

## St. Andrew's (Episcopal), Wellesley, MA



### The Challenge:

In 2007, leaks in its steam heat distribution system had cost St Andrew's over \$60,000 over a two-year period. Energy costs were also rising every year. St Andrew's formed a Property Task Force and retained MassIPL to provide an Environmental Stewardship Assessment. MassIPL recommended that the inefficient oil-fired steam heating system be replaced. Single pane window systems and lack of zone controls also added to huge energy costs. St Andrew's accepted MassIPL's advice. With the assistance of an MassIPL project manager, the church retained an engineering firm, initiated design, and selected contractors. The work was paid for from funds obtained through a capital campaign and was completed over a two year period. All projects were completed on time and under budget. **The Results:**

**CO2 SAVINGS** --- Carbon dioxide emissions were reduced by 60% or by about 188,000 lbs. This is the equivalent of taking 15.3 cars that get 20 mpg off the road every year, or saving 13,152 New England trees, or about 18.8 acres.

**COST SAVINGS** --- Energy costs were lowered by \$21,764. Total 2009-10 heating season fuel cost was \$11,145 compared to \$32,910 in 2007-2008 before the heating system and High E windows were installed ----- a 67% reduction!

### HOW THEY DID IT:



- New High E window systems were installed in the parish wing for an immediate reduction in heating fuel costs of \$6,252 from the previous heating season.
- The old steam system was replaced with three 92% efficient gas-fired condensing mode hydronic boilers, as well as piping and radiation for the new hot water system.
- Heating zones were increased from 3 to 22.
- An electronic management (EMS) zone control system was incorporated for precise heating delivery. This computer-based system allows staff to adjust heat delivery from remote locations.
- Domestic hot water generation was converted to an indirect fired storage tank using the high efficiency boilers.

### St. Andrew's Fuel Cost Analysis and Savings from Energy Improvements

Year	Start Date	\$s	Gallons/Fuel Oil	\$/gallon	Heating Degree Days (HDD)	% change Degree Days	CO2 LBS	% Change CO2 LBS
							<b>22.4 lbs./gallon</b>	
<b>2006</b>	October	\$979.26	498.3	\$1.97	88		11,162	
	November	\$3,029.68	1,541.1	\$1.97	199		34,521	
	December	\$4,219.16	2,125.5	\$1.99	433		47,611	
<b>2007</b>	January	\$4,554.03	2,488.1	\$1.83	687		55,733	
	February	\$5,410.95	2,700.2	\$2.00	801		60,484	
	March	\$4,349.90	2,118.1	\$2.05	538		47,445	
	April	\$2,696.41	1,240.9	\$2.17	327		27,796	
	May						0	
<b>Total for '06---'07</b>		<b>\$25,239.39</b>	<b>12,712.2</b>	<b>\$2.00</b>	<b>3,073</b>		<b>284,753</b>	
	October				220	250.00%	0	
	November	\$4,748.86	1,900.3	\$2.50	654	328.64%	42,567	123.3%
	December	\$7,352.06	2,942.0	\$2.50	1004	231.87%	65,901	138.4%
<b>2008</b>	January	\$5,795.42	2,319.1	\$2.50	972	141.48%	51,948	93.2%
	February	\$5,233.90	2,094.4	\$2.50	934	116.60%	46,915	77.6%
	March	\$4,910.04	1,964.1	\$2.50	822	152.79%	43,995	92.7%
	April	\$2,566.22	1,026.9	\$2.50	472	144.34%	23,003	82.8%
	May	\$2,303.64	562.0	\$4.10			12,589	
<b>Total for '07---'08</b>		<b>\$32,910.14</b>	<b>12,808.8</b>	<b>\$2.73</b>	<b>5078</b>	<b>165.25%</b>	<b>286,917</b>	<b>100.8%</b>
<b>High E windows installed in Parish Building in Summer '08</b>								
	October	\$750.89	242.3	\$3.10	366	166.36%	5,428	
	November	\$5,624.01	1,875.3	\$3.00	643	98.32%	42,007	98.7%
	December	\$6,389.97	2,130.7	\$3.00	902	89.84%	47,728	72.4%
<b>2009</b>	January	\$5,140.04	2,571.3	\$2.00	1236	127.16%	57,597	110.9%
	February	\$4,139.54	2,070.8	\$2.00	894	95.72%	46,386	98.9%
	March	\$3,158.22	1,579.9	\$2.00	844	102.68%	35,390	80.4%
	April	\$1,455.85	741.8	\$1.96	460	97.46%	16,616	72.2%

Total for '08---'09	\$26,658.52	11,212.1	\$2.44	5345	105.26%	251,151	87.5%
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Head]ng system converted from Oil/steam to gas/hot water in summer '09

Year	Month	\$s	Therms/ Gas	\$/thrm	Degree	% change		
							11.7 lbs./therm	
2009	October	\$298.47	215	\$1.39	248	67.76%	2,516	46.3%
	November	\$1,027.24	995	\$1.03	482	74.96%	11,642	27.7%
	December	\$1,137.94	831	\$1.37	982	108.87%	9,723	20.4%
2010	January	\$2,892.78	2,264	\$1.28	1091	88.27%	26,489	46.0%
	February	\$2,510.88	1,908	\$1.32	884	98.88%	22,324	48.1%
	March	\$1,977.99	1,387	\$1.43	653	77.37%	16,228	45.9%
	April	\$1,300.41	864	\$1.51	376	81.74%	10,109	60.8%
Total for '09---'10		\$11,145.71	8,464.0	\$1.32	4716	88.2%	99,029	46.3%

**Hea\$ng fuel cost savings**

**\$6,252** Fuel cost Savings for 2008---9 hear]ng season from window replacement in Parish Building in summer '08

**\$21,764** Savings (67%) from 2007---08 hea]ng season (last before any energy improvements) to 2009---10 when all energy upgrades were in place

**Carbon Dioxide Savings**

12,808.8 gals/oil 2007---08                      286,917 lbs. CO2  
 8,249.0 therms/gas 2009---10                    99,029 lbs. CO2

**St Andrew's saved 187,888 lbs. CO2**

**OR**

**15.3** 20 mpg cars

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

**OR**

about **13,152** NE trees

which is about **18.8** acres of trees