Take Control & Save®

Residential energy efficiency pilot program

Johnston family pilot project - Clarence, Mo.

The problem

Roger and Mia Johnston's heating system could not keep up with the demand for heat their 100 plus-year-old home needed. They purchased electric space heaters to try to keep their house warm, and their electric bills skyrocketed. On very cold nights, they even had to send their children to stay with grandparents because it was too cold in their upstairs bedrooms.

Johnston home statistics:
Construction type: Frame
Exterior: Wood
Home style: Single family
Age of home: 100 plus years
Square footage: 3,000

Finding some answers

The Johnston's contacted their local cooperative, Macon Electric, to help resolve the problem. Macon staff found the heating unit was working properly, so why was the house so cold? Macon Electric staff recommended conducting an energy audit of the Johnston's home to check the actual heating load it required compared to the installed system.

Macon Electric Cooperative staff conducted an energy audit with a blower door test and found the home's 6-ton ground-source heat pump was drastically undersized. Adding more capacity to the current heating system would be difficult and costly, so Macon Electric recommended implementing measures identified in the audit to bring the heat load down as much as possible.

The Johnston's house was found to have an inadequate heating system for the load it required. They joined with Macon Electric Cooperative and their power supplier to make significant energy-efficient improvements so their home would be a comfortable temperature.

Energy audit results

The energy audit revealed some startling information. The Johnston's home was in serious need of an energy-efficient upgrade.

A blower-door test was completed as part of the audit process. This test measures the airtightness of a home by pulling air out using a special fan called a blower door, which lowers the air pressure inside. When the inside air pressure is lowered, the higher outside air pressure flows into the home through all unsealed cracks and openings, showing where your home is in need of weatherization. The test revealed the home had a CFM (cubic feet per minute) of 7,592, and an ACH (air exchanges per hour) of 21.36, which are well above what a "leaky" house has![1]

There was no insulation in the rim joists or in the basement walls, and the majority of the exterior walls were not insulated. The ductwork was not well connected, sealed or insulated. The main attic space had only two feet of blown fiberglass insulation and in some places none at all. There were even spots in the attic where daylight could be seen! The windows and doors were also very leaky and needed to be weatherized or replaced.

After discussing the audit results with Macon Electric staff, the Johnston's were determined to make their home more energy efficient.

[1]Typically, a "leaky" home is rated at a CFM over 4,000 and ACH over 10.

A pilot is born

Macon Electric Cooperative took advantage of an opportunity to help the Johnstons' by participating in a home energy efficiency pilot program with their power supplier. As part of the pilot program, financial assistance was available to the Johnstons to help provide an energy efficient home makeover. Major improvements were made that drastically reduced the home's energy use.

Photos of insulation and windows

Basement had no insulation, and the window opening had no window, only fiberglass insulation.

Photos of the spray foam insulation

The results are in!

The 6-ton ground-source heat pump is now able to fully heat the Johnston's home. They sold their space heaters as they no longer needed them! Best of all, they are now very comfortable at home.

Before	After	Reduction/savings
CFM[1] = ***7,592***	CFM[1] = ***2,430***	CFM[1] = ***5,162***
ACH[2] = ***21.36***	ACH[2] = ***3.85***	ACH[2] = ***17.51***
Used ***20,210 kWh***[3] from 11/08 - 03/09	Used ***12,915 kWh***[3] from 11/09 - 03/10	Saved ***7,295 kWh***[3] in one heating season!
$1,634 for electric use from 11/08 - 03/09	***$1,201*** for electric use from 11/09 - 03/10	Saved ***$433*** in one heating season!

[1]Cubic feet per minute (CFM): a measurement of airflow that indicates how many cubic feet of air pass by a stationary point in one minute.
[2]Air exchanges per hour (ACH): a measure of how many times the air within a defined space is replaced.
[3]Kilowatt-hours

Major energy-efficient improvements

1. Cellulose insulation added to all exterior walls and blown in the attic
2. Closed cell foam insulation added to all foundation walls, rim joist area and attic closet spaces
3. Weatherized doors and windows using ***over eight cases of caulk***!
4. Replaced four basement windows
5. Front door replaced with Energy Star door
6. Insulated and sealed the duct work
7. Air-sealed the main attic access and fireplace
8. Replaced all lighting with compact fluorescent light (CFL) bulbs

HOME COMFORT™

You can Take Control & Save too!

To find out how you can take control of your energy use and start saving like the Johnstons did, contact your local electric cooperative or visit www.TakeControlAndSave.coop.

Take Control & Save®

A Cooperative Effort for Energy Efficiency

www.TakeControlAndSave.coop