

Time-of-Day Rates and In-floor Radiant Heating

Time-of-Day (TOD) rates are special power rates that reflect the cost of generating electricity at different times of the day. Because the demand for electricity varies during the day, Nova Scotia Power must add more expensive generating capacity at those times to meet the peak demands. By offering customers electricity rates that reflect the actual cost of generation, customers can choose to use the majority of their electricity during off-peak times and save money at the same time.

With TOD rates, the customer saves approximately half off standard electricity rates every night of the year, and around the clock on weekends and holidays, for all the electricity used in their home. Because the peak rates are higher than normal rates, TOD works best when electric heating load is controlled to work only in the off-peak times using the concept of thermal storage.

The thermal storage concept works by using electricity to produce heat during the off-peak, and storing it to be used throughout the day. The key to thermal storage with in-floor radiant heat is to ensure enough heat is stored in the concrete under the flooring.

How is electric in-floor radiant heat different from other in-floor heating systems?

Electric in-floor systems are similar to other fuel types of in-floor systems, up to the point of heating the floor. Whereas other systems produce heat on demand (e.g., with an oil boiler or electric cable), electric TOD systems use electric heat sources and the thermal storage capacity of the concrete floor itself. Because of this, there are some considerations to be taken when designing the system; see “Considerations for Electric In-floor Heating” to learn about what has worked for our customers.

What are the eligibility requirements for Nova Scotia Power's Time of Day Rate and Radiant In-floor Heating?

We are mandated by the Nova Scotia Utility and Review Board (UARB) to ensure the heating system utilizes thermal storage and appropriate timing and controls, so as to ensure that the majority of the home's electricity usage is moved (shifted) to the off-peak periods. Control can be either through the use of equipment that utilizes an off-peak signal emitted by the TOD meter, or by a seven day programmable timer (7-day, 4-event), wired to the heating equipment.

Additionally, either an electronic thermostat or programmable (7-day, 4-event) thermostat should be wired to the zone valve.

It is required that you review your timing equipment and/or program settings with Nova Scotia Power prior to implementation. Additionally, we require the following:

- All potential homes need to be scoped by Nova Scotia Power for transformer sizing.
- All systems and installations must meet Canadian Electrical Code wiring requirements. Water heater elements cannot be wired together as this practice does not meet wiring safety standards.

Considerations for Electric In-floor Heating:

Because each installation is different, NSPI cannot provide specific design and/or installation instructions beyond the equipment used to control the time of day the system is in operation. However, in talking with our customers and their contractors, we have identified some practices that contribute to higher-quality installations. Please consult a qualified industry source for more detailed information and specific installation details.

Our customers have told us that:

- A 4" slab with a minimum of 2" of rigid insulation underneath offers best thermal retention.
- At a minimum, the basement (or slab, if no basement) must be thermally heated. Upper levels can be heated with in-floor as long as an overpour of 1½" concrete is used. Occasionally, our customers have had comfort issues with this method, depending on the openness of the floor plan, the insulation levels in the home (e.g., less than R2000) and the amount of solar gain (i.e., sun exposure) of the home. A better option for the main/upper levels can sometimes be thermal storage heaters. Tubes or cables running through the floor joists or stapled under the subfloor have not been successful, due to their high heat loss and limited thermal capacity.
- In general, the better insulated the home (i.e., the lower the heat loss), the more successful the installation. Because the system cannot inject heat on demand, the heat loss should be calculated for each home and the appropriate capacity built in to the home's heating and installation design.
- Often, our customers have found that systems using an outside temperature sensor cause some under-heating of the slab. If the temperature falls quickly, the system may not have stored enough heat.
- For in-floor hydronic systems, two electric hot water heaters (normally 40 or 60 gallon), with element sizes ranging from 4.5kw to 6kw, may be connected in parallel to provide adequate space heating requirements. Consumers should note that hot water heaters used for this application must be approved for space heating and must be certified to CSA C22.2-165 or equivalent. Typically, domestic water heaters for potable water are not suitable for this application. For larger homes, our customers have found that electric boilers or instantaneous water heaters can offer quicker recovery. Also, a mixing valve that combines cool water with water from the heater/boiler should be installed in order to supply input temperature ranging from 90° F - 110° F.