



## 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 MIP&L to provide an Environmental Stewardship Assessment. MIP&L 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 MIP&L's advice. With the assistance of an MIP&L 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 in-direct 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%            |
| <b>Total for '08-'09</b>  |            | <b>\$26,658.52</b> | <b>11,212.1</b>  | <b>\$2.44</b> | <b>5345</b>               | <b>105.26%</b>       | <b>251,151</b>         | <b>87.5%</b>     |
| <b>Heating system converted from Oil/steam to gas/hot water in summer '09</b> |            |                    |                  |               |                           |                      |                        |                  |

| Year                     | Month    | \$s                | Therms/<br>Gas | \$/thrm       | Degree      | % change     |                       |              |
|--------------------------|----------|--------------------|----------------|---------------|-------------|--------------|-----------------------|--------------|
|                          |          |                    |                |               |             |              | <b>11.7 lbs/therm</b> |              |
| <b>2009</b>              | 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%        |
| <b>2010</b>              | 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%        |
| <b>Total for '09-'10</b> |          | <b>\$11,145.71</b> | <b>8,464.0</b> | <b>\$1.32</b> | <b>4716</b> | <b>88.2%</b> | <b>99,029</b>         | <b>46.3%</b> |

#### Heating fuel cost savings

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

**\$21,764** Savings (67%) from 2007-08 heating 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