



Case Study: St. James (Episcopal), Cambridge MA



St James is a large, 19th century facility in Porter Square, Cambridge. There are two building sections, the Church (shown at left) and a Parish Hall. In addition to worship and programs of the congregation, the building provides space for after-school programs, meetings and non-profit organization offices.

In 2003 St James was among the first to have MIP&L complete an Environmental Stewardship Assessment. That study found old, hugely inefficient heating systems (boilers, controls, radiation) and steadily mounting use and even higher rates of increase in costs. *(The old boilers and DHW tanks are shown in the photo at below.)*

Like many congregations, St James did not have the funds to implement the findings at one time. Inexpensive actions (such as programmable thermostats and upgrade in light bulbs and fixtures) helped. But then the boiler failed for the funeral service of a beloved member. Action became essential both practically and spiritually.



These are the Major Energy Conservation Actions

- ❖ **Heating** – The old oil-fired and very inefficient boilers were removed. New high efficiency (92%) gas-fired condensing mode hydronic boilers were installed. The entire facility was converted to hot water heat, eliminating steam. Many zones were installed, so that only what needed to be heated would be heated.
- ❖ **DHW** – Domestic hot water generation converted to in-direct fired storage tank using the high efficiency boilers. *The new equipment is seen above.*

Results

- ❖ **Heating & DHW** –CO₂ generated for heating and DHW only about 120,000 lbs compared to over 248,000 lbs if the old oil/steam system were still in place, a reduction of over 50%!
- ❖ **Electricity** – Electricity use in 2008 only 80% that of 2001.

Total cost in 2008 for all utilities was about \$25,000, compared to an estimated \$47,760 if still on the old system. The CO₂ reduction is the equivalent of taking 14 cars off the road.

SUMMARY OF UTILITY USE

St. James, Cambridge

1999 to 2001, 2008

YEAR	TOTAL	ELECTRICITY		Degree Days Heating	GAS		BTU Used Heat	OIL		WATER & SEWER	
		\$s	KWH		\$s	THERMS		\$s	GALLONS	\$s	VOLUME
1999	\$18,199	\$5,639	52,757	2,944	\$576	676	1,171,450,779	\$10,345	11,414	\$ 1,639.00	260
2000	\$22,344	\$3,824	45,522	3,318	\$593	627	1,170,321,818	\$16,532	11,403	\$ 1,395.00	228
% of 1999	123%	68%	86%	113%	103%	93%		160%	100%	85%	88%
2001	\$21,855	\$5,394	43,238	3,022	\$706	524	1,087,907,680	\$14,239	10,600	\$ 1,516.00	230
% of 2000	98%	141%	95%	91%	119%	84%		86%	93%	109%	101%
<i>2008 if still oil</i>	<i>\$47,760</i>					<i>2008 if oil & steam</i>	<i>1,109,665,834</i>	<i>\$36,220</i>	<i>10,812</i>		
<i>Use prediction based on DD; cost at \$3.35/gallon</i>											
2008	\$24,965	\$8,279	34,496	3,084	\$11,922	9,051	842,400,000	\$2,195	655	\$ 2,569.00	239
% of 2001	114%	153%	80%	102%	1689%	1727%	(gas btu heat)	Oil btu>	67,247,461	169%	104%

Italics estimated

CO₂ lbs 2008	120,574	41,395	105,897	14,677
It takes about 7 NE trees to offset 100 lbs of CO₂	8,440	1.2 lbs/kWh		22.4 lbs/gallon
	10	< trees needed		11.7 lbs/therm
		<Cars needed off the road (20 mpg; 12,000 miles/year)		

CO₂ lbs if still steam & oil	289,715	41,395	6,131	242,189
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20,280 < trees needed
24 <Cars needed off the road (20 mpg; 12,000 miles/year)