MASSACHUSETTS
Interfaith Power & Light

ENVIRONMENTAL STEWARDSHIP ASSESSMENT

Brewster Baptist Church

Brewster, Massachusetts
May 2026

This *Environmental Stewardship Assessment* is based upon information provided by the congregation, observations of the visible and apparent conditions of the property and the components evaluated on the date of assessment. Care has been taken in the performance of this assessment. This report is made only in the best exercise of our ability and judgment. However, Massachusetts Interfaith Power & Light (and or its representatives) makes no representations regarding latent or concealed defects that may exist, and no warranty or guarantee is expressed or implied. Conclusions in this report are based on systems attributes, estimates of the age and normal working life of various items of equipment and appliances. Predictions of life expectancy and the balance of useful life are necessarily based on industry and/or statistical comparisons and observed conditions. It is essential to understand that actual and future conditions can alter the useful life of any item. The previous use/misuse, irregularity of servicing, faulty manufacture, unfavorable conditions, acts of God and unforeseen circumstances make it impossible to state precisely when each item will require replacement and/or what the actual savings in use and cost will be. The Member herein should be aware that certain components with the above referenced property may function consistent with their purpose at the time of the assessment, but due to their nature are subject to deterioration without notice. Unless otherwise noted, all building components are assumed to have met the building code requirements in force at the time of construction. Conclusions reached in this report assume responsible ownership and competent management of the property. Information provided to us by others is believed to be reliable. However, we assume no responsibility for the accuracy of such information.

www.MassIPL.org

This *Environmental Stewardship Assessment* is based on a site visit to Brewster Baptist Church (HOW) on May 29, 2026, by Jim Nail and Bill Schroeder for Massachusetts Interfaith Power & Light (MassIPL). The report provides a summary of conditions and "To Do" summary, followed by findings that will help guide you as you make the recommended improvements, it can easily be shared with other members of your congregation, in print or electronic format.

Also review the ***Everyday Environmental Stewardship Briefs*** and ***Success Stories*** which may be included and are available at the MassIPL web site.

http://www.massipl.org/everyday-environmental-stewardship
https://www.massipl.org/congregation-success-stories

These provide detailed guidance on the actions possible at your HOW, and at all the places we occupy as we live, work, study, and play.

Remember also that the observations for this House of Worship apply as well
to the houses in which we live, work, learn and play.
Be active in caring for them all.

If We Don't, Who Will?

SUMMARY

This summarizes the energy use, environmental and financial impact, of Brewster Baptist Church for its environmental stewardship.

Energy Use Intensity: Above Average

Energy use intensity (EUI) measures the amount of energy used annually per square foot of building space. It is a standard measure used in the energy efficiency field. The Energy Information Administration reports that the average House Of Worship (HOW) in the northeast has an EUI of 54.9. Being "average" as a HOW is not a good rating for environmental stewardship. Your HOW is 59.2 indicating significant potential to become more efficient.

Carbon Emissions: Below Average

Different types of energy emit different amounts of carbon, with heating oil emitting the most. Gas and the fuels used to generate electricity also emit carbon so reducing all energy use is important. The Next Generation Roadmap for MA Climate Policy legislation calls for Massachusetts to reduce carbon dioxide emissions by 50% by 2030 and be net zero by 2050 (versus a 1990 baseline), in line with scientists' recommendations to avoid the worst effects of climate change. The good news is that you are in compliance with BERDO emissions targets up to 2040.

Financial impact: Unknown

Brewster Baptist Church spent $41,612 in 2025 for all its energy use. MassIPL sees a range of energy costs of 2% - 20% of the house of worship annual budget, with an average around 6%. Wouldn't you like to be closer to the 2%? Green grows two ways – one of which you take to the bank! By implementing the recommendations in this report you can reduce this cost and reinvest the savings in additional energy efficiency measures caring for creation, which is a key element of your mission. MassIPL sees savings in a range of 10% savings for the "low-hanging fruit" to over 50% for the major work. All actions have continuing benefits, for decades or more.

Your 24 Questions Score **7 YES; 5 NO; 12 YES and NO**

A perfect score would be answering all 24 questions YES. Currently Brewster Baptist can only answer 7 questions YES. However these NO and YES and NO answers reveal the most important opportunities to decrease energy use, save money and improve your environmental stewardship.

Question	Answer	Comments
BEHAVIOR		
Do you track your Utility Use and Cost (UU&C) monthly?	Yes and No	
Have you created energy awareness among staff and members?	Yes and No	Recycling bins in all areas of the church. Based on the frost in the fridge in Caring Cupboard, those volunteers aren't paying attention to energy use.
Do you have an evironmenntal stewardship team? A designated "energy manager"?	Yes	Ben Gregson.
Do thermostat settings match times of use?	Yes	We program schedules for the thermostats.
Do you have a plan to cut your carbon emissions 50% by 2030?	No	
Do you have a budget line for Energy Efficiency investments?	No	
ELECTRICITY		
Do you make best use of natural and artificial light?	Yes	
Do all your fixtures have LED bulbs?	Yes and No.	Cape Light Compact switched most of our lights to LED. The most notable exceptions are the CFLs in the covered entry.
Do you have occupancy sensing switches in all appropriate spaces?	Yes and No.	In some areas.
Are all your refrigerators and freezers efficient and used efficiently?	Yes and No.	Freezer and Warming Ovens are Energy Star. Not sure about the other kitchen equipment.
Are all other office equipment and appliances Energy Star top-rated?	Yes	Xerox AltaLink C8200 EPEAT Gold Certification.
Have you evaluated your HOW for solar panels?	Yes	We have had solar companies come out and give a report of the number of solar panels we can do in the Historic District.

Question	Answer	Comments
BUILDING ENVELOPE		
Are your walls, ceilings, floors insulated to current standards?	Yes and No	RISE Engineering did an Insulation Energy Savings Plan and will install $19,582 of insulation. Work to be done in June 2026.
Have you sealed areas of air infiltration?	No	This is part of the RISE Engineering proposal
Do you have high efficiency windows? Exterior or interior storms? Sun screens?	Yes and No	Anderson High Performance windows in the Sanctuary, Pella windows in the Old Chapel. Community Hall windows are single pane.
Do windows have effective weatherstripping?	Yes and No	The Anderson and Pella windows are tight. The Community Hall windows likely are not.
Are all doors well-insulated and tight fitting?	No	The RISE proposal includes weatherstripping 6 doors.
HEATING COOLING WATER		
Do heating and cooling zones match use patterns?	Yes and No	Some potential inefficiency across Zones 3 and 5, and Zones 5 and 7
Do controls and distribution optimize energy efficiency of HVAC equipment?	Yes	
Are heat/AC/hot water pipes and ducts insulated?	Yes and No	Only some of them. Most ducts are in unconditioned attic space
Is your air conditioning SEER 14+?	Yes and No	RTU's 14.7 IEER. High Efficiency 2-stage heating & 3-stage cooling. 80% thermal efficiency. The other 5 furnaces are probably not HE.
Have you evaluated your HOW for heat pumps?	Yes and No	We have 3 heat pumps old chapel 1 heat pump in Room 100 and 1 in Room 101. The rest of the building has not been evaluated.
Is your hot water heater 95%+ efficient?	No	Anderson AW 80%, AO Smith electric
Do you have water-efficient faucets and toilets?	Yes	

To Dos

There are a number of steps you can take now, both to save some money in the upcoming heating season and to prepare for larger projects outlined in the Net Zero Plan:

- Check the schedule for the 100 Area Offices and Classrooms to determine if it needs to be heated and cooled every day. Consider setting back the temperature any times there aren't scheduled activities in those rooms. (see pp. 15-16).
- Experiment with lower unoccupied temperatures during "shoulder" seasons, (see p. 17 - 18)
- Install a programmable thermostat in the Music Room, ideally one with remote sensors for the bathrooms (see p. 18)
- Contact Power Options for their discount rates on gas (see p. 17). Contact Zach Holt, zholt@poweroptions.org.
- Consider replacing the window candles with new ones that have a photo sensor that will turn them off during the day, saving perhaps $150 – 200 annually (see p. 25).
- Consider developing a process for shutting off the gas to the commercial range and ovens in the kitchen and relighting them when needed for events, potentially saving much of the $1500 that the pilots may be costing you currently (see p. 28).
- Continue evaluating installing solar panels, with an eye toward completing the project by the end of 2027 in order to qualify for a 30 – 40% "direct pay" rebate from the Federal government (see pp. 28 – 30).
- Complete the MassSave insulation project before the heating season begins in the fall (see pp. 33 – 34)
- Evaluate exterior storm windows, interior storms, or sash replacements for the Community Hall windows (pp. 36 – 37)
- If considering a heat pump for the Caring Cupboard, evaluate if a window heat pump will be effective (see p. 47).
- At your next routine HVAC service appointment, have the technician reconnect the duct that has been disconnected (see p. 48).
- Begin planning to replace the Amana furnaces, the Trane furnaces above Conference Room 107 and the associated outdoor Trane AC condensers by 2030 since they are already over 20 years old (see p. 52).
- Plan to replace the small hot water heater for the baptismal font since it is 25 years old (see p. 53).

Net Zero Plan

In the 2021 Next Generation Roadmap for Massachusetts Climate Policy law, the Commonwealth sets goals to decrease carbon emissions 50% by 2030 (compared to a 1990 baseline) and be net zero carbon emissions by 2050. As these goals relate to buildings, the general approach is to decrease the building energy use as much as possible then switch to electric heating and cooling, either air source or ground source heat pumps. It would be challenging to find data to calculate your 1990 energy consumption and carbon emissions so MassIPL recommends you use the energy consumption documented in this report as your baseline.

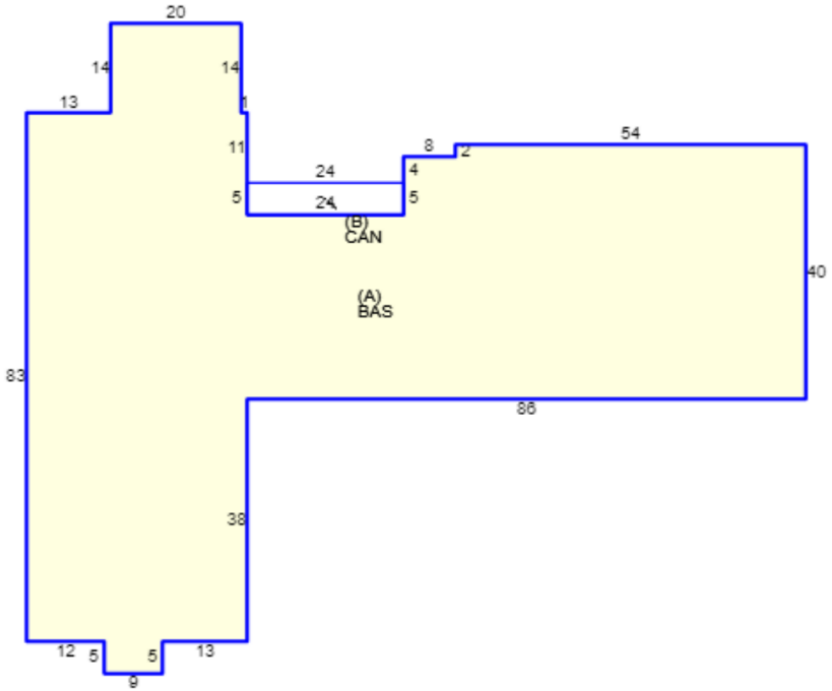
In 2025, the Commonwealth took another step, instituting its Large Building Energy Reporting program which currently doesn't require carbon emissions reductions. But we expect it to follow the example of the Boston Energy Reporting and Disclosure Ordinance (BERDO) which establishes emissions targets that decline every 5 years. While this only applies to Boston, we believe it is a good model that houses of worship can use to help them plan (more details follow in a section on pages 18 – 19).

Using the BERDO framework as guidance, you already meet carbon emissions requirements for 2030 but need to look ahead for when the requirements decrease in 2040. That will coincide with the timing when much of your current HVAC equipment reaches the end of its expected useful life, so you will have the opportunity to convert to heat pumps. There are two

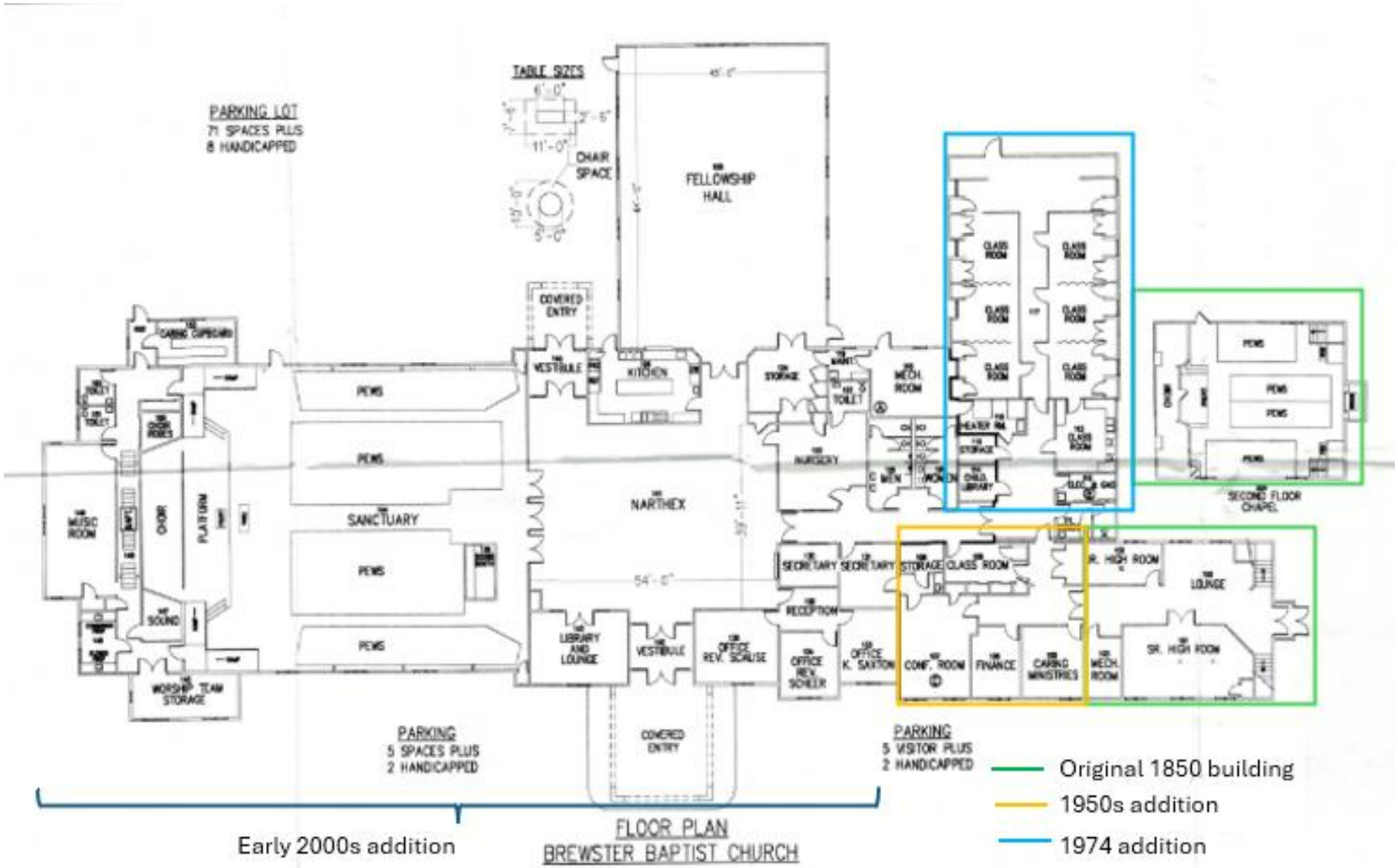
- Community Hall furnace and A/C will be 15 years old in 2031 but since it is inside, it may see longer operational life, perhaps to the late 2030s.
- RTUs 2037 - 2042. Given these units are exposed to the elements, they are likely to need replacement in this time period.

The timing of these two replacements will depend on their condition as well as your budget and priorities. However, once all these are completed, you will have converted your HVAC to be fully electric and assuming Cape Light Compact continues to provide 100% renewable electricity, you will have eliminated the largest source of your carbon emissions. To fully disconnect from gas, you will also need to replace your hot water heater with a heat pump model and the gas range with an induction appliance; time these as needed and watch for incentives as the state continues to promote electrification.

Google satellite photo of HOW



Brewster Assessor Department's building footprint appears not to include the new Sanctuary or the Fellowship Hall.


PARKING LOT
71 SPACES PLUS
8 HANDICAPPED
TABLE SIZES
CHAIR SPACE
FELLOWSHIP HALL
COVERED ENTRY
VESTIBULE
KITCHEN
STORAGE
MECH. ROOM
TOILET
NURSERY
CLASS ROOM
HEATER RM.
CHILD LIBRARY
SECOND FLOOR CHAPEL
PEWS
NARTHEX
SANCTUARY
MUSIC ROOM
CHOIR
PLATFORM
SOUND
WORSHIP TEAM STORAGE
SECRETARY
RECEPTION
LIBRARY AND LOUNGE
OFFICE REV. SCALISE
OFFICE REV. SCHEER
OFFICE K. SAXTON
CONF. ROOM
FINANCE
CARING MINISTRIES
SR. HIGH ROOM
LOUNGE
PARKING
5 SPACES PLUS
2 HANDICAPPED
PARKING
5 VISITOR PLUS
2 HANDICAPPED
Original 1850 building
1950s addition
1974 addition
Early 2000s addition
FLOOR PLAN
BREWSTER BAPTIST CHURCH

The main entrance on the north side of the building with the Sanctuary to the left and the chapel to the right

The Sanctuary from the south, with the Caring cupboard entrance and playground

The Community Room to the right and the chapel straight ahead

The eastern end of the Sanctuary

The Fellowship Hall to the right, the Community Room to the left.

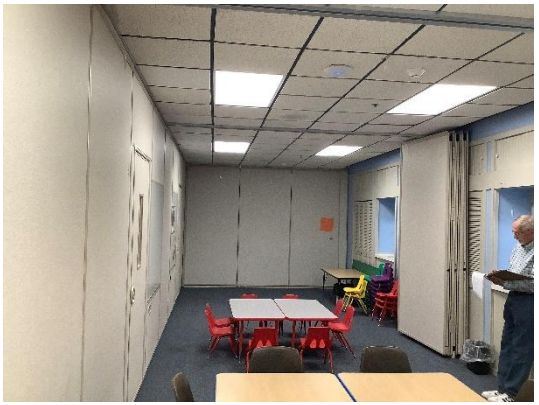
The door to the Caring Cupboard

The Narthex


The Sanctuary


Fellowship Hall


The Chapel


One side of the Community Hall

DETAILED FINDINGS

BEHAVIOR

We generally take energy for granted. If we do think about energy, it is usually when we get a big bill! But cost is the result of how we use energy, and **use** reflects our behavior. Behavior is volitional. We can change it and thus lower the cost (in $s and environmental impact) of our energy use. Follow the low cost/no cost ways to reduce energy use in this section and you may save up to 15%.

Do you track your utility use and cost (UU&C) monthly? **Yes** and **No**

You have begun, now be sure to update the UU&C spreadsheet monthly and review it regularly to identify unusual patterns that can indicate attention is needed. Using the MassIPL *Utility Use & Cost* spreadsheet for all utilities is an effective way to know the impacts and cost (in $s and pollution) of one's behavior, as a congregation or an individual. For more information, see MassIPL's *EES Brief* on *UU&C.*

Though we usually just focus on the financial cost for utilities, it is imperative that we are also aware of the environmental and health impacts. The spreadsheet calculates the carbon footprint of your HOW as a first step in your environmental stewardship journey. This can be translated to a financial impact with a concept called the "social cost of carbon", an estimate of the costs of the damage from extreme weather such as major storms, droughts, floods, etc. that climate change makes more damaging. At the COP 28 climate conference in the United Arab Emirates in December 2023, the Biden Administration announced that it is increasing the social cost of carbon that the government uses in its calculations from $50 per ton to $190 per ton. Even if the Trump Administration rolls this back or eliminates it, we should continue to consider the social cost of carbon.

The summary of Utility Use and Cost information for Brewster Baptist Church is below. The volume and cost of utility use is fertile grounds for improved environmental stewardship. There are savings to be achieved (in the 10% range) simply by using *PowerOptions* to "bulk-buy" gas and electricity; see information in Appendix C. Financial savings and reduction in environmental impact are available through buying electricity from a community solar project (see more detailed description in the Electricity section of this report).

Brewster Baptist Church

insert Sq Ft here >>> 22,771 *square feet*

YEAR	TOTAL	ELECTRICITY $	ELECTRICITY KWH	Cooling Degree Days	GAS $	GAS THERMS	Heating Degree Days	OIL $	OIL GALLONS	PROPANE $	PROPANE GALLONS	WATER & SEWER $	WATER & SEWER VOLUME
2023	**$31,623**	$16,726.55	72,120	1,315	$13,353.14	8,507	3,561	$0.00	0.0	$0.00	0.0	$1,543.36	215
CO_2 metric tons	*45.0*		*0.0*			*45.0*			*0.0*		*0.0*		
kBTU per SF	40.2												
CO2 kg per SF	2.0												
2024	**$33,650**	$17,633.85	69,040	1,233	$15,962.31	9,696	3,900	$0.00	0.0	$0.00	0.0	$53.76	14
% prior year	106.4%	105.4%	95.7%	93.8%	119.5%	114.0%	109.7%	--	--	--	--	3.5%	6.5%
CO_2 metric tons	*51.3*		*0.0*			*51.3*			*0.0*		*0.0*		
% of prior year	*114%*		--			*114%*			--		--		
kBTU per SF	52.9												
CO2 kg per SF	2.3												
2025	**$41,612**	$20,201.70	69,920	1,159	$21,307.61	11,004	4,188	$0.00	0.0	$0.00	0.0	$102.49	23
% prior year	123.7%	114.6%	101.3%	94.0%	133.5%	114.3%	107.2%	--	--	--	--	190.6%	164.3%
CO_2 metric tons	*58.6*		*0.0*			*58.6*			*0.0*		*0.0*		
% of prior year	*114%*		--			*114%*			--		--		
kBTU per SF	59.2												
CO2 kg per SF	2.6												
2026	**$20,116**	$5,300.13	18,600	65	$14,000.09	6,960	2,959	$0.00	0.0	$0.00	0.0	$0.00	0
% prior year	48.3%	26.3%	26.6%	5.6%	69.5%	62.8%	70.7%	--	--	--	--	0.0%	0.0%
CO_2 metric tons	*36.0*		*0.0*			*36.0*			*0.0*		*0.0*		
% of prior year	*63%*		--			*63%*			--		--		
kBTU per SF	33.4												
CO2 kg per SF	1.6												
CO_2 Metric tons 2025	**58.6**	**0.0**				**58.6**			**0.0**		**0.0**		
kBTU per SF for 2025	**59.2**	**The US Energy Information Administration calculates that the average house of worship in the Northeast uses 54.9 kBTU per square foot per year. Is your house of worship better or worse than average?**											

It would need **11.0** 20 mpg cars
taken off the road (12,000 miles/year) all year
OR
about **2,932** NE trees
to offset this Carbon Footprint

DD Balance point temp 60°
Degree Days: *Boston*

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There is no copyright on this. Please spread it around. The more use the better!

You are encouraged to visit MassIPL's web site for *Everyday Environmental Stewardship Briefs* to help implement good stewardship practices.

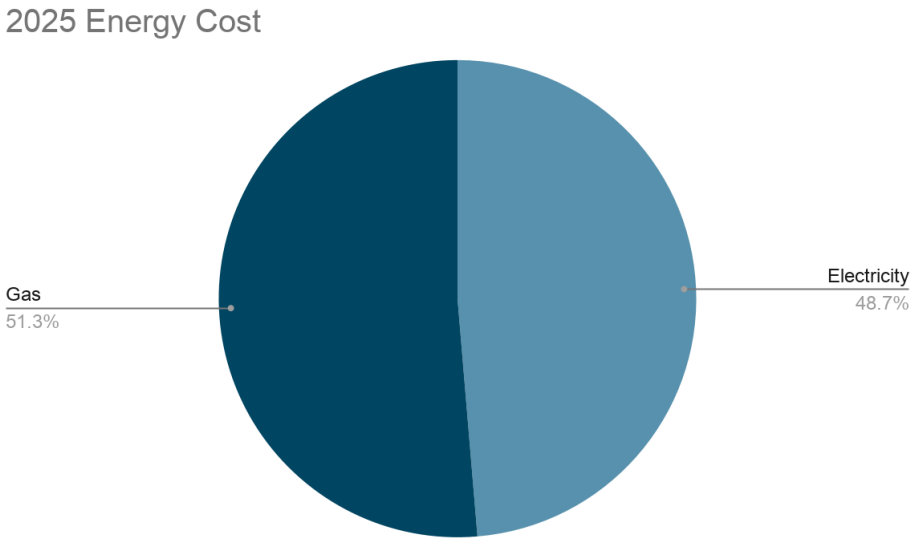
Use Patterns

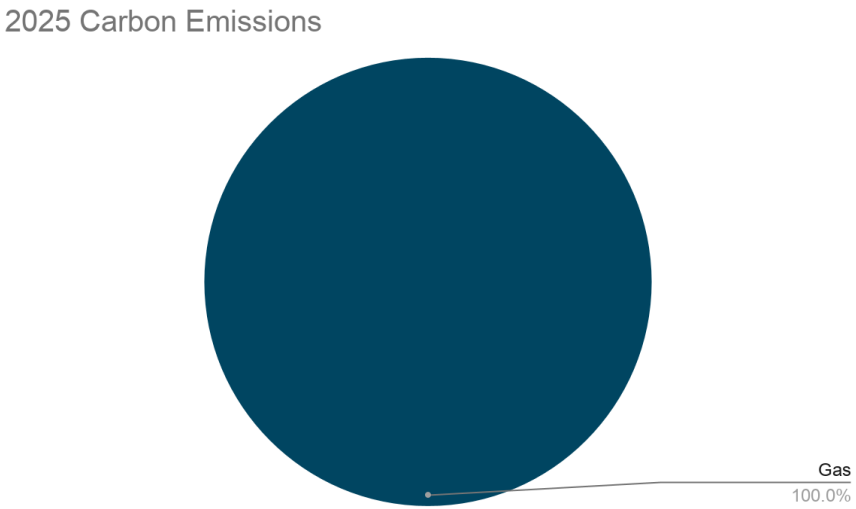
Use for heating should vary in direct relation to heating *Degree Days*. The % change by the congregation at the end of the year should be about the same as *Degree Days*. If the use % is higher, it indicates increasing inefficiency by the congregation. Monthly tracking and comparison with the same month in prior years (adjusting for Degree Days) is also an important indicator in understanding your HOW use patterns.

To learn more about how to use the Utility Cost & Use spreadsheet to lower your energy costs, read the MassIPL's *Everyday Environmental Stewardship Brief* on *UU&C*.

Evaluation
You haven't tracked usage in the past, but you have begun with this assessment. Keep it up so that you can measure changes in energy use due to weather, building use changes, and, of course, any energy efficiency recommendations from this report that you implement!

The church's electricity use is consistent year to year while gas use was, understandably, higher in the winter of 2025- 2026 due to the colder weather and your practice of increasing the unoccupied temperature during the coldest days.





Because Cape Light Compact provides 100% renewable electricity, gas accounts for all of your carbon emissions.

Have you created energy awareness among staff and members? Yes and No

Nothing can change if nobody is paying attention. A life of faithful behavior needs help, which of course is one of the reasons we gather as religious communities, to talk, share and worship. Energy awareness prompts faithful behavior. Start with the HOW by including carbon footprint and energy use reports at meetings of the governing body as well as the annual report to the congregation. Then recognize that the actions discussed in this report can also be done at home, business, and school, all the places we go in our lives.

Include discussion of energy at least twice a year in staff meetings: in the spring at the switch from the heating season to the spring/summer cooling season and in the fall at the beginning of the heating season. Remind staff to be aware of closing doors between zones, how to adjust thermostats temporarily when necessary without affecting the programmed times and encourage them to report cases where rooms seem warmer than necessary. Review staff schedule and schedule of outside groups using the space to be sure the thermostat programming is kept in synch with building usage.

First, discuss with your staff the winter and summer temperature settings and ask them to give energy saving settings a try. The Energy Department recommends 68 degrees for winter and reports that for every 1 degree lower setting for 8 hours you can save 1% of the energy cost. The Energy Department recommends 78 degrees in the summer. Of course, the staff's comfort, health, and productivity are most important so if these temperatures don't work for them, be open to adjusting them. Let them know that by trying these different temperatures, they are helping ensure the budget is spent on your programs and mission!

Also ask them to be proactive and inform you of schedule changes in their hours or programs so thermostat settings can be adjusted accordingly.

Evaluation

Overall, this is a 'yes". One notable oversight is in the Caring Cupboard, where the small refrigerator had a massive buildup of ice, indicating that it hadn't been defrosted in a very long time (see Photo B-1). These types of fridges are prone to this ice buildup and not only does it make the appliance less efficient, it risks shortening its life as the compressor must work harder.

Do you have an environmental stewardship team? A designated "energy manager"? Yes

Awareness moves to action when responsibility is clear. Just as a HOW has committees for finance, social justice, and other ministries so should it have an *environmental stewardship* team. Simply put, the team consists of a group of people who share concern for Creation Care and environmental justice who serve to identify, plan, and execute environmental stewardship activities. They support each other and convey the stewardship actions to the congregation.

The *energy manager* for your HOW should do several things: update the Utility Use & Cost sheet every month, look for unusual spikes in energy use and, if found, investigate the cause; share findings with committees including the environmental stewardship/green team, finance, property, and the lay leadership; update the Space Use sheet at least twice a year (October and March) and use the information to update programmable thermostat settings. Finally, the energy manager should ensure that energy-using equipment (especially boilers, furnaces, and air conditioners) receive regular routine maintenance to operate as efficiently as possible. The energy manager could be any member of the congregation with an interest in saving energy. Now that you have started the UU&C spreadsheet, it only takes a few minutes each month to update it.

Evaluation

You have a strong team of staff and volunteers who are knowledgeable about the building and maintain it well. Ben serves as energy manager and the team can support him in continued monitoring of energy usage and implementation of recommendations in this report.

Do thermostat settings match time of use? Yes

One of the benefits of living in a computer age is that thermostats can be programmed and controlled from a distance. A programmable thermostat "remembers" what humans often forget. But all of this relies on knowing the schedule when rooms are typically used, matching thermostat settings to that schedule, and periodically checking to make sure settings are still appropriate and the thermostat's clock is correct. *Programmable thermostats* automatically adjust to the desired temperature for the desired time period. The multiple time settings (typically 4 settings per day) permit scheduling of space conditioning (heat or cool) when and only when needed. With *Wi-Fi* based thermostats, this check can be done remotely, via a *SmartPhone*. This also enables resetting thermostats whenever a significant change to the use of the building occurs, such as a community group beginning/stopping holding meetings, adding a new service, changing times when the office is open, unexpected use or cancellations and so on. *Programmable thermostats* with an ***adaptive recovery*** element anticipate how long it will take to reach the desired temperature and start the system in just the right lead time. See MassIPL's *EES Brief* on *Thermostats*.

In general, when a space is unoccupied, setting the thermostat down in the heating season and up in the cooling season is a good thing to do. It saves energy and money. This is why we emphasize having the thermostat settings match the time of use. And it's definitely a good thing to do in spaces which are heated by electric resistance heat or oil or gas heat.

We recommend you establish a schedule and assign responsibility for adjusting thermostat settings. To maximize savings, adjust settings during "shoulder" seasons (October and November; late March through April). During shoulder season, the overnight low is unlikely to risk frozen pipes, so the unoccupied temperature can likely be as low as 50; day time highs are in the upper 30s and 40s so the building will warm up relatively quickly. We suggest starting with a schedule below, then adjusting it to the needs of your building and changing patterns of use:

- Between October 15 and November 1 – turn on heat, with unoccupied temperature set to 50 degrees
- December 1 – increase unoccupied temperature to between 55 – 60 degrees; monitor the building during extreme cold (below 20 degrees) to ensure that the building stays warm enough to prevent pipes from freezing
- March 1 – return unoccupied temperatures to 50 degrees
- Between April 15 and May 1 – turn off the heat

Also, be sure that the date and time on the thermostats are correct, and they are adjusted for the changes between Standard and Daylight Savings time.

Set back temperatures should be at least 7 – 10 degrees lower in the winter and higher in the summer and be scheduled for the heat to come on 2 – 3 hours before people come to the house of worship. On extremely hot or cold days, the space may not reach the desired temperature until slightly later, so ask the staff to be patient rather than adjusting the thermostat.

But heat pumps work a little differently. When they are set back for short periods of time, and then set forward to the occupied setting there is usually no net energy saving and instead there is a net energy increase. What's a short period of time? We recommend eight hours. If a space is conditioned by a heat pump and it will be unoccupied for less than eight hours, then don't set the thermostat back. If it will be unoccupied for more than eight hours, then set it back.

The *Space Use* table in Appendix B presents HOW's current pattern of use and is the starting point for ensuring temperature settings match use time. MassIPL recommends updating this form at least twice per year: in the fall as activity typically increases after the summer, and in May or June when the summer schedule is known. Another time to consider an update is in January when a new year may bring new activity patterns. This then guides checking the thermostat settings which should be changed at least twice a year: in mid- to late- October as the weather cools and the heating season begins and in late April or early May as the days warm and heating is no longer necessary. If your house of worship has air conditioning, you can adjust the setting for it at the same time.

Evaluation
While we didn't check each thermostat's settings, you indicated they are all programmed appropriately. We did notice that the time was not always correct on each thermostat, though the difference was only a few minutes – the clocks in thermostats tend to "drift" over time. The day is correct on each that we checked. At the next season change, correct the time to ensure the schedule is accurate.

You noted that in winter the overnight temperature is typically set to 58, though in this past cold winter you raised it to 62 and if a severe storm threatens you might raise it to 70 to be prepared in the event of a power outage. These are all reasonable adjustments to make. Summer unoccupied temperature is 76 so you might try 78 or even 80.

The Space Use sheet notes that 100 Area Offices and Classrooms are scheduled 9 - 5 six days a week, plus evenings for youth groups. Is the space fully utilized during that time? Is the Finance person in every day? Does the Caring Ministries team use their room every day? Is there an opportunity to refine the schedule and not heat this entire space for this entire time?

The Music Room has a manual thermostat and a note next to it specifies the occupied and unoccupied temperatures (see Photo B2). This is a good practice so that everyone who uses the room is aware of the desired settings. A better solution would be a programmable thermostat, especially one with remote sensors (such as this model https://www.poweredbyefi.org/masssave/ecobee-smart-thermostat-premium-b-3.html)
that could be placed in the bathrooms to ensure those rooms remain at a safe temperature. The winter unoccupied temperature is 65 which is relatively high. However, the bathrooms in this area may require higher temperatures in the winter, but this is an excellent space to experiment next fall with lower shoulder season temperatures.

Do you have a plan to cut your carbon emissions 50% by 2030? **No**

The Utility Use & Cost spreadsheet calculates your carbon footprint – that is, the amount of carbon your HOW is responsible for adding to the atmosphere. In addition to Massachusetts' goal to reduce carbon emissions by 50% by 2030 and be net zero by 2050, the state has instituted a program called Large Building Energy Reporting (LBER), requiring buildings over 20,000 square feet to report their energy usage. Boston goes one step further with BERDO (Building Energy Reporting and Disclosure Ordinance) by setting a declining level of carbon emissions in five-year segments. Houses of worship are considered "Assembly" buildings and the targets are:

BERDO Carbon Emissions Targets

	2025 – 2029	2030 – 2034	2035 – 2039	2040 – 2045	2045 – 2049	2050+
Kilograms CO2e/ft2/year	7.8	4.6	3.3	2.1	1.1	0

It is likely that the state will expand LBER to include these kinds of targets in the future. Buildings that don't meet these targets may be required to make "Alternative Compliance Payments" and could be subject to fines if compliance requirements aren't met.

To learn more about these programs, follow these links:

Large Building Energy Reporting: https://www.mass.gov/info-details/large-building-energy-reporting-policy
Boston BERDO: https://www.boston.gov/departments/environment/berdo

Please note that **MassIPL is not an expert** in all the details of each of these energy reporting programs. Our intent with this analysis is to make you aware of the programs, indicate whether you may be required to comply with them, and provide an initial estimate of how your building's carbon emissions compare to program targets. While our calculations should yield similar results, you should use the reporting portal of the program most relevant to your building to ensure accuracy according to the specific protocols used by that program.

Even if your building is not required to comply with these ordinances, we believe they offer a good set of targets for houses of worship to follow as they plan to lower their carbon emissions.

Many houses of worship MassIPL has worked with have made good progress toward these goals. The first step is to implement the recommendations in this report, beginning with the "low-hanging fruit" actions that require minimal cost and effort. Then plan to implement actions that require more time, effort, and budget, ultimately converting as much of your heating system to heat pumps as possible when your current system reaches the end of its useful life.

Reducing the energy you use also reduces carbon emissions. In addition, you can reduce your carbon footprint by buying carbon offsets or committing to 100% Green Electricity. Although Green Electricity and carbon offsets may add money to your energy budget it will be less than the amount you save by taking energy-saving actions and so is an affordable way to further lower your environmental impact. Appendix D provides information on two ways to buy "green" electricity: Green Energy Consumers

Alliance's program (which offers electricity from New England wind, solar and other renewable energy sources) and Energy Sage's Community Solar Marketplace which helps you find nearby solar farms that you can subscribe to.

Evaluation
Since your building is over 20,000 square feet, you should be required to comply with LBER though we looked up your building and did not see it listed on the Covered Buildings List: https://www.mass.gov/info-details/large-building-energy-reporting-lber-covered-buildings-list#2026-lber-covered-buildings-list-cbl This is likely because the Brewster Assessor record lists the church at 7814 sq ft and the footprint drawing of the church appears not to have the new Sanctuary. Since churches don't pay property taxes, we often find these records aren't accurate. Perhaps at some point in the future this will change so it makes sense for you to be aware of the program

Carbon emissions in 2025 were 58.6 metric tons overall and 2.6 kilograms per square foot, so you are in compliance with the BERDO targets through 2039. To stay in compliance after that, you will need to cut carbon emissions 20% by 2040. By 2040 much of your existing HVAC equipment will be nearing the end of its expected useful life and lowering carbon emissions will need to be a key consideration in choosing replacements so that you will be able to reach the net zero goal by 2050, which will be well within the lifespan of the new equipment. We will discuss this in more detail in the Heating, Cooling, Hot Water section of this report.

You benefit from the fact that the Cape Light Compact provides 100% renewable electricity, so your carbon emissions from electricity are zero. While you purchase much of your electricity from the Sippican Community Solar Garden, you likely cannot claim additional carbon reductions to offset the emissions from gas. Usually, solar farms own the Solar Renewable Energy Credits (SRECs) which are the embodiment of the low carbon characteristic of solar power and then sells them, likely to the utility providers which use them as part of their compliance with the Massachusetts Renewable Portfolio Standard that requires them to have 30% of electricity be from Class 1 facilities in 2026. If and when you buy the panels, if you do not sell the RECs or participate in the SMART program, you will be able to claim this as carbon-free electricity.

Have you created a budget line for energy efficiency investments? **No**
In considering costs (especially for capital actions), recognize that "return" on such investments for the community-of-faith is measured by the standards of the kingdom of God, not the kingdom of Wall Street. The decisions being made speak to the care we are called to give to the earth, as stewards of God's creation. The age of the building—dating to 1850 with the newest section about 25 years old—conveys the appropriate time horizon.

At MassIPL we find that often congregations have difficulty finding the money to fund even modest energy efficiency improvements, and so we suggest this "reinvesting the dividends" approach. An *energy efficiency budget* starts by adding a line to the congregation's overall budget for spending on *energy efficiency* projects. Fund it the first year with a modest amount to pay for some small projects. In subsequent years, the projected savings from line items (electricity, gas, oil, propane, water/sewer) as a result of energy efficiency actions are shown in this line, with the savings invested in additional energy efficiency actions. For example, if programmable thermostats are installed replacing manual thermostats with a savings estimate of 10%, and last year's gas bill was $10,000, then the next budget would show $9,000 for gas and $1,000 for energy efficiency. The $1,000 can then be used in the coming year for other actions, such as the HOW's share of LED bulbs after the electric company rebates. If no actions are taken in the year, the funds are set aside in an *Energy Efficiency Reserve Account* for use in future years. In the sample Efficiency Budget at Appendix E, the percentage of the Efficiency line increases over 4 years from 14% to 41%. Setting aside these savings for future investment is a huge help in paying for moderate-cost items (such as the portion of LED upgrades not utility rebate) and also for major work, such as paying a loan for heating system upgrades or replacement. See the MassIPL EES brief *Establish An Energy Efficiency Budget Line*.

An immediate step to start saving is to enroll in a program for **bulk purchase** of gas and electricity and use the savings to fund the energy efficiency budget. Many towns now have "municipal aggregation" programs which automatically enroll customers in a rate for the supply of electricity specially negotiated by the town (transmission and distribution rates remain at the regulated rate).

Another bulk buying program available to Brewster Baptist Church (and other non-profits) is *PowerOptions*. Go to www.PowerOptions.org or contact Zach Holt, zholt@poweroptions.org, to get details about current pricing. Bulk purchase of oil at lower cost (and please buy the bio-fuel for better environmental stewardship) is available via *Green Energy Consumers Alliance* www.GreenEnergyConsumers.com Information on each is available at Appendix D.

Another way to fund the energy efficiency budget is to adopt your own internal fee on carbon. A fee like this is meant to internalize the cost that carbon pollution and the effects of climate change inflict on others and society at large. Many corporations use this approach, putting a price on carbon ranging from $15 to $50 per ton. One approach would be to follow Canada's example: they started at $10 per ton of carbon in 2018, increasing by $10 per ton until the price reaches $50 per ton in 2022. Consider increasing to a higher number, up to the $190/ton that the federal government now uses. Use the funds raised by this mechanism to implement the recommendations in this ESA and establish a reserve fund to save for large projects in the future. See the MassIPL Everyday Environmental Stewardship Brief *Establish An Efficiency Budget Line*.

Evaluation
If you do nothing you can expect your energy costs to increase at least at the rate of inflation. For convenience, let's use a 3% annual inflation rate (in the hope that inflation soon returns to this nominal level we saw for many years!). Thus, the $42,600 spent in 2025 can be expected to be $42,800 in 2026, $44,100 in 2027, etc. Budget for that amount and when you reduce energy use and cost, put the savings into your Energy Efficiency Reserve. Also, if a winter is warmer than usual and you use less energy than expected, put the savings into the Energy Efficiency Reserve rather than shifting it to other expenses or cutting the budget.

You've already reduced the cost of much of your electricity by buying from the Sippican Community Solar Garden. The Power Options bulk-buying for gas typically saves about 10%, which would be $2000 and would be a quick way to begin to fund additional efficiency actions. If you continue to use the Utility Use & Cost spreadsheet, you will have a record of the savings achieved to support your request to put savings into the Energy Efficiency fund.

Given the carbon footprint of 58.6 tons, you would add $2930 to the Energy Efficiency fund if you follow the suggestion to assess a carbon tax of $50/ton on yourselves.

BEHAVIOR Photos

B1 – The small under-cabinet refrigerator in the Caring Cupboard has major frost build up, decreasing its efficiency and show that this tenant is not aware of the need to defrost it on a regular basis.

B2 – The note next to the Music Room thermostat lets everyone know of the proper temperature settings. A better solution is a programmable thermostat.

ELECTRICITY

Electricity is costly and is a significant cause of environmental pollution. Lighting, office and kitchen equipment, and air conditioning (if used) are key uses of electricity where upgrades in equipment and adoption of more efficient use practices typically are possible.

Electricity service at Brewster Baptist is 3-phase, and at least 400 amps. Wiring appears up-to-date with no knob-and-tube (ungrounded) wiring.

Do you make the best use of natural and artificial light? Yes

Lighting is likely to be one of the largest users of electricity in your HOW. Depending on the orientation of the building to the sun and the location of rooms, daylight may be sufficient. When there is sufficient daylight, avoid turning on lights. People often feel that having lights on is more welcoming so it may require some explanation and conversation to explain why lights should remain off. When lights are used, the level should be appropriate for the activity. For example, offices, classrooms, and music rooms need sufficient light so people can read without straining their eyes. Areas such as hallways or entries need lower levels of light, but are often over lit. If an area seems too bright, try removing a bulb or two from a fixture or switching bulbs to a lower wattage. You can often reduce electricity use 20% or more in these areas by this simple, no-cost action.

Evaluation

Given that the Sanctuary and Fellowship Hall have large windows (see Photos E1 and E2), you may not need additional lighting on sunny Sundays. Many people are used to having lights on anyway and feel it is more "welcoming." Experiment with not using the lights on sunny days and educate the congregation how this is an act of environmental stewardship.

The offices don't have sufficient sunlight to provide enough light to work by. Rather than use overhead lamps, consider getting LED desk lamps or other small task-lighting lamps to provide light only where it is needed for reading, writing, computer work, etc.

Do all your fixtures have LED bulbs? Yes and No

The benefits of efficient lighting are well known. Updating lights is easy and has an immediate impact on your electricity use. LED bulbs are superior to both incandescent and fluorescent lighting in both lower electricity use (50>85%) and longer life (10>50,000± hours). The longer life also means the time and cost to change bulbs is significantly reduced, an important

consideration in hard-to-access locations, such as sanctuaries and other big/high rooms. For more information, see MassIPL's EES Brief on *LEDs*.

Fluorescent tube lighting is common, especially in classrooms, hallways and large, open rooms. If your fluorescent tubes and/or fixtures are "old" (3+ years), they are candidates for upgrades to LED that can lower their use and cost 40% or more. A related benefit of LED tubes is better brightness. This often means fewer bulbs are needed to achieve desired lighting levels, such as only 2 tubes in a 3-tube fixture. Another benefit is the ability to dim the fixtures, with the proper dimming switch installed.

Exterior lighting of the building, grounds, parking areas, etc. is often a significant use of electricity, but LEDs are available for almost all exterior fixtures. In addition the fixtures, how they are controlled (with timers, photo sensors, etc.) also determines how much electricity they use. Having someone responsible for understanding the controls, monitoring them, and changing schedules is important. Note that in addition to the cost and carbon emissions, light pollution is becoming a significant concern for its effects on people, wildlife, and the ability to enjoy the night skies https://darksky.org/resources/what-is-light-pollution/ So limiting exterior lighting at night is another act of caring for Creation.

In the past 10 years, LED lights have become the industry standard and, as a result, the incentives in the MassSave program are not as generous as they have been. However, they still pay for a portion of the cost of a lighting upgrade, reducing the payback period on the balance to only a few years.

Evaluation
Most of the lighting at Brewster Baptist Church has been converted to LEDs. However, you noted that the covered entry has CFLs. As they burn out, replace them with LEDs. Be sure to recycle the CFL bulbs as they contain mercury – the town Department of Public Works or a home center may accept them for recycling. There are a few exterior lighting fixtures and it is unclear how they are controlled – ideally on timers and/or motion and photo sensors.

We did notice that you have incandescent window candles in at 15 - 20 windows (See Photo E3). While individually they consume small amounts of electricity (typically 7 watts) this adds up since they are on 24x7x365. Annually each one uses 61 kwh so 15 use 915 kwh and cost $265 at your current electric rate. Not a large amount in the grand scheme of things, but unnecessary during the day. The same type of window candles are available with photo sensors that turn them off during the day, and here is one source: https://www.christmastreehill.com/5440025.html

Do you have sensing switches in all appropriate spaces? **Yes** and **No**

Some spaces are well served by having ***occupancy/vacancy*** sensing switches for lighting control. Restrooms are the prime candidates, with storage rooms and meeting rooms additional places to consider. These spaces have multiple users, with highly variable use patterns. Having a motion sensor switch (typically at the entry) that is also calibrated to typical use time means the use pattern (aka *behavior*) is monitored by technical equipment that ensures efficient on/off of electricity for lighting.

Evaluation

You noted that you have sensors in some locations. Given that the building has an active schedule with many people using the building at different times, sensors can help ensure lights aren't accidentally left on if someone forgets. If you see lights left on frequently in particular rooms, prioritize them for installing sensors.

Are all your refrigerators and freezers efficient and efficiently used? **Yes** and **No**

Refrigerators and freezers run 24 x 7 so continuously consume electricity but have become far more energy efficient in the past 20 years. A new Energy Star rated refrigerator uses up to 35% less electricity than a 15-year-old model; an easy way to check the efficiency of your current appliance is to use the Energy Star Flip Your Fridge Calculator https://www.energystar.gov/products/appliances/refrigerators/flip-your-fridge To maximize efficiency, check the coils (typically underneath or behind the appliance) and clean off any accumulated dust to ensure good air flow. And if there are times when these appliances are not used, turn them off and unplug them. Many houses of worship accept donations of refrigerators from members who buy new ones at their home. Before you accept the next donation, check its age (the manufacturing date is often on a label inside the refrigerator) and if it was made before 2014, politely thank the member but suggest they recycle it!

The Energy Department and Consumer Reports report that refrigerators have an expected life of 12 – 15 years; while they may continue to run after that, you have gotten your money's worth out of it and it may be worth upgrading to a new, more efficient model. The current efficiency standard went into effect in 2014 and the Energy Department has proposed a new standard that is scheduled to come to market in 2029, which will be a good time to consider upgrading!

Evaluation

Brewster Baptist Church has a number of refrigerators and freezers, almost all of which are up to the most current efficiency standards (see Photos E3 - E15). In total, they consume about 5000 - 5200 kwh annually, about 7% of the church's total electricity usage. The True refrigerator in the kitchen is older and the serial number suggests it was manufactured in 2000 or 2001, though the database we use stated it couldn't be certain of this date (see Photos E3 - 4). If this age is correct, it is at the end of its expected

useful life, so the church can expect to replace it in the next couple of years; as long as it keeps working, delay the replacement until the next generation of appliances meeting the 2029 energy efficiency standards become available.

Location	Brand/description	Date of manufacture	Annual kwh usage	Recommendation
Kitchen	True refrigerator – Model T-49	2001	1570	Plan to replace it around 2030
Kitchen	Atosa freezer – Model MBF801GR	May 2025	1340	Continue to use
Garage	Frigidaire freezer- Model FFFU17M	June 2015	507	Continue to use
Caring Cupboard	Whirlpool refrigerator	July 2012	562	Continue to use
Caring Cupboard	Frigidaire Freezer, white	November 2017	449	Continue to use
Caring Cupboard	Frigidaire Freezer, stainless steel	October 2025	545	Continue to use
Caring Cupboard	Small under-cabinet refrigerator	Unknown	100 - 150	Defrost regularly

Source: Energy Star Flip Your Fridge Calculator

You could measure the actual energy use with a Kill-a-Watt meter. They are easy to use and often free to borrow from the local library. Just plug any 120-volt appliance into it and read the instantaneous power consumption. For equipment which cycles off and on, like a refrigerator or a dehumidifier, leave it plugged in for about 24 hours and it will display the total energy used in the period. This is useful for all types of equipment.

Are all your appliances and equipment Energy Star top rated? Yes

Equipment using electricity is found in offices, kitchens, music rooms, and other locations. Computers, printers, copiers, space heaters, dishwashers, humidifiers and dehumidifiers are the most typical sort of such equipment. The ***Energy Star*** program is well known and an excellent guide to finding the most energy efficient equipment to replace older products. But don't just buy any Energy Star product – look for ***Energy Star*** Top Rated. Use the ***Energy Star*** web site to get the best! This ensures both lower electricity use, but likely also longer life for the equipment. Go to

http://www.energystar.gov/certified-products/certified products?c=products.pr_find_es_products

The governing body should adopt a resolution that all new equipment purchased in categories that the Energy Star Program covers should be top-rated, and then apply this policy in all new purchases.

Evaluation
Congratulations on using highly energy efficient equipment. Keep up the good work!

Although not an electric appliance, there is a large commercial gas 8-burner/2 oven range in the kitchen (see photo E16). Each pilot light uses up to 1200 BTUs of gas per hour and they are on 24/7 which adds up to 100 therms per year, per pilot. With 8 pilots, 800 therms at your 2025 cost of $1.92 per therm is about $1500. Some churches with similar commercial ranges that are only used a few times a year have developed a process to shut off the gas to the range and re-light it as needed. While this is somewhat inconvenient, consider whether it is appropriate for your situation. At an appropriate time, consider replacing it with an electric induction appliance.

Have you evaluated your HOW for solar panels? **Yes**

Solar energy produces no carbon emissions. In the past few years, the cost to install solar systems have come down dramatically. The cost of a system for a typical HOW is usually in the range of $75,000 - $100,000. The electricity savings plus state incentives will often pay the cost back in under 10 years, and the systems will continue to produce electricity for at least another 10 - 15 years. The HOW also has the benefit of a very visible expression of environmental stewardship, often better than the best welcoming sign.

As costs have come down, purchasing the panels has become the best financial option. Borrow from savings or endowment, then repay it through the electricity savings and the state SMART solar incentive payments. If your HOW doesn't have cash available, consider a loan from a denominational loan program such as the UCC Cornerstone Fund Ecoloan, the Episcopal Diocese of Massachusetts Green Loan, the Unitarian Universalist Association Building Loan, or the Episcopal Church Building Fund (which loans to other denominations). Check if your denomination has a building loan program. A third option is third-party financing programs such as leases or Power Purchase Agreements. In this model, a third-party financing firm owns the system and your HOW does not have to pay any money upfront. The monthly payments are at a fixed rate, generally 10% -15% less expensive than paying the electric company for the same amount of electricity. For more information, see MassIPL's EES Brief on *Solar Financing*.

With the passage of the federal Inflation Reduction Act (IRA) in late 2022, purchasing the panels has become an even better option for organizations that don't pay federal taxes. While the Trump administration has cut back on these incentives, they

are still available for projects that are completed by December 31, 2027. Now the investment tax credit of 30 percent (40% if American-made components are used which is becoming more common) is available to nonprofits under the provisions called "direct payment" or as the IRS calls it "elective pay". MassIPL hosted this webinar discussing this in early 2023: https://www.youtube.com/watch?v=lH5h8lIvuE4&t=4s and Lawyers For Good Government has an excellent set of resources: https://www.lawyersforgoodgovernment.org/elective-pay-ira-tax-incentives

MassIPL has helped over 60 HOWs install solar in the last 10 years. MassIPL has 5 partners for solar panels:

- 621 Energy (http://www.621energy.com/) has been MIPL's solar partner for 2 years and offers a power purchase agreement to make solar affordable for HOWs. Contact Bob Clarke clarker@621energy.com
- New England Clean Energy, https://newenglandcleanenergy.com/ Contact David Kleinschmidt, David.Kleinschmidt@newenglandcleanenergy.com
- Revision Energy has been a MassIPL partner for over 10 years. Contact Jen Stevenson Zepeda, jstevenson@revisionenergy.com
- Resonant Energy (http://www.resonant.energy/) offers a range of programs to help HOWs install solar, including its Interfaith Community Solar program. Contact Madeleine Barr madeleine@resonant.energy
- Energy Sage (www.energysage.com/mipl) is an online site where you post the HOW's address and some information about its energy use, then multiple solar companies will evaluate and provide proposals.

When you install solar panels using one of these partners, they make a donation to support MassIPL so be sure to mention that you heard about them through MassIPL! As you receive proposals, MassIPL can assist you in the decision-making process.

Evaluation

Brewster Baptist has significant potential for solar panel installation. The roof orientation and pitch of the Sanctuary roof are excellent (see aerial photo at page 8) while the southeast-facing roofs of the Community Center and Fellowship Hall are also feasible. The flat roof is acceptable but since you need access to service the HVAC equipment, the amount of space where you can put panels is limited. Our quick estimate:

- Sanctuary would produce up to 24,000 kwh annually
- Community Hall roof: about 10,000 kwh annually
- Fellowship Hall roof: about 18,000 kwh annually

So in total, these areas would produce about ¾ of your electricity. These systems would likely cost $120,000 - $150,000. We also talked about a parking canopy and you are researching that option. It is likely that a parking canopy system would be

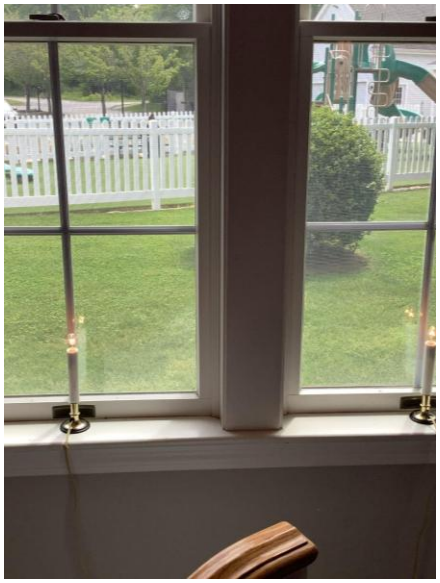
able to produce all your electricity, though it is a bit more expensive. Because of the additional permitting and engineering involved, often installers don't want to install canopies smaller than about 100kw, which is larger than you would need.

But your electric needs will likely increase as you upgrade your heating system to heat pumps, install electric car chargers, etc. so it is worth planning for a larger system. Note that because the panels will be on the roof for 20 or more years, the shingles or other roofing material should be no older than about 10 years to avoid having to remove the panels during a reroofing project. Contact one or more of the MassIPL partners to have them make a more detailed evaluation and proposal. This will also include an evaluation of roof condition and structural ability to support the panels.

ELECTRICITY Photos

E1 — The Sanctuary receives good natural light on sunny days and may not need artificial lighting.

E2 — The Fellowship Hall also has good natural light.



E3 —Individually, these window candles use little electricity, but since there are a number of them and they are on 24x7x365, it adds up! Consider replacing them with models that have a photo sensor that will turn them off during the day.

E4 —True refrigerator and Atosa freezer in the kitchen

E5 — The label for the kitchen True refrigerator. The serial number suggests it was manufactured in 2000 or 2001, though the database we use stated it couldn't be certain.

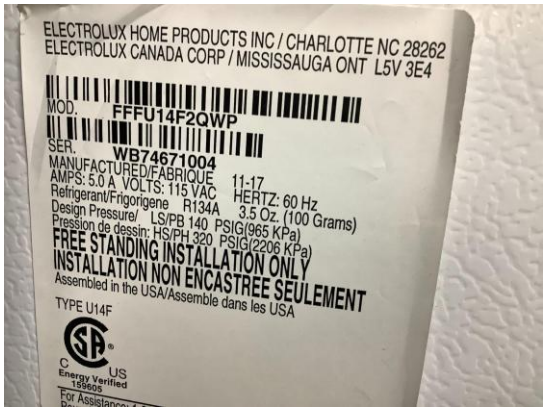
E6 — The label for the Atosa freezer states it was manufactured in May 2025.

ELECTRICITY Photos (cont.)

E7 – The freezer in the garage.

E8 – The label of the garage freezer states it was manufactured in June 2015.

E9 – The Frigidaire freezer in the Caring Cupboard



E10 – The label of the Frigidaire freezer states it was manufactured in November 2017.

E11 – The new Frigidaire freezer in the Caring Cupboard

E12 – The label of the new Frigidaire Freezer states it was manufactured in October 2025

ELECTRICITY Photos (cont.)

E13 – the Whirlpool refrigerator in the Caring Cupboard.

E15 – The small under-cabinet refrigerator in the Caring Cupboard. No label was found that could help identify how old it is.

E14 – Based on the serial number, this appliance was manufactured in July 2012.

E16 – The pilot lights on this gas range use a surprising amount of gas!

BUILDING ENVELOPE

"Building envelope" is a term energy efficiency professionals use to refer to the role walls, windows, insulation, and other physical characteristics play in determining energy use, cost, and carbon footprint. A "tight" envelope prevents the air warmed in the winter or cooled in the summer from leaking out of the building and a well-insulated envelope prevents heat from being transmitted through the walls and roof.

The building is primarily wood frame clapboard construction with asphalt shingle roof; a large flat roof area houses roof-top HVAC units. There are four sections built at various times: the original 1850 church (now the chapel) on the upper level with junior and senior high school rooms on ground floor (rooms 100 - 103); a 1950's addition with offices and conference rooms (rooms 104-107); the 1974 addition, currently the Community Room (rooms 111 - 117); and the early 2000's new Sanctuary, Narthex and Fellowship Hall. These multiple additions are not unusual for houses of worship but in your case it creates a particularly complicated roof system that is challenging to insulate well. Often the connection points between building sections are areas that show the most heat loss and so are areas to focus on in your upcoming insulation project.

Are your walls, ceiling, floors insulated to current standards? Yes and No

Building materials will conduct heat out and cold in wintertime, and the opposite in summer. Well-insulated space retains its desired temperature and takes a shorter time to achieve this temperature. The exterior portions of a building (side, top, bottom) are the key areas for insulation. The first places to insulate are attics and above ceilings; since hot air rises, if you can stop it escaping the building you save a lot of energy. Buildings with pitched roofs and little-used attics are best served by having the underside of the roof insulated with spray foam; alternatively, the floor of the attic can be air sealed and insulated to act as the "exterior" of the occupied space. Next is underneath floors that are above unheated basements or crawlspaces: the ceiling of a little-used basement is the "exterior" of the occupied space. Older buildings, especially 19th/early 20th century with stone walls, present particular challenges for wall insulation. The Energy Star web site has good information on insulation:
http://www.energystar.gov/index.cfm?c=home_sealing.hm_improvement_seal_insulate

Evaluation

The attic above the chapel has had 14 inches of blown cellulose added, along with air sealing so is well insulated (See Photo BE1 - BE3). The tray ceiling structure in the Narthex is difficult to create continuous insulation and the current insulation leaves gaps between the top and the side of the ceiling (see Photo BE4). As we commonly see, the insulation has been disturbed in several places over the years, usually by electricians or other workers (see Photos BE5 and BE6); these seem relatively small but can

significantly decrease the effectiveness of the insulation. The Sanctuary and Fellowship Hall roof areas don't appear to have any space for additional insulation, though given the construction date there is likely a decent level of insulation there.

The church had already had a MassSave assessment and proposal for $19,000 of insulation work by RISE Engineering. The description of the work in the proposal was very general, citing only Attic 1, Attic 2, and Attic 3 for work to be done. During the site visit, the team mentioned significant ice dams this past winter on various roofs. These indicate lack of insulation and air sealing in areas. We noted the following points in an email to Lindsay Henderson of the Cape Light Compact who said she would be in touch with RISE to raise these points:

> "This will be a tricky job to do well and achieve hoped-for energy savings. All these areas have some insulation already, so air sealing will take a lot of detailed work. In many of these areas, the insulation has been disturbed over the years and perhaps they plan to remove it and install new insulation, though the proposal doesn't specifically say this. One attic has a gas furnace in it, currently above the insulation which no doubt contributes to the ice dam problem but the proposal doesn't describe moving the thermal boundary to the roof in any of the areas. One of the main roof areas is flat and while there are soffit vents in the eaves there are no ridge or gable vents to allow good ventilation; and with a good amount of ductwork above the insulation there is likely some heat loss from the ducts contributing to warming the roof -- a particularly tricky problem to solve!"

This work will bring the insulation levels closer to what is currently in building codes, though retrofit installation is unlikely to accomplish the level of insulation and air tightness that can be achieved in new construction.

Have you sealed areas of air infiltration? **No**

Just as open doors between zones are a cause of inefficiency, areas of air infiltration (aka "holes") cause inefficiency. The most common areas of infiltration are between doors or windows and wall framing, places where pipes or electric wires enter the building, electric sockets and switches that are on outside walls, along the sill plate (where the top of the foundation meets the framing of the walls), and in attics. It is rather amazing how these small areas can add up to a large hole. The EPA estimates they can add up to as much space as if you left a window wide open! Sealing these areas can be a project for a work day with simple materials you can buy at any hardware store or home center: door and window weather stripping kits, socket and outlet insulation, caulk, cans of spray foam. An additional benefit is that sealing these areas can also keep out mice and insects.

Evaluation

Photo B6 shows a penetration for wires in the attic that should be plugged – a can of spray foam is ideal for this. Also, in Room 112 there is a quite large penetration made for conduit (see Photos B7 and B8); you could use spray foam (look for a can that specifically says it is for big gaps) or stuff fiberglass insulation around it. Since the building has no basement, you don't have the

opportunity to plug leaks in at the foundation. We did not make a detailed inspection of the exterior for wiring and plumbing penetrations but these appear to be very few. Should you notice any, be sure to seal them with spray foam or caulk. This has the added benefit of helping keep mice and bugs out of the building.

Do you have high efficiency windows? Interior storms? Sun screens? Yes and No

High efficiency windows (sometimes referred to as *thermopane*) serve to provide additional insulation. Some are *fixed* while others are *operable*. Operable windows with cranks can shut tightly but may need weatherstripping if they are old. Older windows (typically single pane) that slide up-and-down typically have counterweights, with a cord or chain moving over a wheel at the top, with the counterweight in a void on the side of the window. This void needs to be filled with insulation when the window is upgraded to thermopane and a vinyl track installed for up-and-down movement.

In general, windows are considered to have the lowest return (measured in either financial terms or carbon reduction) of common energy efficiency projects as long as the windows are in acceptable condition. If the window frame is in good condition, you may be able to reduce the cost by replacing just the sashes with new thermopane sashes. However, if the frames have deteriorated there is likely significant air infiltration that loses more energy than the window itself. In this case, full replacement (taking the window and framing out to the rough framing and installing a new window unit) is a necessary investment. In this case consider triple pane windows: the incremental cost to go from double pane to triple pane is a relatively minor part of the overall cost but results in double or more insulation value.

Improving the thermal performance of windows can be expensive, but there are a number of alternatives to choose from that balance cost and efficiency improvements. If funds are not sufficient to do all windows, prioritize the most-used spaces and over time proceed to least used spaces. Pick the type of upgrade that is most appropriate for the space:

Exterior storm windows: These are very common and offer a balance of energy improvement at a reasonable cost. These are installed on the outside of the building, attached to the trim around the window. Often "triple track", they have screens for the summer and glass panes for the winter. While they add R-1 insulation value, they also provide another layer to block wind and drafts.

Interior "storm" windows: Likely the least expensive of the alternatives, this, as it sounds, adds a panel of glass, plexiglass or plastic film on the interior, make the windows similar to "thermopane" glazing, reducing heat loss in winter and heat gain in summer while also reducing any air leakage. See MassIPL's *Everyday Environmental Stewardship* brief on interior "storm" windows and the attached list of vendors for companies who provide a range of different types of interior storm windows.

One noteworthy provider is Skylarc Innovations' Windowtherm panels www.skylarcinnovations.com which has been tested to increase window insulation value by R-2. Another firm, ClimateSeal, has a different approach that is described in this case study on their web site of St. Paul's Episcopal Church in Brookline https://www.climateseal.com/projects/st-pauls-episcopal-church/

Restoration of single-pane windows: If the windows have unique, hard-to-replicate features and the sashes and frames are in good condition, restoring them by resetting the panes, improving weatherstripping, "tuning up" the sash cords and significantly improve their energy efficiency. Besides, windows from 75 years ago or longer used higher quality wood and so can be superior to new windows.

The Window Preservation Alliance lists companies in Massachusetts that restore old windows: https://windowpreservationalliance.org/directory

Convert existing single pane to double pane. The Bi-Glass System installs a new double pane insert in the existing sash and "tunes up" the window. https://www.bostonbiglass.com/

Window inserts, aka, frame-in-frame replacement. These are replacement window units that fit within the existing framing of the window. This is a very common approach because it is less labor-intensive and doesn't disturb the existing trim and sill. It is thus less expensive than a full window replacement, but some may not like the look of the windows. See this article for a full discussion of this approach: https://www.thisoldhouse.com/windows/reviews/full-frame-vs-insert-window-replacement

Full replacement. With this approach, all window components are removed back to the rough opening, and the new window unit is installed. This is the most expensive option but may be the best choice if the frame, sashes, sill, and casing are badly rotted and must be replaced in order to reduce air leakage. You will have a choice of materials (wood, fiberglass, composite, vinyl), styles, and double- versus triple-pane. They come in a wide range of prices but beware of very inexpensive products, as they may not hold up well over time.

Stained glass windows are almost always single pane and allow significant air infiltration around the leading and sections that may be operable. Interior storm windows are typically the best solution as many of them can be custom ordered to a desired shape and installed so they are not noticeable.

In the summer, consider window inserts that use a film that blocks the sun's heat from entering the building. Similarly, for windows that have screens, consider installing *sun screens* that block up to 80% of the heat from sun exposure, keeping the room cooler without the use of air conditioning. For both window inserts and sun screens, rooms that face south and west – especially frequently-used rooms like offices – are the best candidates. Install them in early June or when people using the room notice that the sun heats the room to an uncomfortable temperature. Remove them and replace the regular screens in early September.

Evaluation
The chapel, new Sanctuary, Fellowship Hall, and Narthex all have good quality thermopane windows (see Photos BE9 and BE10). Likely these windows have reflective coating to limit summer heat gain already. The Community Room has original single pane windows (see Photo BE11). The windows themselves are in good condition so exterior storm windows are a good option. The next step up would be to replace the sashes with thermopane sashes, which would be much less expensive than full window replacements; window inserts are a second option; the lowest cost option would be interior storm windows which are especially good at blocking drafts. As noted above, window replacements are expensive and thus tend to have long payback periods so the decision of whether and when to replace these windows should consider how many hours the room is used and whether the improved comfort would be a valuable benefit.

Are doors well insulated and tight fitting? No

Like windows, door replacements are expensive. But an old wooden door will likely have an insulation value as low as R-2 while a new door may have an R-5 or more, over twice the insulation value. In addition, new doors are more intentionally designed to reduce the air leakage around them. If a door shows signs of age and wear – being out-of-square, large gaps between the edge of the door and the jambs or sills – a replacement is worthwhile, not only for energy savings but improved security. Most doors are "pre-hung", i.e., it comes as a unit with the framing, jambs, and sills; these units are designed together to minimize air infiltration.

However, if the framing is sound, you may be able to save money by just purchasing the door "slab", i.e., the door itself, and having a carpenter or handyman hang the door in the existing frame and adding appropriate weatherstripping. Whenever you weatherstrip a door there is something of a tradeoff between the tightest closing vs. the ease of closing. If the weatherstripping is too tight and people do not make sure it is secure, it may not close completely. Monitor at the start of winter and summer seasons to ensure that the weatherstripping continues to function effectively; due to wear, it will likely need to be replaced every couple of years.

Evaluation
The RISE Engineering assessment identified 6 doors that will be weather-stripped as part of their insulation project.

Do windows have effective weatherstripping? **Yes** and **No**

Doors and windows that don't fit their frames well leave gaps that can allow a significant amount of air leakage – letting that heated or cooled air escape and requiring energy to heat or cool more air to replace it. Weatherstripping doors is an easy DIY project with many different types of products to suit the specific needs of different doors and windows. The *This Old House* web site has excellent information and videos about weatherstripping:

- https://www.thisoldhouse.com/doors/21112231/how-to-weatherstrip-a-door
- https://www.thisoldhouse.com/windows/22937818/practical-air-sealing-techniques

Evaluation

The newer windows in the Sanctuary, Narthex, Fellowship Hall and the Chapel do not need weatherstripping. The Community Room may benefit from weatherstripping, though they seemed to be reasonably tight. Colder weather is the best time to check and if you feel cold drafts, apply an appropriate weatherstripping material.

BUILDING ENVELOPE
Photos

BE1 —14 inches of blown insulation in the Chapel attic

BE2 —Insulators preserved the airflow in the attic by installing baffles around the perimeter.

BE3 — The insulation company used spray foam to seal gaps between the boards.

BE4 —The Narthex ceiling is a difficult shape to create a continuous insulation layer and shows gaps in the original installation.

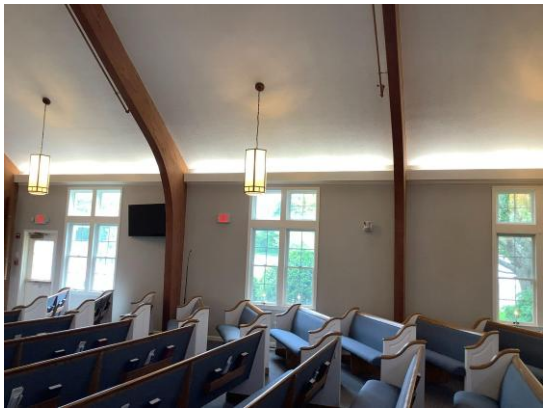
BE5 —Note the insulation removed from one of the stud bays toward the middle of this photo.

BE6 —The insulation does not fit against the joist, leaving a gap. Note also an electric line running through a hole drilled in the joist that hasn't been filled with spray foam.

BUILDING ENVELOPE
Photos (cont)

BE7 and BE8 – Conduit runs through the ceiling of Room 112 and you can see from the attic there is a significant gap that allows air leakage. Spray foam and/or stuffing fiberglass insulation around this conduit would block this air loss.

BE9 – The chapel has high quality Pella thermopane windows.



BE 10 – Sanctuary windows are also high quality thermopane.

BE11 – The single pane windows in the Community Room are candidates for replacement.

HEATING, COOLING AND WATER

Heating (and if used cooling) is the biggest user of energy at your HOW, accounting for as much as 60% of your total energy use. Thus, it is both the largest contributor to climate change and a significant expense. In looking at this equipment, three areas are evaluated:

- *Generation* (the equipment that heats or cools air or water)
- *Distribution* (the system that takes the heated air or water to the spaces where it is needed)
- *Controls* (mechanisms that control generation and distribution).

Each of these offers opportunities to decrease your energy use and carbon footprint. When it comes time to replace generation equipment, you should prioritize energy efficiency and lowest carbon emissions in choosing new equipment. That will likely mean upgrading to *heat pumps.* The MassSave program is prioritizing heat pumps as a replacement for fossil fuel-fired equipment and the Baker Administration's 2050 Decarbonization Roadmap says this:

- "...in order to achieve Net Zero, the use of gas for building heat must start to decline in the near term."
- "...electrification and efficiency strategies rely on infrequent opportunities to change out heating, ventilation, and air conditioning (HVAC) equipment, such as equipment end-of-life or major renovation. Leveraging these opportunities early is essential for keeping costs low."

Heating and cooling equipment typically last between 15 - 30 years and so it is likely every piece of equipment operating today will be replaced at least once between now and 2050. If your equipment is more than halfway through its useful life, you should begin educating yourself about new technologies, begin planning for its replacement, and setting aside money to pay for it. In addition, MassIPL believes it is likely there will be new programs and incentives developed in the next few years to encourage Commonwealth residents to replace fossil fuel fired equipment. Learning and planning now will mean you will be in a good position to take advantage of new programs as soon as they are available.

Though often taken for granted, water use can be significant and costly. This is especially true if the HOW is the location for a pre-school program and/or if it hosts a variety of other users (AA, AlAnon, choral groups, other congregations, and so on). In these instances, use of sinks and toilets draws considerable water. It also increases the demand of water supplies, a matter of increasing concern.

General Observations

First of all, congratulations on having complete and excellent documentation of your HVAC systems. We don't always see this and having information about the age, make, and model of equipment is an important part of maintaining and operating these systems efficiently. We have incorporated much of this information in this report in the hopes it makes it more convenient and accessible to interested people in the congregation.

Just as the multiple additions over the years make the building envelope complicated, these additions have each required additions and changes to the HVAC system making it also quite complicated. Equipment details are below and photos are shown in H1 – H6.

	Thermostat Location	**Associated Equipment**	**Areas served**	**Comments**
1	Music Room	Trane furnace above ceiling near room 152. AC condenser near entrance to Caring Cupboard	Rooms 145 - 153	Furnace and AC condenser both date to 2022; anticipate replacements 2037-2042
2	Sanctuary left	RTU 1 – Trane 10-ton heating/cooling packaged unit	Sanctuary	Rooftop unit dates to 2020; anticipate replacement 2035-2040
3	Sanctuary right	RTU 2– Trane 10-ton heating/cooling packaged unit	Sanctuary	Rooftop unit dates to 2020; anticipate replacement 2035-2040
4	Narthex	RTU 3 – Trane 10-ton heating/cooling packaged unit	Narthex, Nursery, Kitchen, rooms 118, 119, 122 - 124, 135, 142, 143	Rooftop unit dates to 2020; anticipate replacement 2035-2040
5	Fellowship Hall	RTU 4– Trane 10-ton heating/cooling packaged unit	Fellowship Hall	Rooftop unit dates to 2020; anticipate replacement 2035-2040
6	Reception room 132	RTU 5– Trane 5-ton heating/cooling packaged unit	Rooms 112 - 115 120, 121, 130 - 134	Rooftop unit dates to 2020; anticipate replacement 2035-2040

7	Conference Room 107	Trane furnace in attic above room 107. Trane AC condenser under ramp	Rooms 105- 108	Furnace dates to 2000, AC dates to 2002. This equipment is at the end of its expected useful life. AC likely uses obsolete R-22 refrigerant.
8	Noah's Ark Lobby	Trane furnace in attic above room 107. Trane AC condenser under ramp	Noah's Ark Lobby, Room 109, Lounge, back restroom	Furnace dates to 2000, AC dates to 2002. This equipment is at the end of its expected useful life. Likely uses R-22 refrigerant.
9	Lounge, room 106	Amana furnaces in Room 103; heat pumps	Rooms 100 - 103, Chapel	Furnaces date to 2004. This equipment is at the end of its expected useful life.
10	Community Hall (room 117)	Trane furnace in Sexton's closet. AC condenser outside Community Hall	Community Hall (room 117)	Furnace and AC date to 2016; anticipate replacement 2031 - 2036
	100 Area Heat Pump	Fujitsu Mini-split	Room 100	Equipment is dated 2022
	101 Area Heat Pump	Fujitsu Mini-split	Room 101	Equipment is dated 2022
	Chapel stage Heat Pump	Fujitsu Mini-split	Chapel	Equipment is dated 2022
	Chapel Middle Heat Pump	Fujitsu Mini-split	Chapel	Equipment is dated 2022
	Chapel Stairs Heat Pump	Fujitsu Mini-split	Chapel	Equipment is dated 2022

Schematic of locations of RTUs.

Do heating/cooling zones match use patterns? Yes and No

The best efficiency for an existing heating and cooling system is achieved when zones allow for heating or cooling areas of the building consistent with how they are used. The use patterns of HOWs are highly variable, even for buildings that otherwise are essentially identical. Often, only the offices or a meeting room are being used, but many heating systems we see heat up much larger areas. If the current zones of a HOW do not match use patterns, money and energy are being wasted.

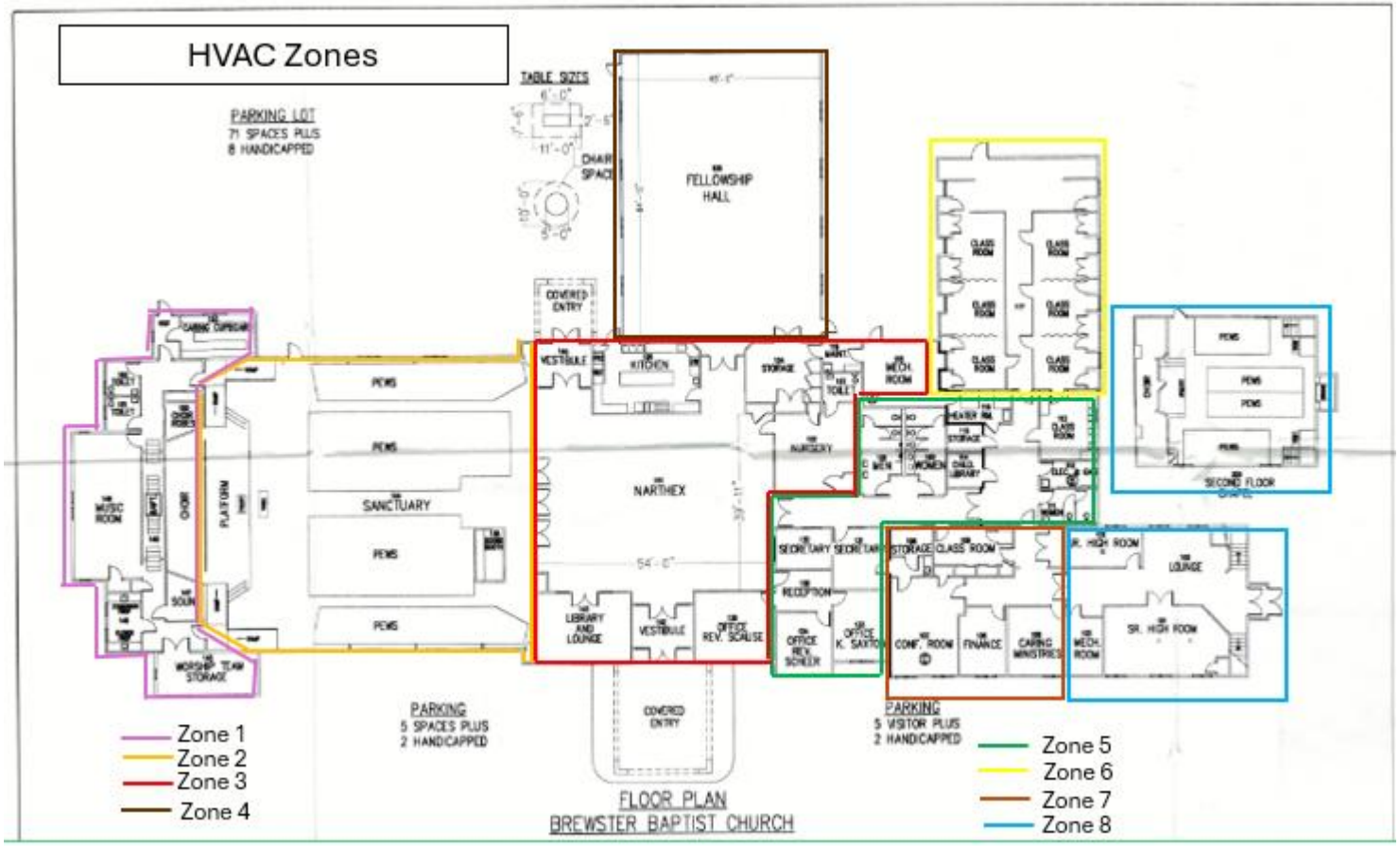
There are two ways to think of zones: 1) the physical areas served by a single thermostat, and 2) the usage patterns that determine which rooms require heat at particular times. Ideally, these should align so that only the spaces being used are heated or cooled.

But often as building usage changes, heating systems are replaced, additions built, etc. and zones may be designed for the convenience of the installer or low cost to the congregation.

Updating zones can be more or less complicated (ergo expensive) depending on the type of heating or cooling generation and distribution equipment. Typically, it is easier with hydronic heating and more challenging with either steam or forced air systems.

Evaluation

The current zones are mostly well-suited to the typical use of the building. I have incorporated your zone map here for reference:



The *Space Use* table in Appendix B presents Brewster Baptist's current pattern of use and the zones associated with them which identifies some areas where zones may not match usage as well as would be ideal. Particularly the Conference room (107) and the 100 Area Offices and Classrooms span 2 heating zones (5 and 7), but it is not clear that the Zone 7 rooms are fully occupied for all the hours listed. As noted earlier, document the activities and consider if you can reduce the hours of heating and cooling. This is also the area with HVAC equipment that is near or at the end of useful life and are excellent candidates for heat pumps. We will discuss the options of ducted vs mini-split systems later.

Another area you noted is the Caring Cupboard which is in the same zone as the Music Room and each of these areas have very different schedules. You have addressed much of this with the window AC units and we discussed the possibility of a single-zone mini-split for the Caring Cupboard. Another option to consider is a window heat pump unit like this one from Midea that is far less expensive than a standalone mini-split heat pump: https://www.midea.com/us/store/cooling-and-heating/window-air-conditioners/midea-window-air-conditioner-multi-season-low-noise.maw12hv1cwt

Rooms 118 - 143 also cross two zones – Zone 3 and 5. But since they are staff and clergy spaces, likely their occupied hours are similar so they may not need to be any adjustments.

Do controls and distribution optimize energy efficiency of HVAC equipment? Yes

Even if generation equipment is highly efficient, energy can be wasted if controls don't match heating and cooling to the actual need. The most familiar control is the ***thermostat***. (See the discussion on thermostats in the Behavior section.) Hydronic heating systems should also have an ***outdoor reset control***. It adjusts the water temperature based on how cold it is outside. For example, in deep winter it would set the boiler to heat water as high as 180° but in fall and spring only to 110°>140°. Thus, the amount of fuel used to reach a desired comfort level matches need. Next consider replacing existing pumps with ***variable speed pumps*** which vary the volume of heated water sent to the use locations. If heated water returns at a temperature not much lower than it was sent out, the speed of delivery can be reduced so that the heat is transferred in the use spaces. Again, this reduces fuel use, and therefore cost. Similarly, for forced air systems, variable frequency drives adjust fan speeds to deliver the right amount of heat to rooms. An ***energy management system*** (*EMS*) is a computerized system that centrally manages all thermostats, logging in remotely to change settings rather than setting each individually on site. These systems also provide detailed information about energy use in the building to help manage use and cost even more closely. If your existing HVAC equipment is less than 10 years old, modest investments in these kinds of controls and distribution equipment can improve efficiency today while you plan for conversion to heat pumps in the future when the current equipment reaches the end of its useful life.

Evaluation
As noted earlier, thermostats seem to be well programmed and managed regularly. Forced air systems don't offer the kinds of additional controls available to hot water systems so there is likely not much opportunity to refine them. Also as noted earlier, we recommend replacing the manual thermostat in the Music Room with a programmable one that also has Wi-Fi capability.

Are heating/cooling/hot water pipes and ducts sealed and insulated? **Yes** and **No**

Getting space conditioning (water, steam, air) to the use location is the first delivery consideration. Uninsulated pipes and poorly-sealed ducts lose 10 - 30%of the heat or cooling before reaching the use space. Improving insulation and reducing air leakage in ducts is often a simple, inexpensive project that members and other volunteers can do on a work day if the ducts and pipes are readily accessible.. Such work days are also good learning experiences, reducing anxiety about doing such work, thus increasing the probability that those involved will "go and do likewise" in other needed locations, such as their own homes. MassIPL can help organize this kind of event. Sometimes ducts are inaccessible behind doors or under floors. In that case, consider contracting with an Aeroseal dealer; the Aeroseal process injects a fine mist of a sealant into the ducts under pressure, causing the sealant to find and plug any leaks. You can find an Aeroseal dealer here: https://directory.aeroseal.com/

Once at the location, delivery should match space type and use. For example, in-floor forced air vents in large/high worship spaces are very inefficient, blowing warm or cooled air to the ceiling, rather than distributing at the level of people. (7± foot maximum) Similarly exposed steam radiators in classrooms (especially nursery and pre-school) risk burning occupants if they are touched. There are now ***"high-efficiency" radiators*** that can be wall-mounted, including in classrooms. Even better for classrooms (especially where kids crawl on the floor) and in large and/or high spaces (such as meeting halls and sanctuaries) is ***in-floor radiant***. This can be installed over existing flooring, or if accessible from below, beneath the current flooring. Use of in-floor radiant is beneficial in classrooms and worship spaces because heat will be uniform throughout the space, delivered where the kids or people are. The heat "pools" slowly, staying at the base of the space rather than going upwards to the ceiling. This system can be zoned within large spaces so that for small gatherings, the participants can be clustered at the heated area, which is beneficial in both energy efficiency and community formation.

Evaluation
The biggest issue is also one that is extremely difficult to address: most of the duct work is above the ceiling insulation – in the industry this is known as being outside the conditioned space. These attic spaces are a very different temperature – colder in the winter and hotter in the summer – than the air they are moving to condition the rooms, leading inevitably to some loss of efficiency between the air handler and the rooms. Industry rules-of-thumb estimate this efficiency loss is between 10 - 30%. The supply feed coming from the RTU do not have insulation (though this type of duct may have interior insulation) and the supply

ducts have typical (likely R-6) insulation so you should be at the lower end of this range (see Photos H6 and H7). In the last few years, the industry (and building codes) have moved to bring ductwork into the conditioned space, either by running ductwork through soffits or locating the insulation (known in the industry as the thermal boundary) up to the underside of the roof. Either change for you would be a major project and likely beyond the scope of what MassSave will provide incentives for. But you might consider including this in work scope of the HVAC replacement cycle you can expect in the late 2030s or early 2040s.

We also noticed a disconnected duct (see Photo H8). It wasn't obvious where it had been connected, so perhaps it is no longer part of the system. At your next routine HVAC service, inform your HVAC company you would like the technician to investigate and reconnect the duct.

Is your air conditioning SEER 14+/SEER2 13.4+ efficient? Yes and No

If you have air conditioning (AC), it can be a significant use of electricity in summer. Thus, it is essential to have highly efficient equipment that is properly sized for the space. Before 2023, efficiency of central A/C units was measured in SEER and the formula was revised and dubbed SEER2 as of 2023. Given most HOWs are old, AC tends to be localized, often through-window. Some equipment is of the "gift-horse" type, given to the HOW when it was no longer useful to a member. Window air conditioner efficiency is listed as the Energy Efficiency Ratio (EER) or since 2014 the Combined Energy Efficiency Ratio (CEER). While calculated slightly differently, we can use them interchangeably for our purposes. Energy Star rated window air conditioners must have a minimum 12.8 CEER, while the most efficient units today can be over 15 CEER. The refrigerant used can also indicate the unit's age; prior to 2010, R-22 was common but has since been phased out due to its high impact on the ozone layer. If you need to dispose of a unit with R-22, be sure to recycle it properly; check with your town or city sanitation department to see if they collect these units for recycling. For new units, look for R-32 which is classified as a "low global warming potential" refrigerant.

An excellent replacement for window air conditioners is a *mini-split* heat pump system: an outdoor compressor feeds refrigerant to a small delivery device in the room or rooms without the need to run expensive duct work. The most common of these delivery devices hang on the wall, but they can also sit on the floor or be installed in the ceiling.

However, if you already have a central air conditioning system and have ductwork, you may be able to convert to a ducted heat pump system. MassSave is offering significant incentives to convert air conditioning-only systems to heat pumps. For more information, see MassIPL's *Everyday Environmental Stewardship* brief on heat pumps.

Evaluation
Heat pumps are typically well above the SEER 14 number. We don't have the model numbers of the 3 outdoor units so we couldn't check.

The rooftop units are all similar models – in the Trane Precedent line – and use R-410a refrigerant. While these models have been discontinued, new Trane Precedent products have an EER of 11- 14, so this older model is likely at the lower end of this range. Note that the HVAC industry has stopped using this refrigerant in favor of those with lower ozone depletion impacts. The industry expects prices for R-410a to rise as supplies continue to fall, making future repairs more expensive.

The condensers for the Music Room, Conference Room 107, and Community Hall are all likely SEER 12 - 13, based on their age. The 2002 unit (Trane TTRO48D100AZ) is old enough it may use R-22.

We also saw two window air conditioners in the Caring Cupboard area, both of which have an efficiency rating around CEER 11 which is the minimum CEER level; new models can achieve CEER 17 and the Energy Star ratings start at CEER 12.8. They are both new enough that they use R-32 refrigerant. With any refrigeration device, when it comes time to replace or dispose of it, make sure it is responsibly recycled to capture the refrigerant; most of the large appliance retailers will remove and recycle old appliances or your town department of public works may have resources.

	Location	Window AC Unit	EER/CEER	Comments
1	Entry hall to Caring Cupboard	LG Model LW8024RSMY	11.4	R-32 refrigerant; not Energy Star rated; continue to use
2	Caring Cupboard room	GE Model AHP06LZQ2	11.0	R-32 refrigerant; not Energy Star rated; continue to use

Have you evaluated your HOW for heat pumps? **Yes** and **No**

In order to achieve net zero carbon emission by 2050, we must transition away from fossil-fuel fired heating equipment to the maximum practical extent. Any time an existing fossil fuel heating system reaches the end of its useful life, it should be replaced

by equipment that doesn't emit carbon. Heating equipment typically has a useful life of 15 – 20 years so unless you have replaced equipment in the last couple of years, you will likely replace equipment in your HOW by 2030.

The leading technology today is a *heat pump*. A heat pump may sound like an exotic new technology, but is already widely used in Europe and Asia, and increasingly in the US. Simply put, a heat pump moves heat from one place to another. In fact, a refrigerator is a type of heat pump that cools food by taking the heat from the inside and blowing it outside-- you feel the heat coming out from under the refrigerator when it is working. Air conditioners work by a similar principle, using an electrically-driven compressor to cool occupied spaces while blowing hot air outside. So, by reversing the process, occupied spaces can be heated. The equipment for doing both heating and cooling is called a ***heat pump***. Because New England winters are cold, install a *cold climate heat pump* which will remain efficient down to zero degrees Fahrenheit or lower. Because heat pumps operate on electricity, their carbon footprint will decrease as more wind and solar power is added to the electric grid; if you can install solar panels, your heat pumps may have zero carbon emissions. See MassIPL's *EES Brief* on *Heat Pumps*.

Upgrading to heat pumps will be more complicated than replacing an existing gas or oil furnace or boiler with similar equipment, so it is important to begin planning 2 – 3 years before the old equipment is at the end of its life. MassIPL always recommends working with a mechanical engineer on a major heating/cooling system project and it is especially important for conversion to heat pumps. Depending on the configuration of your current HVAC equipment, it may be possible to phase replacements, for example, converting offices or classrooms before converting the sanctuary or large gathering spaces. Because converting heating and cooling to heat pumps is such a high priority for the state, the MassSave program offers generous incentives that will help finance this project.

Heat pumps come in two main versions: air source and ground source (aka, geothermal). Geothermal is attractive because the ground temperature is constant throughout the year and thus the system operates at a higher level of efficiency. However, it is up to twice as expensive to install because you must drill wells or excavate a large field to install piping; note that geothermal systems are eligible for the 30% federal "direct pay" rebate as long as that program remains available. Air source heat pumps are able to extract heat from the air, with *cold climate* heat pumps able to extract heat even when temperatures hit zero degrees or lower – thermodynamically speaking, there is heat in the air as long as temperatures are above absolute zero: -459 degrees F. Air source heat pumps are not eligible for the direct pay federal rebate.

Evaluation

Given the different types and ages of heating equipment, it makes sense to develop a phased plan, prioritized by the areas used most frequently and timing replacements to coincide with when equipment reaches the end of its expected useful life. As we

discuss below, hiring a mechanical engineer to help develop specifications for a new system is a wise investment. MassIPL's initial recommendation is:

1. The next 3 – 5 years: Plan to replace the Amana furnaces, the Trane furnace above the Conference Room 107 and the two Trane outdoor condensers. These units are over 20 years old, so at the end of their useful life. Heat pumps are an excellent solution for these rooms and you have the option of using either ducted or ductless equipment. Ductless minisplits would give you the ability to control each room individually based on its usage, eliminating some of the inefficiency you may have in the current configuration. The added benefit would be eliminating the additional heat in the attic from the furnace, likely lessening ice dam formation.
2. 2031 - 2036: The Community Hall furnace and A/C will be 15 - 20 years old, so nearing the end of their useful life. Because this equipment is mainly inside and protected from the elements, it may last longer. Depending on your priorities you might decide to replace the RTUs before this equipment.
3. Replace rooftop units in the 2035 - 2041 time frame: Because these units are fully exposed to the elements, they may need to be replaced before other equipment. Trane and other commercial HVAC equipment manufacturers are bringing out rooftop heat pump units and with the likely continued improvement in the technology and performance of heat pumps in the next 10 years, heat pumps will likely be the preferred solution.

Given the state of heat pump technology, it is common to retain a fossil fuel fired back up system for the coldest days. This is especially common for the roof-top unit type of equipment today, but we'll see how the technology evolves over the next 10 years. These "hybrid" systems are typically installed with controls that automatically switch between the heat pump and traditional heating equipment based on the outdoor temperature. Discuss the switchover temperature with your installer as it should be determined based on the heating capacity of the heat pump equipment and the temperature at which its efficiency drops significantly. Pay careful attention to the design and equipment to ensure the highest efficiency and lowest use of fuel.

Is your domestic hot water heater 95%+ efficient? **No**

Standard domestic hot water ("DHW") vertical tanks are not very efficient (65±%) and little hot water is typically used in an HOW: virtually no HOW's have showers or clothes washers and use is typically limited to sinks and dishwashers. And because there are long periods of time when none might be used, there is some "standby loss", i.e., after being heated the water cools off while waiting for a faucet to open and must be reheated to maintain temperature. Modern tank hot water heaters have significant insulation to limit this loss.

Similar to heating systems, the Commonwealth is encouraging us to move away from fossil fuels for heating water and installing a ***hybrid heat pump hot water heater***. Like the heat pumps discussed above for space heating, a heat pump hot water heater uses electricity, but uses it 3 times as efficiently as an electric resistance tank. While heat pump water heaters are more expensive, their lower operating costs (and incentives from the MassSave program) can pay back the investment in under 2 years.

If you are not able to switch to a heat pump water heater and currently have a gas hot water heater, switch to an on-demand DHW system which heats water only when the tap is turned on, eliminating the waste of heated water in a tank cooling because no one is using it. This cuts energy use by 30 - 40%. On-demand DHW systems save more money because they typically last 20 years, compared to tanks which often need to be replaced in about 10 years. If you have an electric resistance hot water tank, on-demand is likely not a practical alternative.

Whatever type of hot water system you have, make sure it is no bigger than needed: 40 gallons is more than enough to serve sinks and dishwashers. If it is located far away from where hot water is used, try to move it closer when the time comes to replace your current water heater. Finally, be sure the temperature is set to no more than 120˚, both for energy saving and to prevent scalding. When used in dishwashers (whether residential or commercial), the DHW from the source (typically at the 110° level) is heated to an even higher temperature by the dishwasher. For more information, see MassIPL's *Everyday Environmental Stewardship* brief on *Domestic Hot Water*.

Evaluation

The water heater in the mechanical room serves the majority of the building and is a 75 gallon gas-fired model manufactured in 2022 (see Photo H9). It should continue to provide reliable service until the mid-2030's when you should plan to replace it with a hybrid heat pump model.

You can extend the life of the tank by having your plumber replace the anode rod, either with a traditional sacrificial anode rod or a powered anode rod https://www.corroprotec.com/product/water-heater-anode-rod/

You may also want to have your plumber install a leak detection and shut off system which, as the name implies, would shut off the cold water feed to the water heater in the event of a leak. The water heater is in a location that your facilities manager likely is in most days so a leak is not likely to go unnoticed for too long but this would provide an additional layer of protection against damage from a leak.

A second water heater is a 15-gallon electric model in the Sanctuary for the baptismal font (see Photo H10). Based on the serial number it was manufactured in 2000, so well past the expected life of 10 years. Plan to replace it within the next year, at most.

This water heater is in an out-of-the-way location so a leak detection and shut off system makes sense. Depending on the frequency of baptisms, consider shutting it off and only turning it on the day of a service.

Do you have water-efficient faucets and toilets? Yes

Water is another scarce resource that is often taken for granted but should be part of your environmental stewardship. There is also an energy connection: it takes considerable amounts of energy to pump the water, treat it, send it to you, then treat the wastewater. Reducing water use also reduces this energy. Many faucet aerators are 2.2 gallons per minute (gpm) when 0.5 gpm is sufficient for restrooms, 1.5 gpm for kitchens; faucet aerators are inexpensive and easy to install.

Modern toilets use 1.6 gallons per flush (gpf) or less while toilets older than 1992 use 4 or 5 gpf. Dual flush toilets save even more water, with .8 gpf for flushing liquids and only using the higher 1.6 gpf for solids. Given the higher gpf needed to flush defecation, and that the ratio of urination to defection of about 6:1, it means that for 6 out of 7 flushes more water is used than needed. Dual-flush converters that can be installed in any 1.6 gpf toilet cost less than $20, and are easy to install. If your house of worship hosts a pre-school program, the savings can be quite significant. Each involves an environmental stewardship practice readily followed.

These are easy projects that members and volunteers can do on a work day – and can also be done at work, homes, schools, day care centers and so on. When replacing fixtures, look for the *Water Sense* logo, the water equivalent of the *Energy Star* label. (See https://www.epa.gov/watersense for more information.)

Evaluation

All sinks and toilets appear to be water-efficient. Congratulations!

Special Notes on Heating

Given that heating equipment (generation, distribution, controls) can be costly, a **studied process** to determine the equipment to be used is an important investment of time and money that ensures the new system is optimal. Key factors include operating cost, life expectancy of equipment, ease of operation, care and maintenance, and improved comfort in spaces when in use. And since the lowest carbon and least cost energy is that which isn't used, prior to planning for the heating equipment it is wise to invest in tightening the building envelope so you can install smaller, less expensive heating equipment.

For proper design of a heating system, it is important to hire a **mechanical engineer** (ME) to plan and design the new system, especially if it includes new generation, distribution, and controls. The ME will provide system specifications that will be used to obtain competitive bids from contractors. The cost of hiring this professional is a small investment relative to the total cost of the heating system and will ensure you get the right equipment for your needs. MassIPL frequently works with two firms:

Norian Siani Engineering Incorporated
336 Baker Ave.
Concord, MA 01742
781 398 2250
www.ns-engineering.com/
Matt Bean
mattb@ns-engineering.com

Elevated Design
1212 Hancock St., Suite 300
Quincy, MA
724-561-6329
www.elevateddesign.boston
Mark Schow
mark.schow@elevateddesign.boston

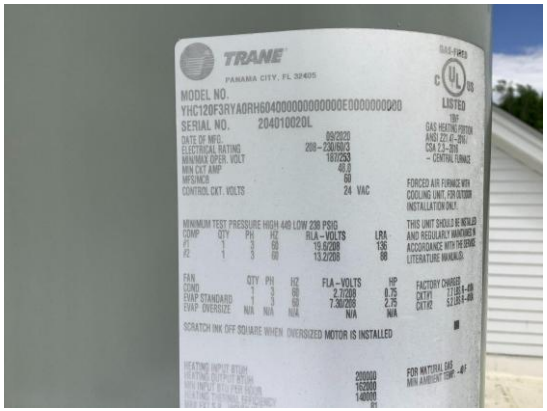
This is especially true for heat pumps. Because of their different operating characteristics, a conversion to heat pumps requires more careful planning to match the equipment to the building's needs. And while heat pumps are not new, HVAC contractors by and large have much more experience with gas and oil burning equipment and are still climbing the learning curve with heat

pumps. For example, if a contractor tells you that heat pumps don't work below about 30 degrees, you'll know they have not kept up with the development of a new generation of equipment called cold climate heat pumps which work even in below zero temperatures. MassIPL has several HVAC contractors we believe are highly knowledgeable and will look to expand our list in the coming years.

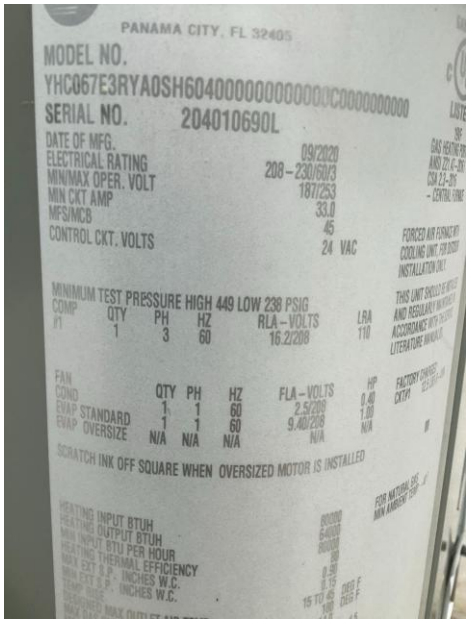
A practical action is to have a good equipment ***maintenance contract*** with a prepared and knowledgeable service company. Most HVAC companies offer an annual service contract, priced based on the equipment you have. They usually include an annual cleaning and tune-up for boilers, or twice-per-year service for furnaces and air conditioning equipment. Just as a well-tuned car gets more miles per gallon, well-maintained heating and cooling equipment uses less energy and lasts longer. Not having a maintenance contractor is like not having a doctor.

HVAC Photos

H1 — Five roof-top units (RTUs) on the roof above the Narthex provide heating and cooling to the bulk of the building



H2 — Four of the five RTUs are 10-ton models



H3 — The RTU for the office area is a 5-ton unit

H4 —A furnace in the attic above Room 107 provides heat for part of the 1950s era addition

H5 — Amana furnaces in Room 103 heats much or the original building;

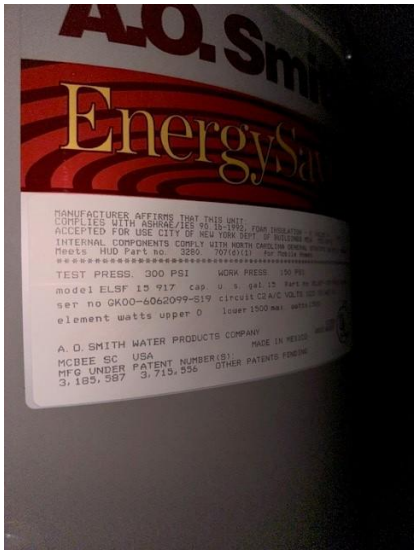
H6 —Heat pumps have been installed in the original 1850 building

HVAC Photos (cont)

H7 – Ducts are above the insulation. While some have insulation (likely R-6), the supply coming down from the RTU on the roof does not.

H8 – This duct has been disconnected. When your HVAC contractor comes for their next service visit, have them connect this.

H9 – The label for the main hot water heater (75 gallon, gas) states it was manufactured in October 2022.



H10 – The 15-gallon electric water heater for the baptismal font is well past its expected useful life.

Appendices

Appendix A — Utility Use & Cost 2023 – 2026

SUMMARY OF UTILITY USE & COST

Brewster Baptist Church

insert Sq Ft here **22,771** *square feet*

YEAR	TOTAL	ELECTRICITY $s	ELECTRICITY KWH	Cooling Degree Day	GAS $s	GAS THERMS	Heating Degree Day	OIL $s	OIL GALLONS	PROPANE $s	PROPANE GALLONS	WATER & SEWER $s	WATER & SEWER VOLUME
2023	**$31,623**	$16,726.55	72,120	1,315	$13,353.14	8,507	3,561	$0.00	0.0	$0.00	0.0	$1,543.36	215
CO 2 metric tons	*45.0*		*0.0*			*45.0*			*0.0*		*0.0*		
kBTU per SF	*48.2*												
CO2 kg per SF	*2.0*												
2024	**$33,650**	$17,633.85	69,040	1,233	$15,962.31	9,696	3,908	$0.00	0.0	$0.00	0.0	$53.76	14
% prior year	106.4%	105.4%	95.7%	93.8%	119.5%	114.0%	109.7%	--	--	--	--	3.5%	6.5%
CO 2 metric tons	*51.3*		*0.0*			*51.3*			*0.0*		*0.0*		
% of prior year	*114%*		--			*114%*			--		--		
kBTU per SF	*52.9*												
CO2 kg per SF	2.3												
2025	**$41,612**	$20,201.70	69,920	1,159	$21,307.61	11,084	4,188	$0.00	0.0	$0.00	0.0	$102.49	23
% prior year	123.7%	114.6%	101.3%	94.0%	133.5%	114.3%	107.2%	--	--	--	--	190.6%	164.3%
CO 2 metric tons	*58.6*		*0.0*			*58.6*			*0.0*		*0.0*		
% of prior year	*114%*		--			*114%*			--		--		
kBTU per SF	*59.2*												
CO2 kg per SF	2.6												
2026	**$20,116**	$5,308.13	18,600	65	$14,808.09	6,960	2,959	$0.00	0.0	$0.00	0.0	$0.00	0
% prior year	48.3%	26.3%	26.6%	5.6%	69.5%	62.8%	70.7%	--	--	--	--	0.0%	0.0%
CO 2 metric tons	*36.8*		*0.0*			*36.8*			*0.0*		*0.0*		
% of prior year	*63%*		--			*63%*			--		--		
kBTU per SF	*33.4*												
CO2 kg per SF	1.6												
CO2 Metric tons 2025	**58.6**	**0.0**				**58.6**			**0.0**		**0.0**		
kBTU per SF for 202	**59.2**	**The US Energy Information Administration calculates that the average house of worship in the Northeast uses 54.9 kBTU per square foot per year. Is your house of worship better or worse than average?**											

Saved to this PC

It would g cars

taken off the road (12,000 miles/year) all year

OR

about **2,932** NE trees

to offset this Carbon Footpint

DD Balance point temp 60°

Degree Da *Boston*

www.MassIPL.org

There is no copyright on this. Please spread it around. The more use the better!

ELECTRICITY USE

Brewster Baptist Church

Provider
Meter #
Account #

Rate **Serves>**

Year	Bill Month	$s	% of prior year $s	kWh	$/kWh	% of prior year kWh	Total Degree Days	% of prior year DD
2023	January	$1,280.50		5,680	$0.23		620	
	February	$1,256.30		5,840	$0.22		692	
	March	$1,398.09		5,880	$0.24		608	
	April	$1,576.85		6,640	$0.24		313	
	May	$1,266.37		5,320	$0.24		173	
	June	$1,228.73		5,160	$0.24		204	
	July	$1,197.24		5,040	$0.24		478	
	August	$1,963.77		8,520	$0.23		335	
	September	$1,606.97		6,960	$0.23		241	
	October	$1,359.94		5,880	$0.23		147	
	November	$1,231.85		5,320	$0.23		498	
	December	$1,359.94		5,880	$0.23		567	
		$16,726.55		72,120	$0.23		4,876	
2024	January	$1,707.31	133%	7,320	$0.23	128.9%	803	129.5%
	February	$1,814.31	144%	7,080	$0.26	121.2%	727	105.1%
	March	$1,428.01	102%	5,560	$0.26	94.6%	554	91.1%
	April	$1,468.68	93%	5,720	$0.26	86.1%	394	125.9%
	May	$1,275.53	101%	4,960	$0.26	93.2%	199	115.0%
	June	$1,204.38	98%	4,680	$0.26	90.7%	258	126.5%
	July	$1,614.26	135%	6,280	$0.26	124.6%	453	94.8%
	August	$2,534.83	129%	9,720	$0.26	114.1%	337	100.6%
	September	$690.26	43%	2,680	$0.26	38.5%	112	46.5%
	October	$1,264.62	93%	4,880	$0.26	83.0%	197	134.0%
	November	$1,264.62	103%	4,880	$0.26	91.7%	390	78.3%
	December	$1,367.04	101%	5,280	$0.26	89.8%	717	126.5%
		$17,633.85	105%	69,040	$0.26	95.7%	5,141	105.4%
2025	January	$1,641.89	96%	6,200	$0.26	84.7%	938	116.8%
	February	$1,976.64	109%	6,720	$0.29	94.9%	779	107.2%
	March	$1,661.37	116%	5,640	$0.29	101.4%	585	105.6%
	April	$1,673.04	114%	5,680	$0.29	99.3%	348	88.3%
	May	$1,451.20	114%	4,920	$0.29	99.2%	132	66.3%
	June	$1,299.40	108%	4,400	$0.30	94.0%	253	98.1%
	July	$1,738.27	108%	5,920	$0.29	94.3%	418	92.3%
	August	$2,228.95	88%	7,800	$0.29	80.2%	263	78.0%
	September	$1,958.29	284%	6,840	$0.29	255.2%	164	146.4%
	October	$1,413.40	112%	4,880	$0.29	100.0%	191	97.0%
	November	$1,493.67	118%	5,160	$0.29	105.7%	466	119.5%
	December	$1,665.58	122%	5,760	$0.29	109.1%	810	113.0%
		$20,201.70	115%	69,920	$0.29	101.3%	5,347	104.0%
2026	January	$1,903.33	116%	6,600	$0.29	106.5%	947	101.0%
	February	$1,901.86	96%	6,680	$0.28	99.4%	873	112.1%
	March	$1,502.94	90%	5,320	$0.28	94.3%	619	105.8%
	April		0%		--	0.0%	398	114.4%
	May		0%		--	0.0%	187	141.7%
	June		0%		--	0.0%	0	0.0%
	July		0%		--	0.0%	0	0.0%
	August		0%		--	0.0%	0	0.0%
	September		0%		--	0.0%	0	0.0%
	October		0%		--	0.0%	0	0.0%
	November		0%		--	0.0%	0	0.0%
	December		0%		--	0.0%	0	0.0%
		$5,308.13	26%	18,600	$0.29	26.6%	3,024	56.6%

GAS USE

Brewster Baptist Church

Provider **Serves>**

Meter #

Account #

Year	Bill Date	$s	% of prior year $s	Therms	$/therm	% of prior year therms	Heating Degree Days	% of prior year DD
2023	January	$2,859.11		1,661.0	$1.72		620	
	February	$2,652.34		1,595.0	$1.66		692	
	March	$2,347.89		1,563.0	$1.50		608	
	April	$1,123.97		782.0	$1.44		304	
	May	$463.17		354.0	$1.31		138	
	June	$133.85		113.0	$1.18		31	
	July	$62.96		48.0	$1.31		0	
	August	$73.29		60.0	$1.22		0	
	September	$57.38		46.0	$1.25		8	
	October	$210.79		220.0	$0.96		95	
	November	$1,073.51		699.0	$1.54		498	
	December	$2,294.88		1,366.0	$1.68		567	
		$13,353.14		8,507	$1.57		3,561	
2024	January	$3,360.23	118%	2,002.0	$1.68	120.5%	803	129.5%
	February	$3,045.78	115%	1,815.0	$1.68	113.8%	727	105.1%
	March	$2,360.25	101%	1,404.0	$1.68	89.8%	554	91.1%
	April	$2,060.52	183%	1,233.0	$1.67	157.7%	394	129.6%
	May	$626.61	135%	469.0	$1.34	132.5%	153	110.9%
	June	$176.05	132%	143.0	$1.23	126.5%	0	0.0%
	July	$102.26	162%	74.0	$1.38	154.2%	0	--
	August	$0.00	0%	0.0	--	0.0%	0	--
	September	$171.28	299%	127.0	$1.35	276.1%	2	25.0%
	October	$339.53	161%	288.0	$1.18	130.9%	178	187.4%
	November	$1,125.62	105%	708.0	$1.59	101.3%	380	76.3%
	December	$2,594.18	113%	1,433.0	$1.81	104.9%	717	126.5%
		$15,962.31	120%	9,696	$1.65	114.0%	3,908	109.7%
2025	January	$4,710.55	140%	2,439.0	$1.93	121.8%	938	116.8%
	February	$4,386.78	144%	2,259.0	$1.94	124.5%	779	107.2%
	March	$3,004.63	127%	1,563.0	$1.92	111.3%	585	105.6%
	April	$2,349.60	114%	1,211.0	$1.94	98.2%	345	87.6%
	May	$532.43	85%	315.0	$1.69	67.2%	96	62.7%
	June	$255.12	145%	164.0	$1.56	114.7%	3	--
	July	$84.98	83%	46.0	$1.85	62.2%	0	--
	August	$94.29	--	58.0	$1.63	--	0	--
	September	$82.05	48%	52.0	$1.58	40.9%	9	450.0%
	October	$342.45	101%	272.0	$1.26	94.4%	157	88.2%
	November	$1,545.48	137%	847.0	$1.82	119.6%	466	122.6%
	December	$3,919.25	151%	1,858.0	$2.11	129.7%	810	113.0%
		$21,307.61	133%	11,084	$1.92	114.3%	4,188	107.2%
2026	January	$5,181.07	110%	2,458.0	$2.11	100.8%	947	101.0%
	February	$5,873.78	134%	2,763.0	$2.13	122.3%	873	112.1%
	March	$3,753.24	125%	1,739.0	$2.16	111.3%	619	105.8%
	April		0%		--	0.0%	392	113.6%
	May		0%		--	0.0%	128	133.3%
	June		0%		--	0.0%		0.0%
	July		0%		--	0.0%		--
	August		0%		--	0.0%		--
	September		0%		--	0.0%		0.0%
	October		0%		--	0.0%		0.0%
	November		0%		--	0.0%		0.0%
	December		0%		--	0.0%		0.0%
		$14,808.09	69%	6,960	$2.13	62.8%	2,959	70.7%

Appendix B — Space Use

Brewster Baptist Church *Space Use by Day of Week*

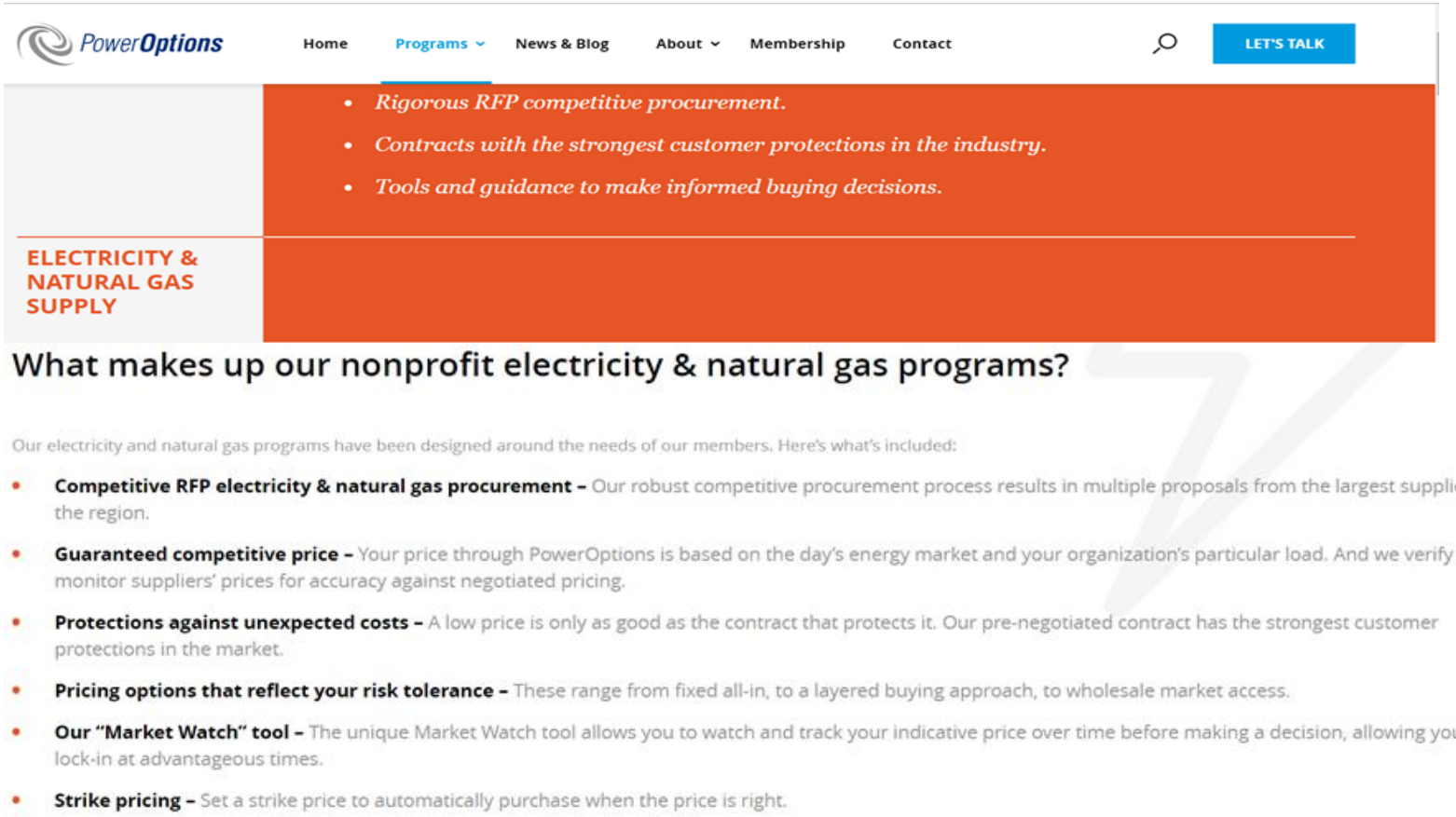
SPACE	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	NOTES
Sanctuary – Zone 2								
Morning	7:30-12:00							Two Sunday Worship Services at 8:30 and 10:00
Afternoon						12:00-3:00		Average of one other event per week
Evening				5:30-7:30				Music rehersal Wednesday evening
Music Room/Worship Team Storage – Zone 1								
Morning	7:30-12:00							Choir Rooms open during worship and rehersals
Afternoon								
Evening				5:30-7:30				
Narthex Zone 3								
Morning	7:30-12:00	7:00-12:00	8:00-12:00	9:00-12:00	9:00-12:00	9:00-12:00		Narthex is generally open whenever there is
Afternoon		12:00-5:00	12:00-5:00	12:00-5:00	12:00-5:00	12:00-5:00		an event at church
Evening	6:00-9:00	6:30-9:00	6:30-9:00	6:30-9:00	6:30-9:00	6:30-9:00		
Fellowship Hall (Zone 4) /Kitchen (Zone 3)								
Morning	7:30-12:00							Fellowship Hall average use is 3 nights
Afternoon								per week. Specific nights may vary
Evening		7:00-9:00		7:00-9:00	7:00-9:00			
Offices and Library (Rooms 118-143) (Zones 3 and 5)								
Morning	7:30-12:00	9:00-12:00	9:00-12:00	9:00-12:00	9:00-12:00	9:00-12:00		
Afternoon		12:00-5:00	12:00-5:00	12:00-5:00	12:00-5:00	12:00-5:00		
Evening								
Conference Room (Room 107) (Zone 7)								
Morning	9:30-11:00	7:00-1200	8:00-1200			9:00-12:00		Conference Room is typically available for use
Afternoon		12:00-5:00	12:00-6:00		1:00-5:00			anytime the church is open
Evening		6:30-9:00	6:30-9:00		6:30-9:00			
Community Hall (Zone 6) and Noah's Ark Lobby/Lounge (Rooms 111-117) (Zone 5)								
Morning	9:30-11:00		9:00-12:00					
Afternoon			3:00-5:00		1:00-3:00			
Evening	6:00-8:00		6:30-9:00	6:30-9:00	6:30-9:00			

100 Area Offices and Classrooms (Rooms 100-109) (Zones 7 and 8)								
Morning	7:30-12:00	9:00-12:00	9:00-12:00	9:00-12:00	9:00-12:00	9:00-12:00		Open during business hours and two nights a
Afternoon	12:00-1:00	12:00-5:00	12:00-5:00	12:00-5:00	12:00-5:00	12:00-5:00		week for youth groups
Evening	6:00-9:00					6:30-10:00		
Old Chapel Upstairs (Zone 8)								
Morning	8:30-10:00							
Afternoon								Old Chapel is used about two nights per week
Evening		6:30-9:00			6:00-9:00			Nights may vary
Caring Cupboard Food Pantry (Room 153) (Zone 1)								
Morning		10:00-12:00	10:00-12:00	10:00-12:00	10:00-12:00			
Afternoon								
Evening								

Appendix C — Bulk Purchase

PowerOptions Gas & Electricity https://poweroptions.org/programs/electricity-and-natural-gas-supply/

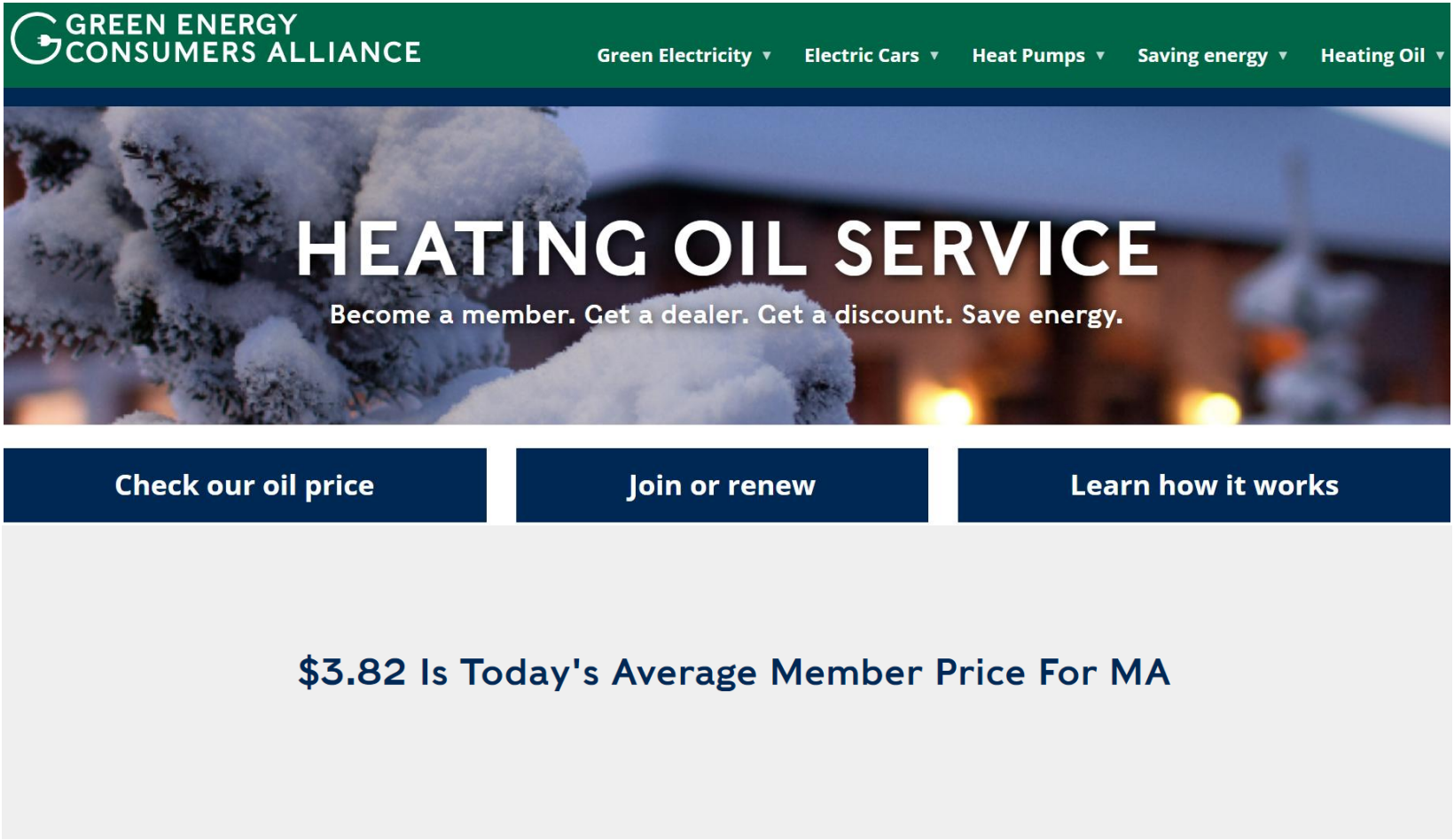
Contact Zach Holt, zholt@poweroptions.org or 857-990-6488



Appendix C — Bulk Purchase

Green Energy Consumers Alliance

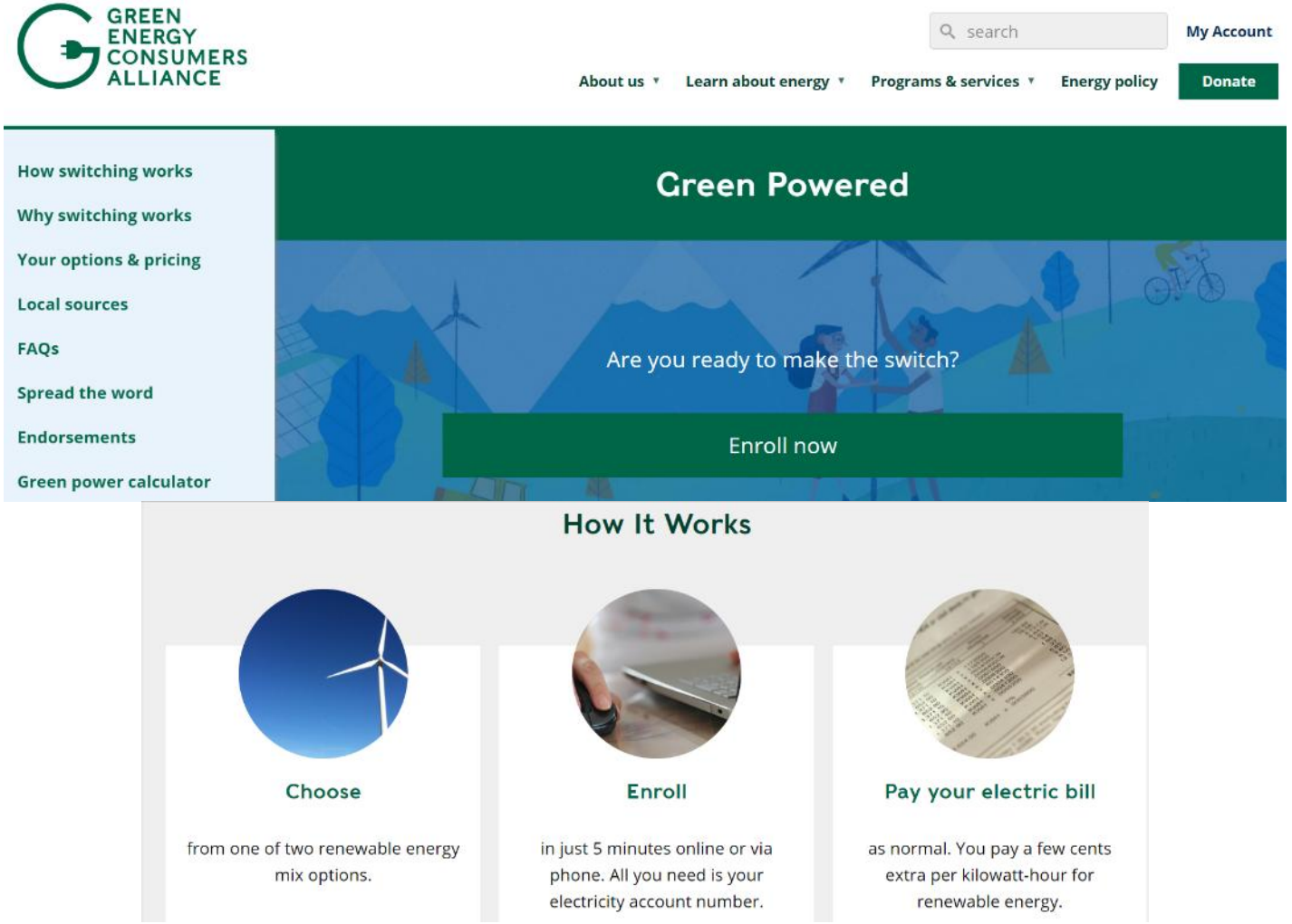
https://www.greenenergyconsumers.org/heatingoil



Price as of August 2023. Check the web site above for current pricing.)

Appendix D — Green Electricity

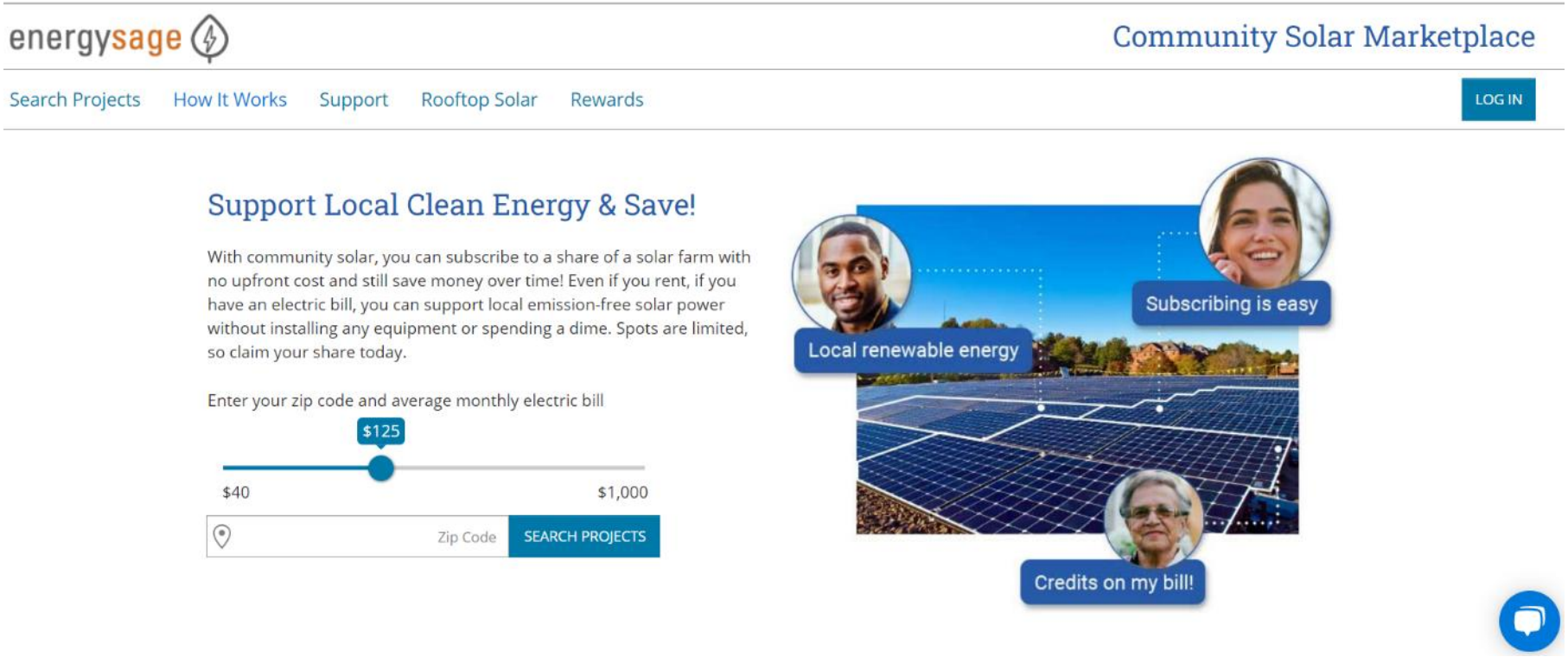
Massachusetts Clean Energy Consumers Alliance
https://www.greenenergyconsumers.org/greenpowered



Check the site listed above for current pricing.

Appendix D — Green Electricity: Community Solar

https://communitysolar.energysage.com/



Appendix E — Efficiency Budget

As the example below illustrates, if you make no changes, you can expect energy costs to increase at least at the rate of inflation; here we have assumed 3%. If you take some actions, for example beginning with the simple, behavioral actions such as lowering the thermostat, turning off lights, signing up for bulk purchase of gas or electricity. The savings from those actions fund the Energy Efficiency budget line and provide funds in Year 2 for more extensive actions that in turn generate more savings for year 3 for more actions. Continue this process until you have achieved Net Zero carbon emissions then use the ongoing savings to fund your mission!

Illustrative **EFFICIENCY BUDGET**

	2021	% of Total	2022	% of Total	2023	% of Total	2024	% of Total
TOTAL Budget 3% inflation	**$23,600**		**$24,308**		**$25,037**		**$25,788**	
Electricity	$8,700	36.9%	$7,395	30.4%	$6,286	25.1%	$6,411	24.9%
Gas	$12,300	52.1%	$10,455	43.0%	$8,364	33.4%	$8,029	31.1%
Water & Sewer	$2,600	11.0%	$1,820	7.5%	$1,638	6.5%	$1,671	6.5%
Efficiency Budget $s saved	*$0*	0.0%	*$4,638*	19.1%	*$8,749*	34.9%	*$9,677*	37.5%
Actions for Saving$	*Low-Hanging Fruit* Behavior changes		LED lighting Smart Stats Boiler Outdoor Reset 0.8 gpf Flush Toilets 0.35 gpm aerators		On-Demand DHW Heating zones		Hire ME to plan heating & cooling system upgrade *Efficiency Budget $s to pay HVAC loan*	