

# Roseville Project

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## Greatly reduce your energy usage in the Southwest.

Residents of California, Arizona, and Nevada don't need a weather forecast to know how oppressively hot it can get. During the seemingly endless summers, air conditioners are strained to keep the house cool and comfortable. The right kind of glass can make a big difference.

Cardinal has long known that LoE<sup>2</sup>, a highly efficient coated glass, can help slash summer heat gain through windows, which in turn means substantial energy savings. But Cardinal wanted to prove it. Cardinal purchased two identical tract homes in Roseville, California, a bedroom community near Sacramento.



One house was outfitted with Cardinal LoE<sup>2</sup>, while the other retained ordinary clear 2-pane glass. The houses were unoccupied, but equipped with electrical heaters that simulated normal occupancy. They also had on-site monitoring equipment that tested indoor and outdoor temperature and humidity, furnace and air conditioner energy consumption, and other important factors. Cardinal's results conclusively show that LoE<sup>2</sup> can cut energy costs, make homes more comfortable, and even reduce pollution in the environment. Clearly, LoE<sup>2</sup> is no ordinary glass.

## Housing features

- Vinyl frame windows
- AC Capacity: 3.5 tons for 2-pane clear house, 2.5 tons for LoE<sup>2</sup> house
- 17% window-to-floor area ratio
- Air/duct leakage and thermostat calibration tested and balanced

## Noticeable savings

Windows are the single largest factor in a home's cooling load. Cardinal has now gathered two years worth of data from Roseville, which offers unequivocal evidence of the energy savings offered by LoE<sup>2</sup>. In contrast to the home with 2-pane clear glass, Cardinal LoE<sup>2</sup> cut solar heat gain by more than 50%. In the house with Cardinal LoE<sup>2</sup>, Cardinal measured a remarkable 27% savings on cooling costs.

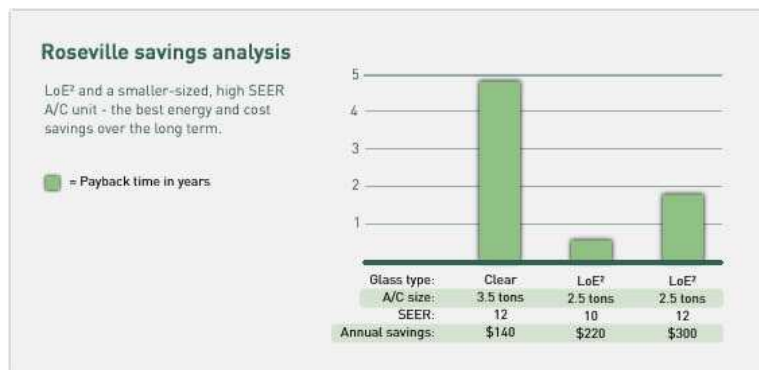
Cooling loads for homes with clear glass windows:

Energy savings extended to the winter time as well. The LoE<sup>2</sup> house saved 10% on the heating bill when compared to the house with regular clear glass.

The stellar energy performance of Cardinal LoE<sup>2</sup> means that a smaller air conditioner can be used to cool the same space. Cardinal found that the combination of LoE<sup>2</sup> and a smaller air conditioning unit with an increased Seasonal Energy Efficiency Ratio (SEER) can save 35% annually on heating and cooling costs.

For the builder, this is the lowest cost, most highly efficient upgrade available.

For the homeowner, that can mean an average energy savings of \$12,000 over thirty years (assuming a 2% year-over-year increase in energy rates).



## Power choices

Cardinal's extensive research with its test houses in Roseville has already demonstrated the energy savings that can be achieved by using LoE<sup>2</sup>. But that's not the only benefit.

Currently, there are roughly a quarter of a million new homes built every year in California, Arizona, and Nevada. Based on the demonstrated savings produced by LoE<sup>2</sup> in Roseville, Cardinal projects that if all new windows in this region used low solar gain glass rather than clear, the energy savings would equal 1 billion kilowatt hours per year. The peak load savings equate to building one new 400 Megawatt power plant every year.\*

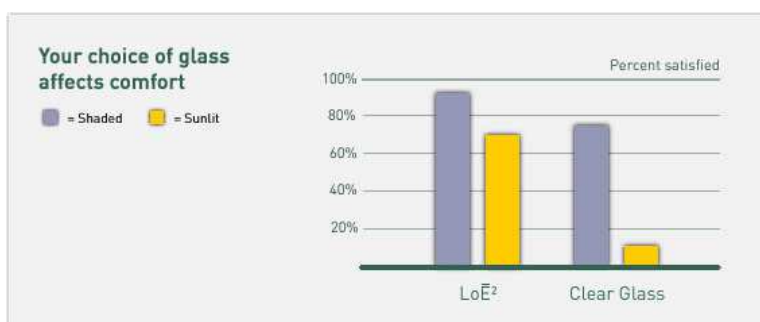
What does this mean for the region in practical terms? Accumulated over 10 years of new home construction:

- Homeowners would save 5 billion dollars on their electric bills.
- Peak load savings would have the same effect as adding more than 5% to the existing total electrical generation capacity.
- Air pollution savings would equate to shutting down all power plants for the next 3 months.

While each homeowner will enjoy measurable savings in their energy bill, the cumulative effects mean cleaner air for everyone and increased reliability of electrical supplies into the future.

## Comfort zone

The American Society of Heating, Refrigeration and Air Conditioning Engineers has developed standards to rate the thermal comfort of an indoor environment. ASHRAE Standard 55 defines an environment as “acceptable” when 80% of the occupants are comfortable.



Using the measured temperatures from the Roseville test homes, the chart above shows how dramatic the improvement in comfort is with LoE<sup>2</sup>. Even with direct sunlight shining in, the home with LoE<sup>2</sup> will feel more pleasant than the clear glass house with the shades drawn. To develop a comparable comfort level in the clear glass house, the homeowner would have to lower the cooling thermostat setting by 4°F or more. Set for equal comfort, the energy analyses show that the measured savings of 25% for LoE<sup>2</sup> would now increase to nearly 40%!

Cardinal LoE<sup>2</sup> offers energy savings, pollution reduction, and improved comfort when compared to ordinary clear 2-pane glass. Cardinal’s Roseville project is the proof.

\*Estimated peak load reduction of one kW per house. Assumes window replacement in existing homes at 80% of new home start rate. Estimated energy savings of 2,200 kWh per house per year. Regional electrical generation capacity and air emission analysis comes from E-GRID 2000 database.