ROSE Cottage Relies on Bosch Efficient Heating & Cooling
Case Study

**ROSE Cottage Net Zero Home** in Concord, New Hampshire

**Project Goals:**
- **R** = Renewable energy production
- **O** = Occupant driven spatial design
- **S** = Sustainable building practices
- **E** = Energy efficient construction

**Background**
The ROSE Cottage Project is a newly constructed 3,370 sq ft single-family home in the capital city of Concord, New Hampshire, designed as one of the first zero net energy homes in northern New England. This multi-generational, aging-in-place house demonstrates how a sustainable residence can be built within a reasonable budget to incorporate multiple themes of long life cycle value.

The ROSE Construction Method™ (RCM) was developed to produce projects with a timeless architectural design, while incorporating standardized engineering protocols that result in cost effective and affordable zero net energy construction. In all situations, it requires the collaboration and cooperation of the owner, designer and builder to make it successful. According to Turner Group President Harold Turner, “The architect’s commitment to creating a flexible design that can fit the needs of several types of multi-generational occupants is a complement to the investment in a zero net energy home that generates as much energy from renewable sources as it uses. We all have to discover the inherit benefits of sustainable, energy efficient living that go beyond simple return on investment (ROI), because the economic benefits alone can change as rapidly as the stock market.”

Bosch water to water geothermal heat pump.
Installation Summary

The New Hampshire climate, with its very cold winters and hot, sometimes humid summers, required a mix of active and passive strategies to achieve cost effective interior conditioning. Mr. Turner commented “The house is capable of withstanding the harshest winters and the hottest summers that northern New England can dish out. It has all the heating, cooling, lighting, and fresh air systems required to maintain a safe, comfortable, healthy, and efficient environment, free from either internal or external hazards.”

The geothermal heat pumps are both Bosch two-ton units. One is a water to water unit and is used solely for heating. The other is a water to air unit that provides both heating and cooling via an air ductwork distribution system hidden in the soffits of the first floor level. There are nine Buderus Logasol SKS 4.0 solar flat plate collectors rated at 28,000 Btu/day located on the sloped house roof and connected to a Buderus PL750/2S Solar DWH/Space Heating Combi Tank holding 198 gallons in the mechanical room. This unique design storage tank offers 80 gallons of domestic hot water and 120 gallons of water for space heating. The system is controlled with a Buderus TR0603 solar controller with two additional Buderus diverter valves. The solar loops deliver additional energy to the heat sink when there is excess solar thermal energy available from the panels, and the glycol can be as hot as 200°F upon initial flow. Under certain mid-day heating season conditions the hot water used for radiant floor heating may be provided solely by the buffer tank’s hot water from the solar panels when there is adequate solar radiation with moderate outdoor temperatures. According to mechanical contractor Dan Morin, VP / Service Manager of Eckhardt & Johnson (Manchester, NH), “With on-site support from Buderus, installation of the solar panels went smoothly; solar controls are easy to program.”

There are thirteen 300 ft long x ¾ inch diameter PEX solar ground loops filled with glycol, buried in a 12 inch thick wet sand bed making up the geothermal heat sink. The ground loop “slinkies” extract heat energy from the sand bed for heating purposes or deposit energy during cooling mode.

Benefits and Conclusion

“The independent Energy Star rater for Unitil Electric Company gave the project a HERS index rating of 2.0, (i.e 0.0 is theoretical Zero Net) on a scale of 0 to 100, so our targeted zero net goal was accomplished,” commented Mr. Turner. “The geothermal heat pumps and solar thermal heating systems are functioning flawlessly since December 2011, and energy usage is consistent with our expectations.”