

St. Paul's Facility Heating

August 6, 2008





Presentation Goals

- **Progress to Date**
- **Energy Audit**
- **Potential Savings**

Progress to Date

- **Window Sealing**

- Limits air leaks and adds insulation

- **Thermostat Settings / Timers**

- Less temperature difference outdoor versus indoor

- **Furnace Shutdown: May - Oct**

- Furnace consumes ~\$250/month on standby

\$3,000 - \$5,000 Savings per Year

Heating Expenses

- Gas Usage Last 12 Months = 7,400 Therms
- Winter Gas Portion (82%) = 6,100 Therms
- Last Year Natural Gas Rate = \$0.90 per Therm
- This Year Natural Gas Rate = \$1.25 per Therm
- Last Winter Heating Expense = \$5,500
- Next Winter Heating Expense = \$7,600 (at Least)
- 10% increase / yr = \$12,000 per winter in 5 yrs
- 20% increase / yr = \$18,000 per winter in 5 yrs

Saint Paul's Facility

- **Parish Hall**

- Lots of Glass
- Concrete Basement

- **Office / Entry**

- Some Glass
- Two External Walls

- **Sanctuary**

- Some Glass
- Roof Heating
- Huge Thermal Mass



Facility Comparison



Similarities

- **Overall Design**
- **Gas Heat**
 - Furnace BTU Output
 - Hot Water Baseboard
- **Solar Orientation**
- **Basement Pre-School**



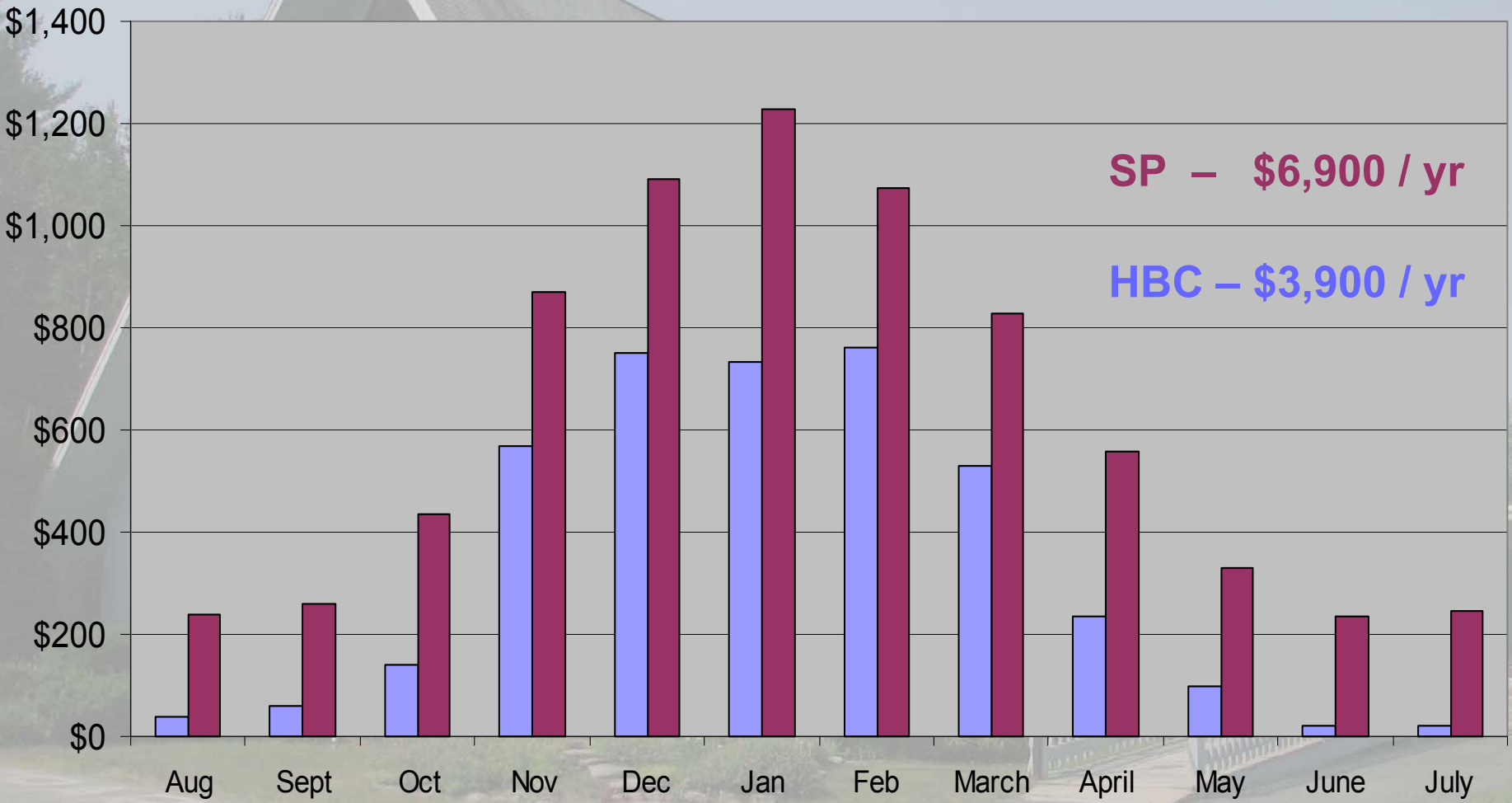
Differences

- **No Roof Attics**
- **Furnace Age & Zones**
 - 1966 versus 1990
 - 12 versus 4 Zones
- **North Side Windows**



Holliston Baptist Church

St. Paul's

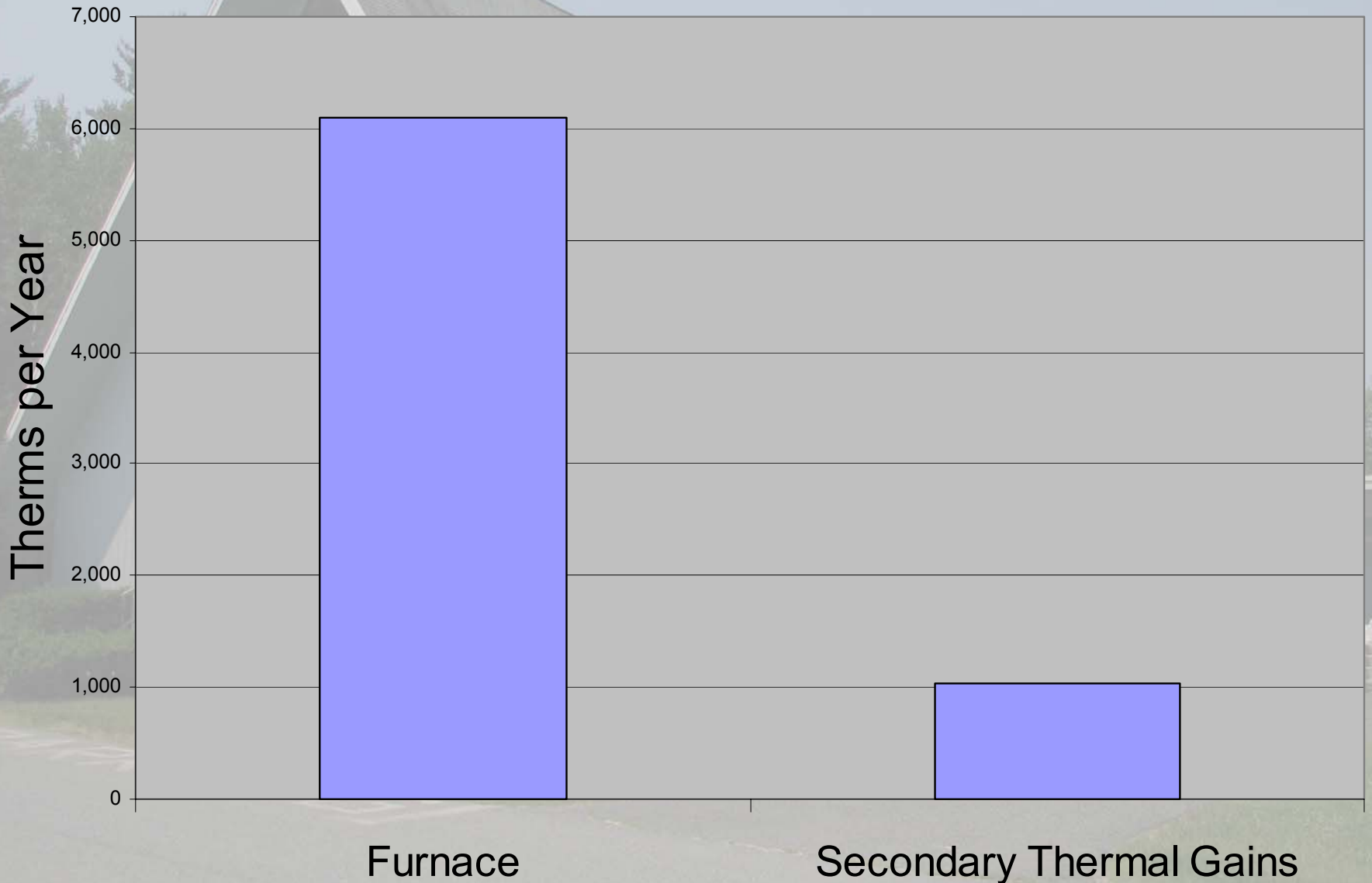


SP – \$6,900 / yr

HBC – \$3,900 / yr

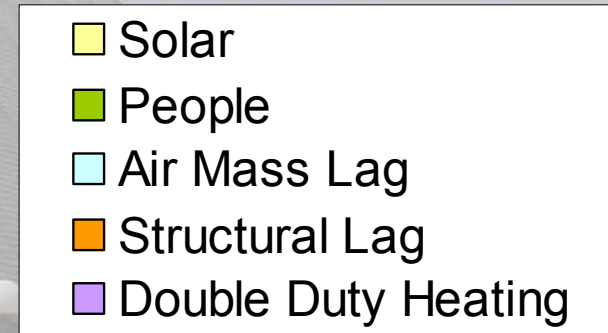
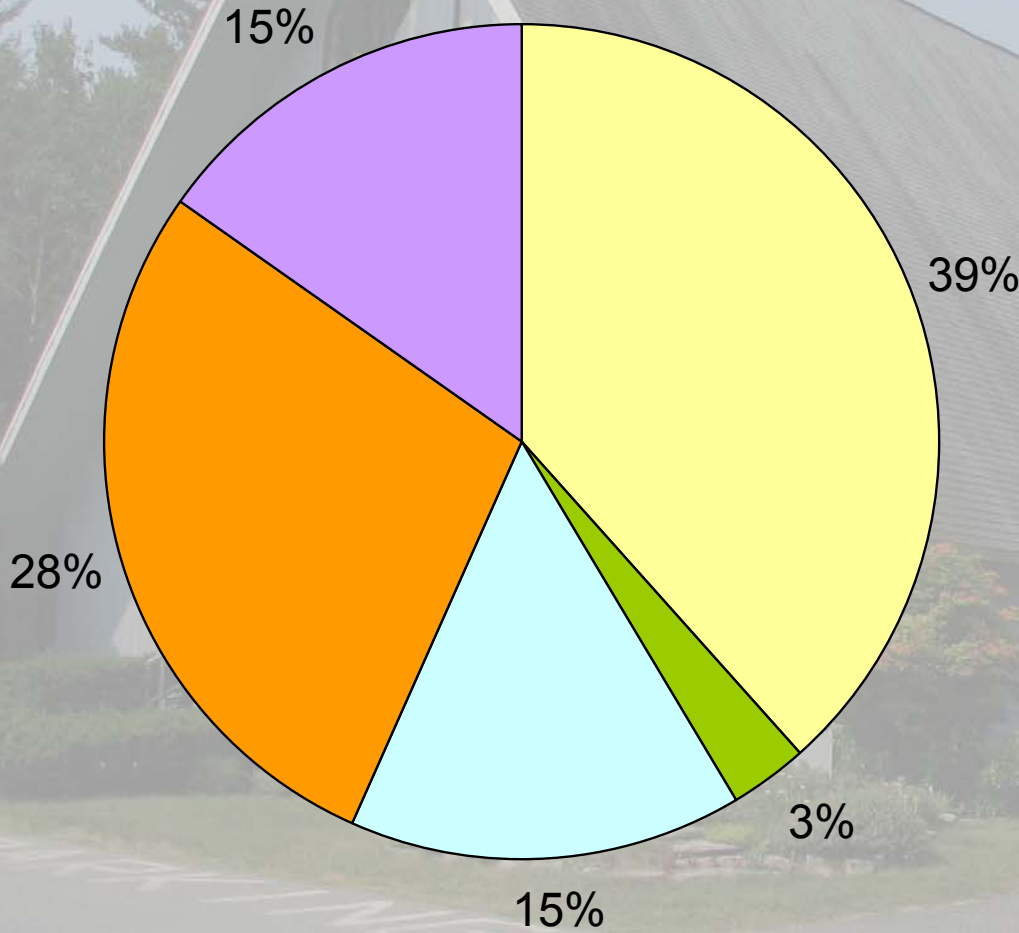
Natural Gas Consumption 2007-2008

St. Paul's Heating



Secondary Thermal Gains

St. Paul's



Heat Losses by Method



Radiation

A thermal image of a two-story house at night. The interior lights are on, making the windows and the house's exterior appear bright yellow and orange. The surrounding environment is dark blue and black, indicating a significant temperature difference between the house and the outside air. The word 'Radiation' is written in blue text over the central part of the house.



Conduction

A thermal image of a brick wall at night. The wall is a mix of red and orange, indicating heat loss. A small window is visible on the right side of the wall. The word 'Conduction' is written in yellow text over the top left part of the wall.



Convection

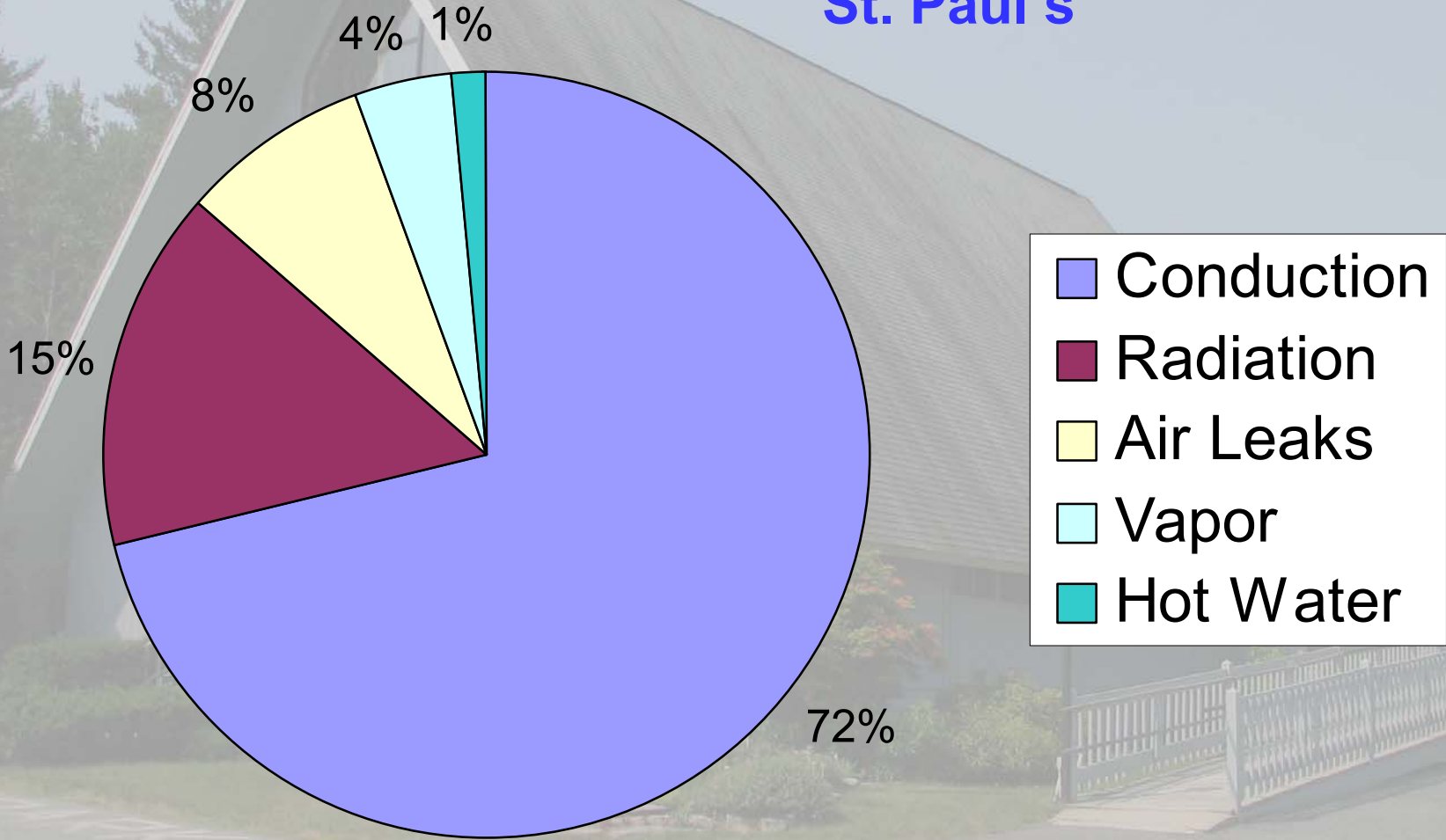
64.8 °F

48.8

A thermal image of a door at night. The door is a mix of yellow and orange, indicating heat loss. A temperature scale is visible on the right side of the image, ranging from 48.8 to 64.8 °F. The word 'Convection' is written in blue text over the bottom part of the door.

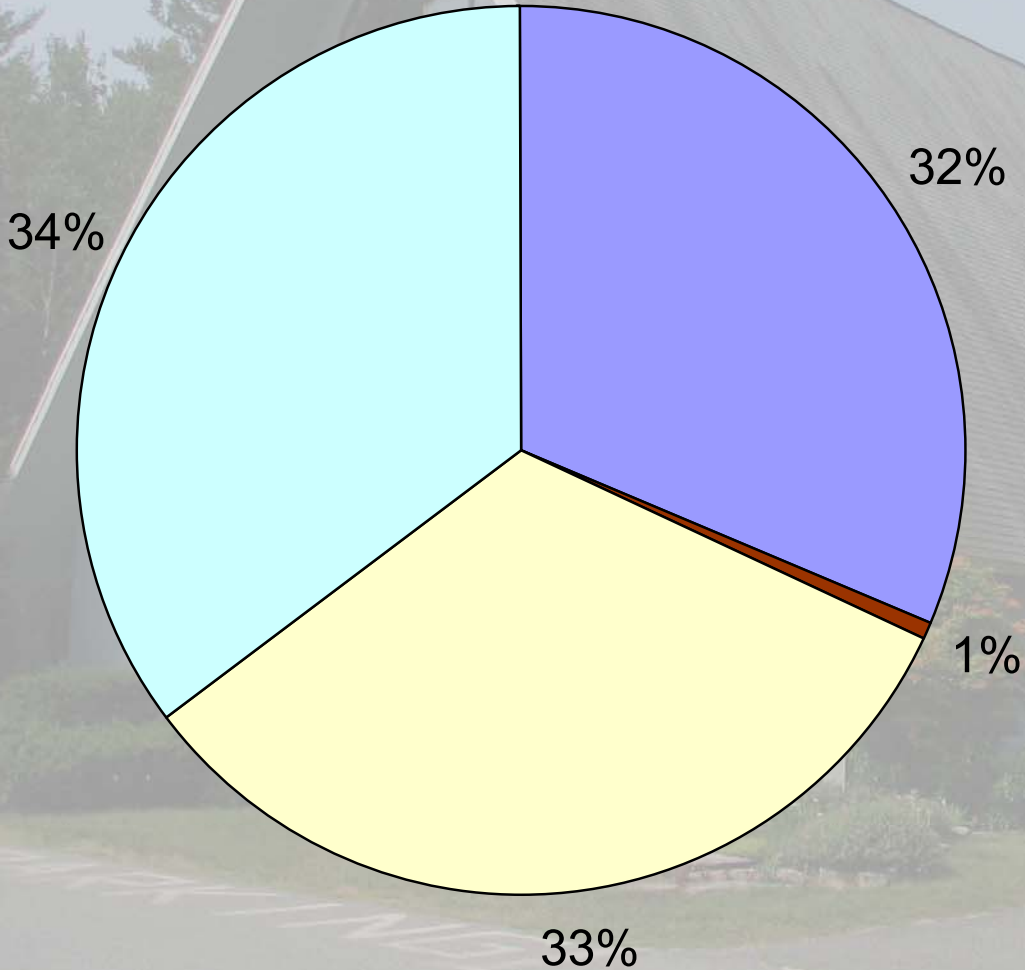
Heat Losses by Method

St. Paul's



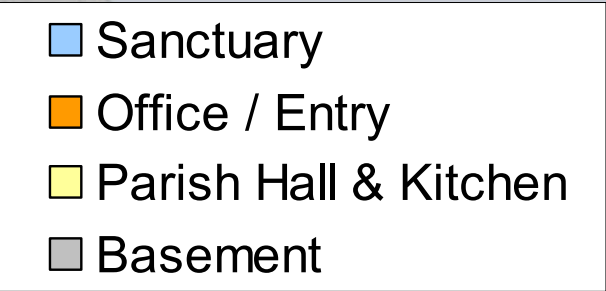
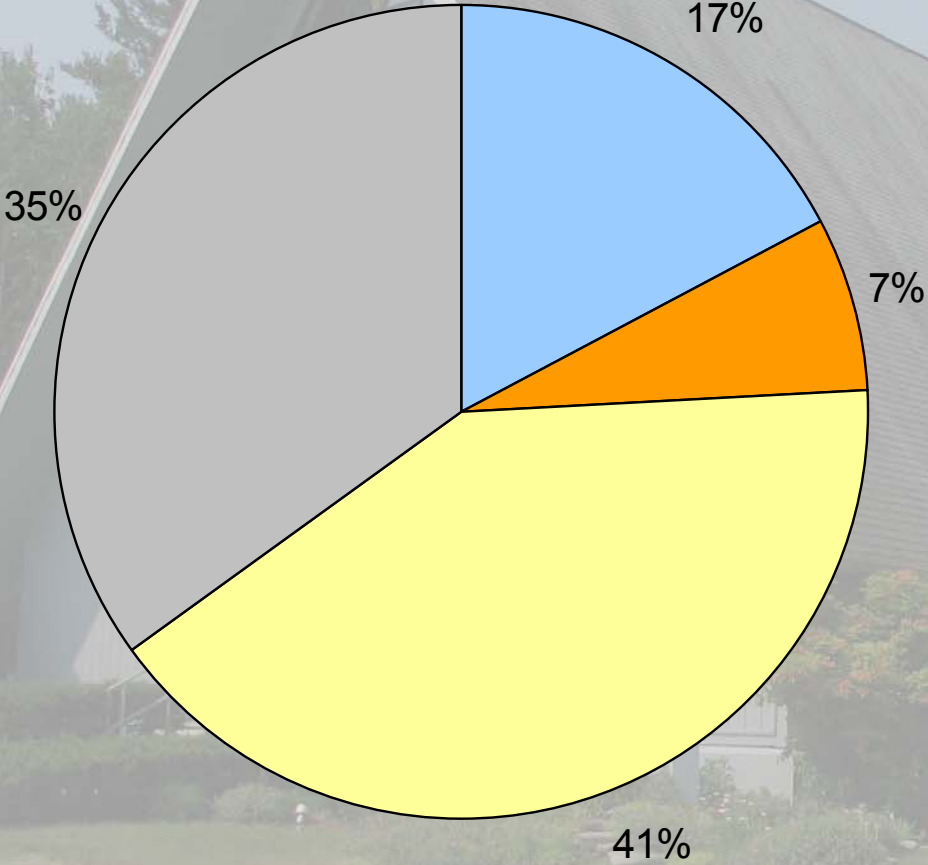
Net Heat Losses by Type

St. Paul's



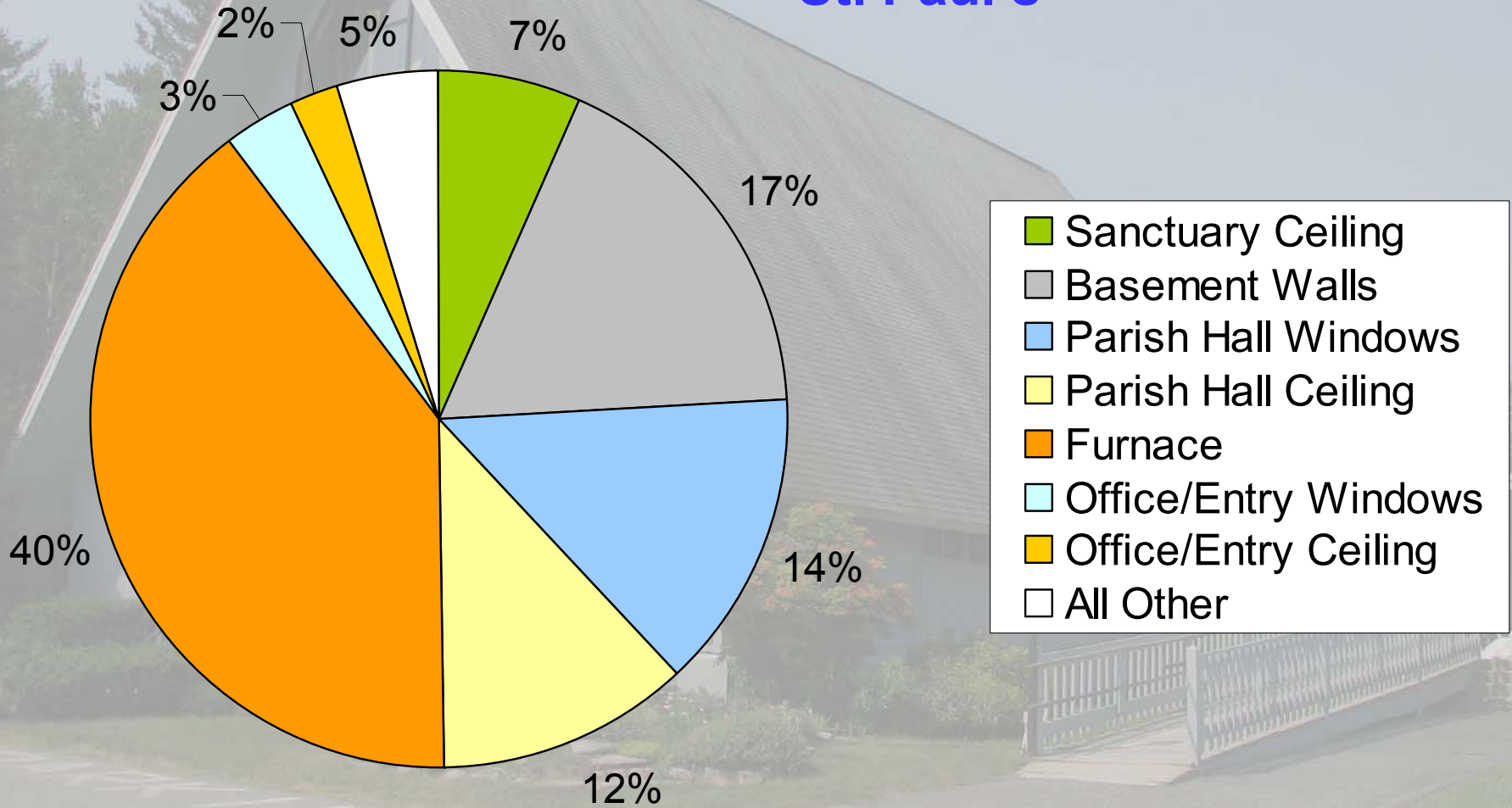
Net Heat Losses by Location

St. Paul's



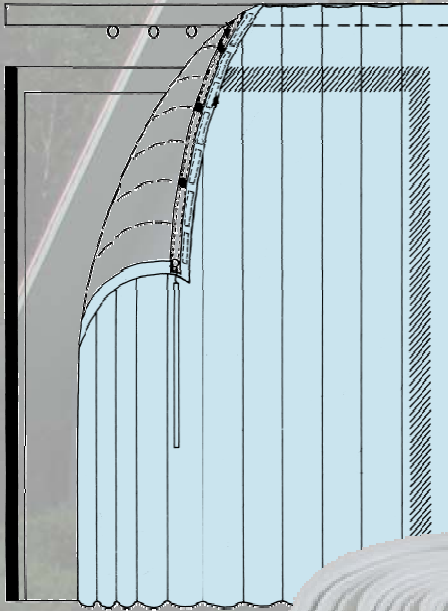
Heat Loss Offenders

St. Paul's



Things to Consider

Window Quilts & External Plastic



Weather Stripping



Basement Insulation



95% Efficient Furnace

Estimated Upgrade Costs

- **Weather Stripping** ~ \$ 250
- **Window Quilts & Plastic** ~ \$1,000
- **Ceiling Insulation** ~ \$1,000
- **Basement Wall Insulation** ~ \$2,000
- **New Furnace and Zones** ~ \$8,000

1st Year Gas Reduction

- **Weather Stripping** \$200 - \$300
- **Window Quilts & Plastic** \$300 - \$500
- **Ceiling Insulation** \$500 - \$1,000
- **Basement Wall Insulation** \$1,000-\$1,200
- **New Furnace and Zones** \$2,000-\$2,500

Total ~ \$4,000-\$5,500

Approximate Payback

- **Weather Stripping** ~ 1 year
- **Window Quilts & Plastic** ~ 1 Year
- **Ceiling Insulation** ~ 2 - 3 years
- **Basement Wall Insulation** ~ 1 - 2 years
- **New Furnace and Zones** ~ 3 - 4 years

Five Year Net Savings

- **Weather Stripping** \$1,000 - \$2,000
- **Window Quilts & Plastic** \$1,000 - \$3,000
- **Ceiling Insulation** \$2,000 - \$6,000
- **Basement Wall Insulation** \$4,000 - \$7,000
- **New Furnace and Zones** \$4,000-\$10,000

Total Range ~ \$12,000-\$28,000

Includes Range of Upgrade Costs and Expected Savings

10% – 20% Annual Fuel Price Increases

Follow Up Steps

- **Weather Stripping**
- **Window Quilts**
- **Storm Window Plastic**
- **Cost Estimates**
 - **New Heating System**
 - **Basement Wall Insulation**
 - **Ceiling Insulation**
- **Electrical Power Conservation**
- **Solar Power Generation**