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## Radiant Showcase **Residential Home**



# STEP Warmfloor® - The Primary Heating System in the 7,500 square foot Butera Residence

## LOCATION

The Butera Residence is a 7,500 sq.-ft. home on a beautiful property next to a river and surrounded by trees in Aspen, Colorado, at an altitude of approximately 8,000 feet.

## SPECIAL CONSIDERATIONS

With no central gas, and the owners not wishing to have a propane tank on the property, electric heat was essential. In addition, several other special considerations needed to be addressed:

- In-floor electric radiant heat with minimal changes to floor thickness under multiple types of flooring.
- Local building energy efficiency requirements had to be respected.

## HEATING SOLUTION

After extensive research, the homeowners decided on STEP Warmfloor as their primary heat source inside the house, and STEP Snowmelt was installed in seven areas outside, along paths and walkways.

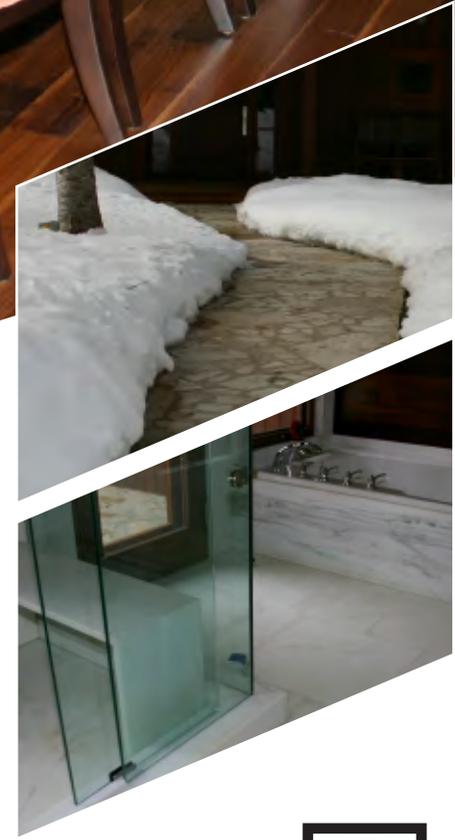
In the end, the results were amazing, and all requirements were made to the full satisfaction of the home owners. They now enjoy safe, comfortable, even heat, with low energy consumption and almost no change in the floor's height.

## APPLICATIONS

A total of 5,714 sq.-ft. of element was installed in the residence, 4,878 sq.-ft. on the main level, and 836 sq.-ft. on the upper level, with a variety of applications.

Installation methods included:

- Stapled between joists under the wood sub-floor.
- Thin set on a concrete slab, with tile laid on top.
- Installed in the walls and behind bath room mirrors in a few select locations, to generate additional heat and to keep the mirrors from fogging.
- Outside, 2,219 sq.-ft. of STEP Snowmelt was imbedded in concrete with stone laid on top.



# Energy efficiency and minimal floor buildup requirements give STEP Warmfloor an advantage when compared to other heating alternatives

## THE OWNERS REVIEWED SEVERAL HEATING OPTIONS:

### Baseboard Heaters

To enjoy the scenic view outside, the house has many windows, several of which are floor length. As a result, there was insufficient wall space to properly install enough baseboard heaters to suitably heat the entire living space.

### Traditional Heating Cables

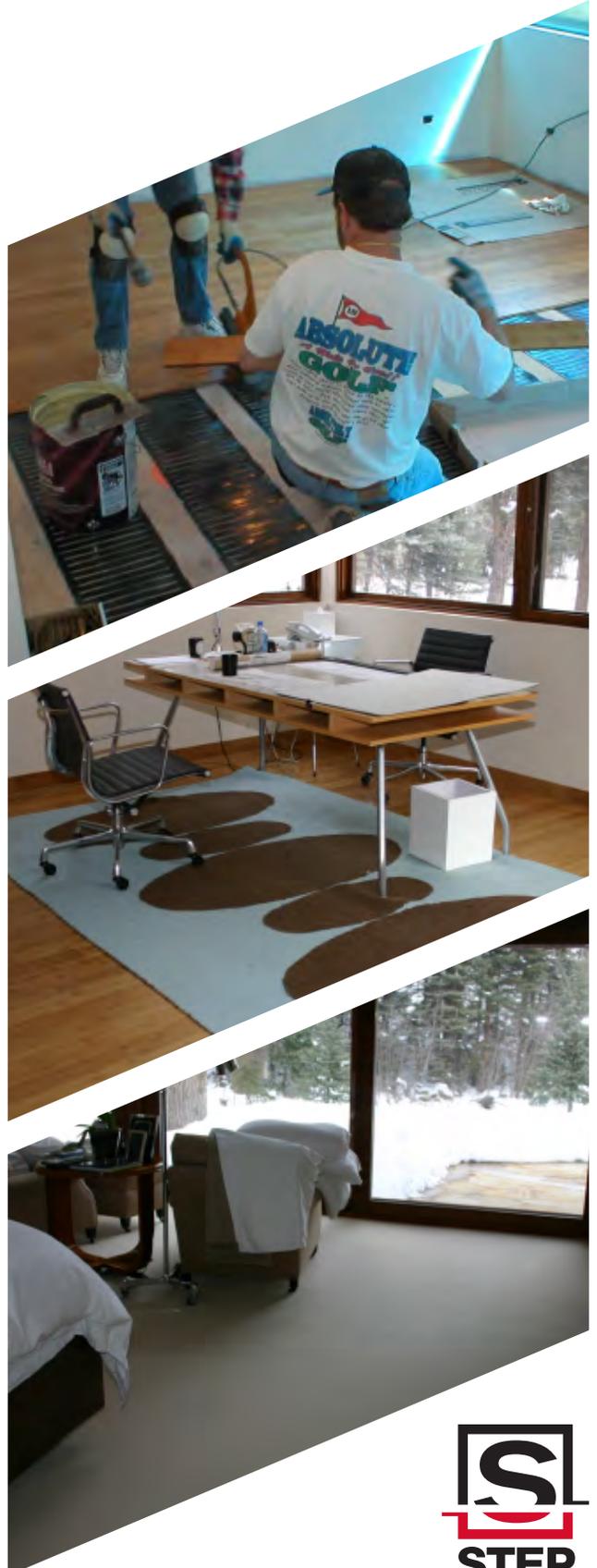
The home contained several types of floor coverings, including hardwood, carpet, tile and natural stone. Because of this, installation of constant wattage heating cables would have included a variety of installation methods with undesirable increases to the floor thickness.

### Forced Air System

With no central gas or propane to burn in a furnace, a forced air heating system wasn't an option. Additionally, at an altitude of 8,000 feet, burning fuel is 40% less efficient.

### Hydronic Tubing

Without central gas or propane, a hydronic heating system wasn't ideal. An electric water heater would have been very inefficient for the perpetual demand required to heat the system. In addition, significant changes to the thickness of the floor would have been an issue with some of the various installation methods required.



## STEP WARMFLOOR ADVANTAGES

STEP Warmfloor is safe for almost all non-conductive floor coverings because of its self-regulating properties.

The elements work like a floor sensor, drawing more energy when they are colder and less when they are warm. As a result, STEP Warmfloor radiant heating elements cannot overheat and are very energy efficient.

STEP Warmfloor is low voltage (24V), making it safe for wet areas like bathrooms and under tubs and shower pans.

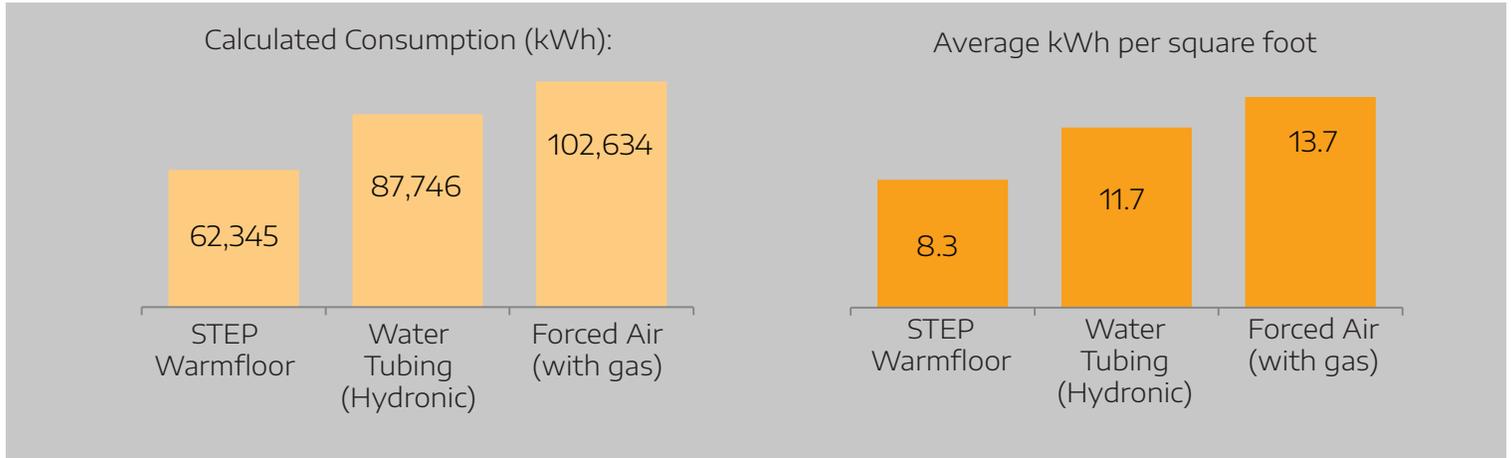
With a thickness of only 3/64" (1.2 mm), there is very little change in the thickness of the floor.



# ENERGY REPORT - The total energy consumption for the first year measured at 8.6 kWh/sqft

## CONSUMPTION AND COSTS

The house was monitored for energy consumption for one year. The electricity was measured by two permanently installed watt-meters, and the total reading on the meters was 64,708 kWh – 3.7% more kWh than calculated. This was due to: construction period (opened doors and windows, unfinished thermal insulation, etc.), drying time of the building materials, and regulators installed at a later time.



## INSTALLED WATTAGE

To ensure sufficient heat output during cold peak periods, a total of 44,569 watts was installed providing a maximum capacity of 5.9 w/sq.-ft.

## ENERGY SAVINGS

By choosing STEP Warmfloor as the only heating source, the homeowners reduced energy consumption by:

- 29% compared to water tubing
- 39% compared to forced air

## NOTE:

- Radiant heated floors have a better heat distribution than forced air systems.
- At an altitude of 8000 feet, burning of fuel is 40% less efficient.
- A 50/50 mixture of antifreeze and water reduces the heat capacity approximately 20%.



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