

# JOEGREEN ROADMAP TO ENERGY EFFICIENCY™



**JOEGREEN** Audit Team: Chris Henson

Audit Date: May 26<sup>th</sup>, 2010

Town of Topsfield Town Hall,

Thank you, once again, for choosing us to be your partner in Energy Efficiency. The Joe Green Commercial Energy Audit was the first step towards meeting your Energy Efficiency goals. It allowed us to learn about your building and how it is used. We have used the data from our audit to create your “Roadmap to Energy Efficiency” with customized solutions tailored specifically to your situation/needs and with the ultimate aim of enabling you to meet your goals.

## GOODNEWS:

We were able to diagnose the problem areas in the facility during the Audit. We have listed the specific problems responsible for your energy efficiency issues as well as solutions targeted at reducing your energy bills and increasing comfort in the facility.

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## EFFICIENCY SUMMARY

### WALLS

There is absolutely no insulation in the walls and there are some instances of "knob and tube" electrical systems present. These have to be deactivated prior to inserting insulation.

### WINDOWS

All of the windows in the converted auditorium will require interior storm windows. There is significant air leakage around the windows (which contributes to air infiltration and is not listed under the "windows" heat loss) which further compounds the problems surrounding these windows.

### CEILING

Significant insulation and sealing is required to prevent air movement both through the existing insulation as well as going through the wall cavities and affecting the heat loss through walls.

### FURNACE

The furnace system is in dire need of replacement. There are leaking pipes, low efficiency, and poor transmission of heat from the furnace to the offices above.

### BASEMENT

Some thermal leakage around the top of the basement ceiling can be easily fixed and can show significant returns on investment.

### DOORS

Creating an "airlock" system of multiple doors will aid significantly in reducing the conditioned air lost through the doors when operated.

### OUTSIDE

No issues found around the outside of the building.

### SOLAR

Due to the historical significance of the building, attaching renewable energy solar systems to the building is not desirable.

### GEOTHERMAL

Geo-thermal options are available and can be optimized to coincide with the furnace change-out.

### WIND

Due to the historical significance of the building, attaching renewable energy wind systems to the building is not desirable.

# EFFICIENCY SUMMARY

## APPLIANCES

The refrigerator in the break room on the 2nd floor is in direct sunlight and backed into an area without any ventilation and between an AC and non-AC boundary. Recommended is a solar reflector system on the window, condition the air on both sides of the space, and allow more air to move through the space.

## WATER USAGE

There were no issues found with water usage. All systems were operating within reasonable levels.

## LIGHTING SYSTEM

Because of the T-12 bulbs in most of the lighting system, a complete change-out of almost every system will yield significant savings.

## MISC ELECTRICAL USAGE

There are many computers being utilized in the building. Special care must be made to reduce the power usage of the computers. By placing them on smart power strips and ensuring that computers go into sleep mode when not in use will curb power consumption.

# YOUR PROBLEMS:

Based on the Joe Green Energy Audit conducted on May 26<sup>th</sup>, 2010:

## VENTILATION, HEAT LOSS, AND INFILTRATION

- Lack of Insulation In Walls
- Attic Edge Unsealed
- Soffits Along The Attic Edge Lack Ventilation
- Attic Lacks Sufficient Insulation
- Basement Rim Joist Unsealed
- Air Chutes Unsealed
- Air Leakage/ Infiltration through Single Pane Window Units
- Air Lock Needed Between Inside and Outside Doors

## FURNACE AND DISTRIBUTION

- Inefficient Furnace and AC System
- Ineffective Fan System in Converted Auditorium

## ELECTRICITY USAGE

- Inefficient T-12 Lighting System
- Inefficient DHW System
- Knob and Tube Wiring in Attic

# INFRAREDDIAGNOSTIC

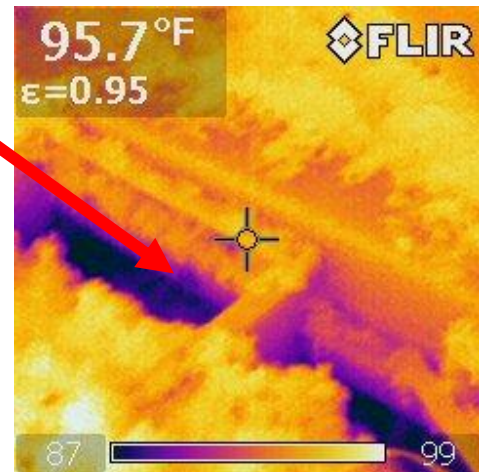
**CAMERA USED:** Flir 8-68 Thermal Imaging Device

\*Note that darker colors = cooler areas



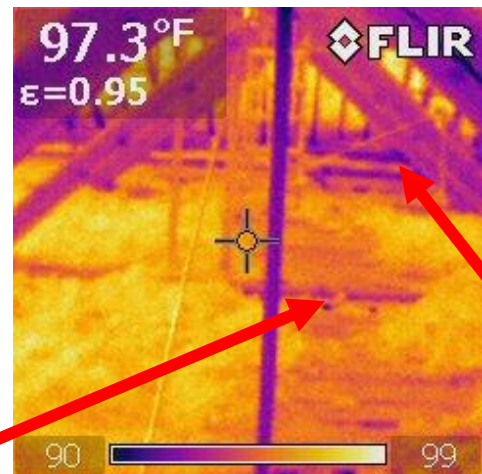
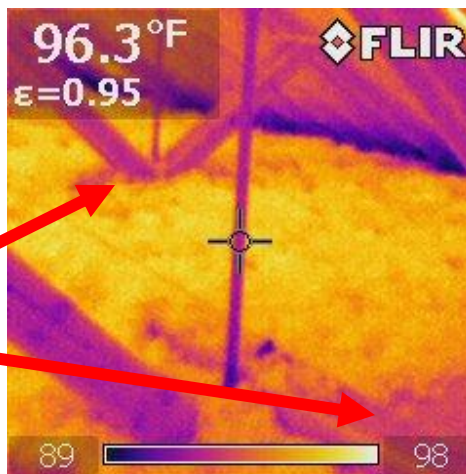
**JOEGREEN**  
Energy From Synergy

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**LOCATION:** Attic

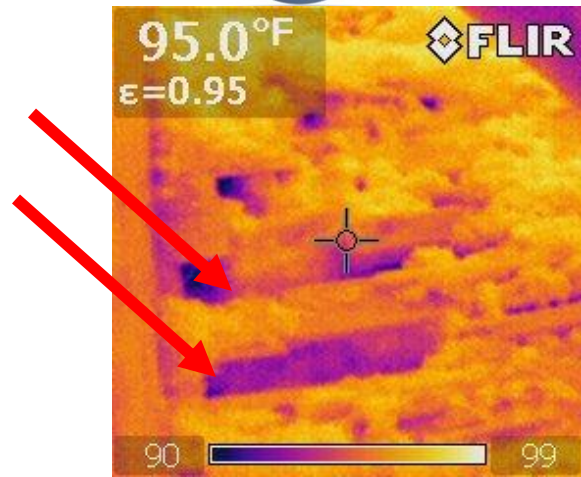
**OBSERVATIONS:** These Gaps in the attic floor allow significant air flow through both the ceiling and walls creating significant energy loss throughout the building.



**LOCATION:** Attic

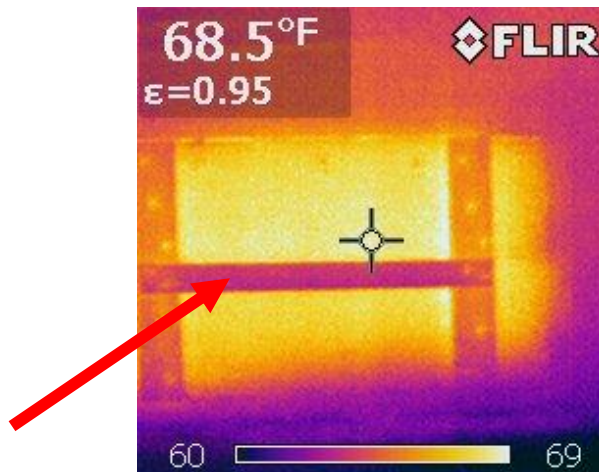
**OBSERVATIONS:** The changes in color across the attic floor represent areas of inadequate insulation which contribute to significant heat loss throughout the building.



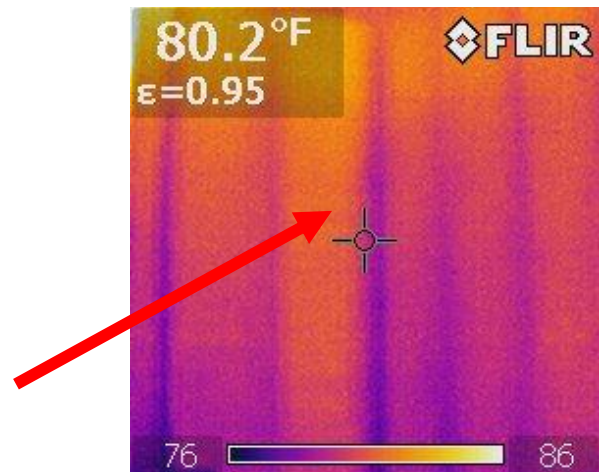


**LOCATION:** Attic

**OBSERVATIONS:** These pictures demonstrate further some of the areas of inadequate insulation in the attic and areas where some of the insulation has been pulled back.

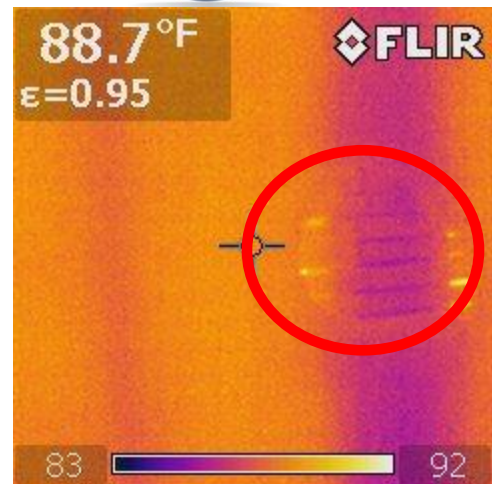


**LOCATION:** 1<sup>ST</sup> Floor West side



**LOCATION:** 2<sup>nd</sup> Floor Break Room

**OBSERVATIONS:** These two pictures demonstrate the lack of insulation in the walls. The darker areas show the building studs and structure – If there was adequate insulation, these areas would blend in more with the open voids.



**LOCATION:** 3<sup>RD</sup> Floor Hallway

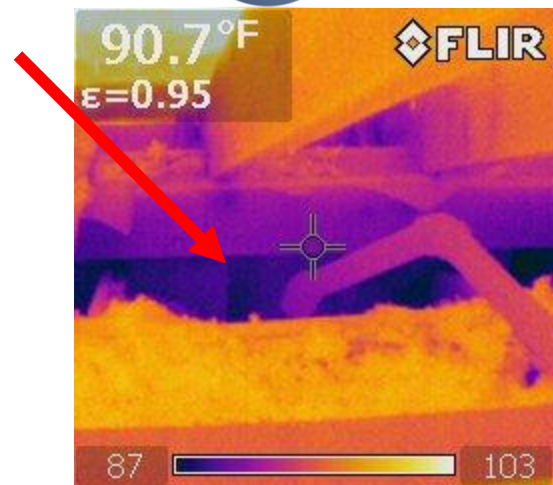
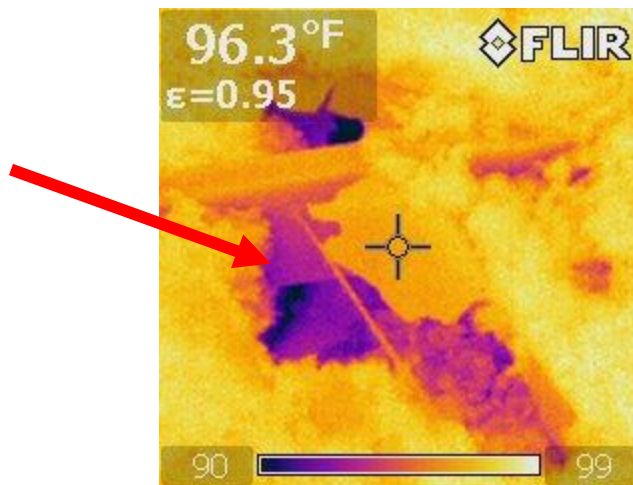
**OBSERVATION:** This picture indicates the lack of insulation in the walls. Openings in the cavity like this only further accelerate energy loss.



**LOCATION:** 3<sup>RD</sup> Floor Hallway

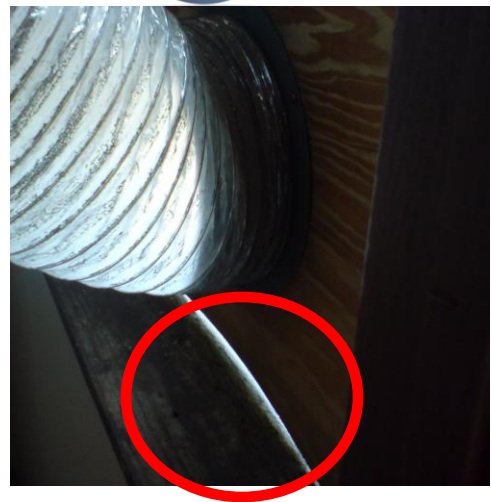
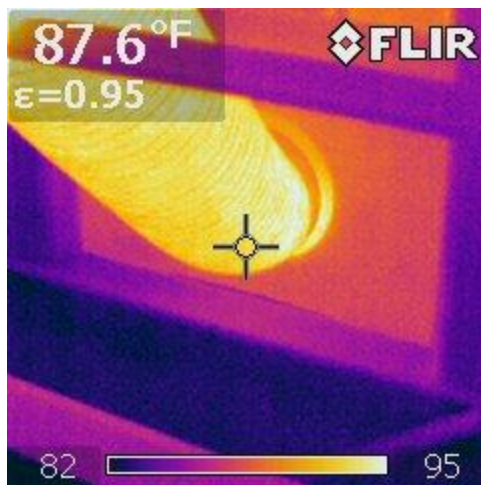
**OBSERVATION:** Because of the original construction of the building, the attic edge connects through the wall all the way down to the basement. These are large areas of energy loss and should be sealed.





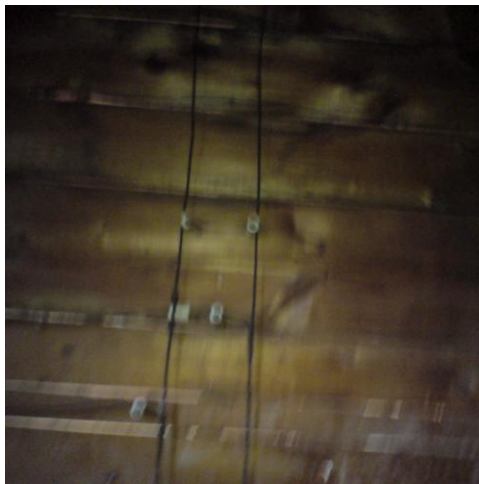
**LOCATION:** Air chutes

**OBSERVATION:** This large air chute in the attic runs down to the first floor which causes air infiltration in the building, leading to significant heat loss.



**LOCATION:** AC system on 2<sup>nd</sup> floor

**OBSERVATION:** Because the vent isn't adequately sealed, it is rendering the AC ineffective and allowing large amounts of air infiltration into the building.



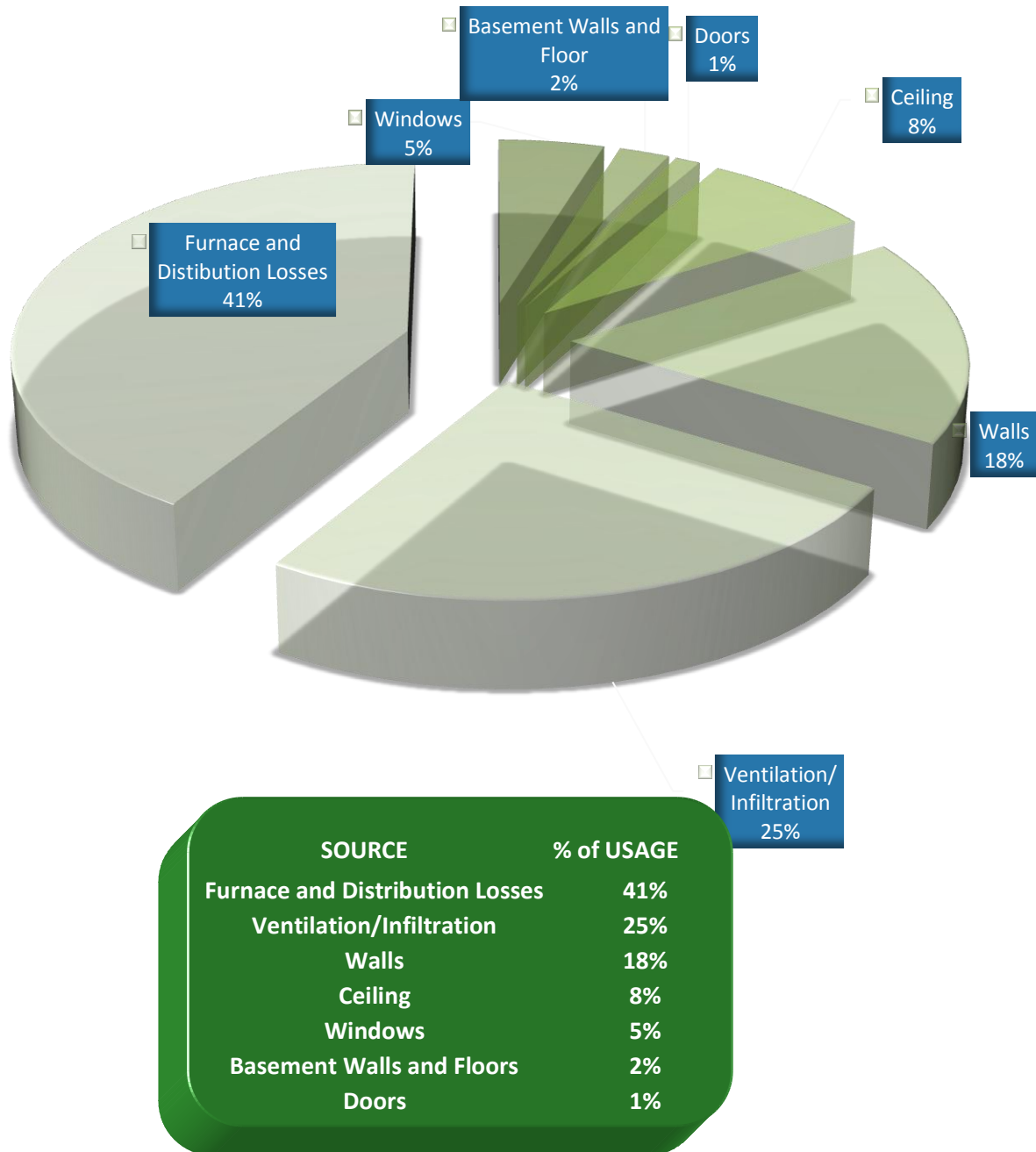
**LOCATION:**

**OBSERVATION:** Knob and tube wiring (active)

Additional Pictures can be found at  
<http://photobucket.com/joegreenhome-TopsfieldTownHall> Password: JOEGREEN



## CONDITIONED AIR LOSS



## YOURSOLUTIONS:

	<i>Initial Investment</i>	<i>Per Year Savings</i>	<i>% of Energy Savings</i>
Replace T-12 Lighting With T-8	\$8,268	\$2,416-\$3,382	25-35% (Electric)
Add Blown-In Insulation To The Walls	\$10,200	\$1,161-\$1,742	20-30% (Heating/Cooling)
Install Interior Storm Windows	18,000	\$581-\$1161	10-20% (Heating/Cooling)
Add Attic Insulation	\$4,819	\$581-\$870	10-15% (Heating/Cooling)
Create A Vestibule Area Outside Of Doors	\$4,000	\$406-\$871	7-15% (Heating/Cooling)
Seal And Insulate Basement Rim Joist	\$1,611	\$406-\$697	7-12% (Heating/Cooling)
Seal Air Chutes Running Through Building	\$545	\$406-\$697	7-12% (Heating/Cooling)
Install Auto-Shut Off Motion Sensor Devices On Lights In Each Office	\$1,181	\$483-\$966	5-10% (Electric)
Seal And Insulate The Attic Edge	\$2,021	\$290-\$406	5-7% (Heating/Cooling)
Install A Fan System In Converted Auditorium	\$2,500	\$116-\$406	2-7% (Heating/Cooling)
Replace Hot Water System With An On- Demand System	\$2,000	\$193-\$483	2-5% (Water)
Replace All Incandescent Bulbs With CFLs	\$504	-	(Electric)
Remove Knob And Tube Wiring In Attic	\$1,500	-	(Electric)
Replace Furnace And AC System	\$178,500	\$929.33-\$1,510.17	16-26% (Heating/Cooling)

*These calculations are derived using proprietary software that models the energy usage of the building based on the conditions found at the time of the audit. Although behavioral variance has been accounted for, it cannot be fully predicted and may affect the actual savings achieved. **Please be aware that the percentage reductions achieved by each action are based upon that specific action alone. When multiple actions are taken the total percentage reductions achieved will be different from an arithmetic sum of the individual actions. Please be especially sensitive when adding projected dollar savings together as they are produced by multiplying the percentage savings by the historical dollar outlay resulting in a total that is only related to that one specific action and cannot be added to other projected dollar savings in a meaningful fashion.***