2	143.47		143.37					274370		31150	
180 Vickers Drive - Milford - Sussex -	29611	725.4	127.85		127.33			187	109	157793	28358	17783	7/16/2018
2600 Kirkwood Hwy - Newark - New Castle -	94081	5206.1	426.39	104.19	425.92			3716	260	436720	172750	73250	10/21/2019
61 Corporate Circle - New Castle - New	10930	562.8	79.66	36.66	79.6			66	54	145610	64600	11330	10/21/2019
208 Front Street - Milton - Sussex -	26922	657.6	100.48	13.95	100.41	36				191771	26672	17425	4/26/2019
1300 Foulk Road - Wilmington - New	135735	2834.5	248.98	84.15	248.71			1855	420	287088	118130	40880	5/5/2019
514 Interchange Blvd. - Newark - New	26454	633.1	66.43	48.6	66.37			306	267.4	95860	65680	18600	5/6/2019
510 Interchange Blvd. - Newark - New	7027	609.4	48.81	42.59	48.75			446	430	47890	37620	12410	5/6/2019
1901 Rockland Road - Wilmington - New	29235	1040.3	134.94	63.41	134.83			245		233085	121280	27780	11/13/2019
1803 North Market Street - Wilmington -	14099	903.1	72.32	15.22	72.24			661		70945	29110	10870	10/21/2019
1137 South State Street - Dover - Kent -	66108	4028.9	325.75	273.33	325.39			2918	2699	325585	247655	49320	10/21/2019
219 Rehoboth Ave - Rehoboth Beach -	13572	439.7	48.17	5.44	48.11	356	524	105.2		66250	10420	6840	12/16/2019
900 North Washington Street -	8742	242.2	37.12	19.34	37.1				-22	70990	39240	7970	11/26/2019
1301 Carruthers Ln, Wilmington DE 19803 - Wilmington - New	55702	273.9	37.13		37.1	580				64756	21646	41760	2/19/2019
20520 Sand Hill Rd., Georgetown, DE	21619	840.1	120.73	111.46	120.62		733			215060	164030	33060	3/7/2019
22317 Dupont Blvd., Georgetown, DE	19568	986.9	151.24	122.12	151.14					289236	233550	25120	10/21/2019
921 Barksdale Road, Newark, DE 19711 -	21707	305.9	37.69	10.83	37.66			92	41	62700	16540	9840	3/1/2019

808 S Old Baltimore Pike, Newark, DE	19522	447.7	45.72	35.17	45.68			229	120	64099	55009	10430	4/30/2020
226 Rehoboth Avenue - Rehoboth	13346	129.3	19.82	15.46	19.81					37904	29571	4397	5/15/2020
4840 Kennett Pike, Wilmington, DE 19807 - Wilmington -	31302	2970	182.47	57.21	182.22			2728	558	70935	52555	30095	3/2/2020
1530 Foulk Road - Wilmington - New	9122	730.7	60.41	32.91	60.34			516		62933	62933	10695	3/6/2020
19285 Holland Glade Rd - Rehobeth Beach -	9126	299.1	43.14	41.34	43.11	321.5				79047	79047	9701	4/30/2020
501 N Madison St, Wilmington DE 19801	121978	1602.2	226.64	226.65	226.48			189	189	414173	414173	165706	3/2/2020

Attachment 9. Program Status Report FY19

SEU Code	Site/Facility	Contact Date	Audit Date	Report delivered	Follow-up	Invoicable		
SEU074	***Grace Methodist Church (Edwin)***	5/16/2019	5/29/2019	6/24/2019	NA	3500	5/29/19	3500
SEU075	Lighthouse Baptist Church (Chester)	5/9/2019	6/19/2019	7/25/2019	NA	4000	6/19/19	7500
SEU076	Delaware Agricultural Museum (Claypoole)	6/12/2019	7/9/2019	8/14/2019	9/24/19 (T)	2500	7/9/19	10000
SEU077	**Lutheran Church of the Good Shepherd (Loney)**	5/15/2019	7/13/2019	8/19/2019	NA ?	2500	7/13/19	12500
SEU078	Long Neck United Methodist Church (Brogers)	6/28/2019	7/15/2019	8/27/2019	9/24/19 (K)	2500	7/15/19	15000
SEU079	Harrington Senior Center (Crouse)	12/5/2018	8/14/2019	9/30/2019	10/29/19 (S,A)	2500	8/14/19	17500
SEU080	West End (Quinn)	8/6/2019	8/28/2019	9/23/2019	11/5/2019 (T)	8000	8/28/19	25500
SEU081	**Epworth (Bunny)**	8/29/2019	10/11/2019	11/17/2019	not needed	6000	10/11/19	31500
SEU082	Legion 28 (Beattie)	8/30/2019	11/1/2019	12/2/2019	keith following	6000	11/1/19	37500
SEU083	Immanuel Church (Vickie)	10/12/2019	11/20/2019	1/5/2020	keith following	2500	11/20/19	40000
SEU084	KNF (Kalmar, Morton)	10/29/2019	1/3/2020	2/9/2020	keith following	2500	1/3/20	42500
SEU085	Laurel bldg. (Mann)	11/19/2019	1/10/2020	3/18/2020	?	8000	1/10/20	50500
SEU086	LACC (Morton)	1/20/2020	2/14/2020	3/24/2020	asked Steve	8000	2/14/20	58500
SEU087	Habitat for Humanity (Bailey)	2/3/2020	3/2/2020	4/9/2020	5/12/2020	2500	3/2/20	61000
SEU088	Delaware City (Johnson)	1/9/2020	3/10/2020	3/27/2020	4/28/2020	8000	3/10/20	69000
SEU089	Red Clay Creek Pres. Church (Dave)	2/21/2020	3/23/2020	4/17/2020	5/1/2020	4000	3/23/20	73000
SEU090	DCFC15 (Watson)	1/8/2020	5/18/2020			2500	5/18/20	75500
SEU091	Kirkwood Library (Frese)	2/27/2020	5/22/2020			8000	5/22/20	83500
SEU092	Rockwood Park (Frese)	2/27/2020	5/26/2020			8000	5/26/20	91500
	CSC churches (Sharee)	2/14/2020	6/1/2020			4000	6/1/20	95500
	Richard Allen School (Alonna)	3/25/2020						
	more NCC (Surles, Frese)	2/4/2020						
	Clayton Fire Co. (Wilson)	2/17/2020						
	Delaware Innovation Space	6/17/2019						
	Lewes Senior Center (Dennis Nealen)	6/12/2018						
	All Saints Catholic School (Muir)	5/16/2019						
	Goodwill New Castle building (Alabi)	7/2/2018						
	CHIMES Millsboro (Burkett)	2/3/2018						
	Georgetown Public Library (Fike)	10/19/2017						
	Grand Opera House in Wilmington							
	Kingswood logan herring							
						95500		



font color code:
black: done or scheduled
blue: tentatively scheduled
purple: a possibility
red: declined but still remote chance

Follow-up meetings:
Long Neck (SEU078) done, revised report with heat pump replacement of boiler, they want to know if they can get a DESEU loan.

Implementation:
Grace (SEU074): ARs 1, 2 done; "Trustees are actively working on LED items. We plan on implementing LEDs 24/7 first. We are awaiting a vendor review of replacement bulb types. We should have pricing in early December, begin implementation by the first of the new year. It has been time consuming getting vendors in for a look."

Attachment F. Implementation Survey Example

SEU Assessment Implementation Survey

University of Delaware Mid-Atlantic Industrial Assessment Center
University of Delaware – 107 Evans Hall, Newark, DE 19716-3130 • Ph: (302) 831-0590 • FAX: (302) 831-4316

Date:	August 27th 2018	Assessment Date:	March 13th 2018
Company name:	Chimes Community Center	Report Date:	April 23rd 2018
Assessment No.:	SEU056	Contact Person:	Martin Burkett

Thank you for participating in the Industrial Assessment program at the University of Delaware.

Please take a few minutes to fill out the following implementation survey. This information is very important to our team and to the US Department of Energy for evaluation purposes. Please return the survey via e-mail (goossen@udel.edu), Mail or FAX to Keith Goossen – IAC Director using the contact information listed above.

Filled by: _____ Title: _____

Date: _____ Signature: _____

SEU Assessment Implementation Survey

University of Delaware Mid-Atlantic Industrial Assessment Center

University of Delaware – 107 Evans Hall, Newark, DE 19716-3130 • Ph: (302) 831-0590 • FAX: (302) 831-4316

AR No.	Assessment Recommendation	Is Annual Energy or Cost Savings different from those anticipated in the IAC report?	Implemented ?		Implementation Cost ($)	Implementation Date	If not Implemented, Primary Reason for Rejection
			Yes	No			
AR1	Request equal electric billing			X			
AR2	Replace RTU in 512 reception area			X			
AR3	Install programmable thermostats		X				
AR4	Fix the weather-stripping on 514 entrance		X				
AR5	Block heating vent in 514 entrance		X				
AR6	Complete drop ceiling in 511			X			

AR7	Insulate dock door		X				
AR8	Replace incandescent and metal halide lighting in 512		X				
AR9	Replace 32 W T8 tubes with ballast-compatible LED tubes		X				
AR10	Replace 34 W T12 tubes with direct-wire LED tubes		X				

Comments: _____

_____

_____

SEU Assessment Implementation Survey

University of Delaware Mid-Atlantic Industrial Assessment Center
University of Delaware – 107 Evans Hall, Newark, DE 19716-3130 • Ph: (302) 831-0590 • FAX: (302) 831-4316

Date:	May 2018	Assessment Date:	April 24th 2018
Company name:	Chimes Community Center	Report Date:	May 2018
Assessment No.:	SEU059	Contact Person:	Martin Burkett

Thank you for participating in the Industrial Assessment program at the University of Delaware.

Please take a few minutes to fill out the following implementation survey. This information is very important to our team and to the US Department of Energy for evaluation purposes. Please return the survey via e-mail (goossen@udel.edu), Mail or FAX to Keith Goossen – IAC Director using the contact information listed above.

Filled by: _____ Title: _____

Date: _____ Signature: _____

SEU Assessment Implementation Survey

University of Delaware Mid-Atlantic Industrial Assessment Center

University of Delaware – 107 Evans Hall, Newark, DE 19716-3130 • Ph: (302) 831-0590 • FAX: (302) 831-4316

AR No.	Assessment Recommendation	Is Annual Energy or Cost Savings different from those anticipated in the IAC report?	Implemented ?		Implementation Cost ($)	Implementation Date	If not Implemented, Primary Reason for Rejection
			Yes	No			
AR1	Install programmable thermostats and reprogram existing ones in 510, 509 and 508		X				
AR2	Install switches or timers on suites' 510 and 705 bathroom fans		X				
AR3	Install timers on cold drink vending machines in 510 508 and 705			X			
AR4	Insulate 510 and 509 dock doors		X				
AR5	Convert 509 electric water heater to natural gas			X			
AR6	Replace metal halide lighting in 510 loading dock		X				

AR7	Replace exterior light with LED and light sensor			X			
AR8	Replace 32W T8 tubes in facility with 16W LED		X				
AR9	Upgrade exterior lights to LED			X			

Comments: _____

_____

_____