PRESTYL

Green heating solutions

When planning a heating solution for a modern building the "other needs" of the building as well as the power company's ability to provide adequate energy to support the entire building during peak demand hours are often overlooked.

- Unlike with traditional heating technologies, Prestyl's far-infrared technology is able minimize a building's peak demand by shifting its power requirements to non-peak hours. Prestyl does this by storing heat energy prior to peak-demand and releasing it when needed (please see page 3 for details).

- Peak-demand and its associated costs are the most troublesome issues for the local power producer. When the energy supplier cannot keep up with demand it can have a major impact on the community; limited growth, loss of job opportunities, excessive operating costs (funding peak demand and grid upgrades). Uncontrollable peak-demands are the primary cause of excessive peak charges, brownouts, blackouts and premature grid obsolescence.

What is peak demand and how do we mitigate it?

Peak demand is the need for electricity over and above the "normal" usage. It occurs when a modern building "comes alive" in the morning. Lights are coming on, convection heaters are coming on, elevators and escalators are working overtime, coffee makers are running and computers, data-systems, copiers and other office equipment are "warming up".

In convection heated buildings the heaters and their associated fans, pumps and blowers are switched-on at the worst possible time. Once everyone settles in, the elevators are used less often, the load on escalators is diminished and the rooms and common areas will have reached their normal temperatures.

This is the point at which the energy that a power company has to supply goes "back to normal", or to "base-load" levels. The next peak, though not quite as high, occurs around lunch-time and a generally smaller peak may occur as people are coming home.

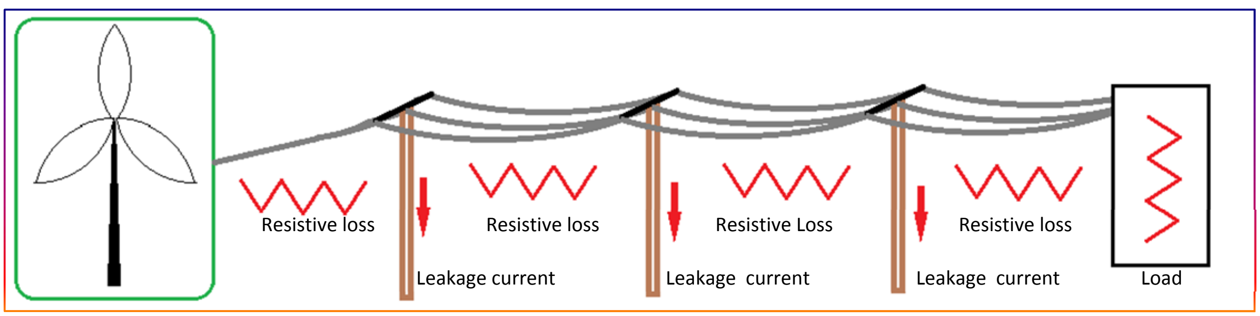
Unless we are able to mitigate these peaks, the local power company will have to provide extra power to offset these peak demands. They can do this by either running their power plants inefficiently (increasing the temperature and pressure in steam plants) hours before the anticipated peak demand, or fire up "peaker plants". Peaker plants are jet or diesel-fired power-plants that can be put online quickly (10-30 minutes), but which operate at 10-15% efficiency (85-90% of the energy required to run these facilities is wasted).

Because of the "Green energy movement and hype about wind and solar energy many people (erroneously) believe that the addition of solar panels and wind-farms would be able to offset these peak loads, but the reality is far from this:

- Commercial solar and wind-farms do not offer storage capabilities; hence, the energy must be used when generated.
- With a few exceptions, solar generally peaks between late morning and mid-afternoon; if it is not cloudy, the mid-day or lunch peak can be partially supported by the solar resource - - similarly, the wind-peaks in most places occur midafternoon and may be of some benefit to a commercial building environment.

The next part of the equation is the transmission loss; power plants, including wind and solar-farms (even if these were active during peak demand) are generally far away from the power consumer; hence, the energy must be transported for long distances. The combination of increasing demands on an ever aging grid, and the distance the energy has to travel (sometimes hundreds of kilometers/miles) increases what is known as the "transmission-losses". Some of these transmission-losses are caused by "voltage conversion" (conversions are needed to increase or decrease voltage levels - - the higher the voltage the thinner and less expensive the transmission lines can be). However, in a transmission-line the most significant losses are the "resistance" (think of it as "friction" turning into heat) and "leakage" or arcing across insulators or losses through miles of insulation in underground systems (this is like water disappearing from a container that has many small holes - - not all of the water put in is available and more is needed to keep it full). The higher the voltage and the dirtier the insulators the more the leakage losses will be. Compensating for leakage (supplying more power) causes more resistive losses as the demand for power (current) increases.

Even without a load (usage demand) on the transmission line, the combination of leakage and resistance in the line by nature causes a drop in voltage. The greater the current, the greater the drop will be. Hence, this drop becomes much greater when we add the power user load to the equation.



Since the relationship between Voltage and Resistance is exponential a 10% drop in voltage results a 19% loss in available energy; if during an extreme peak-demand we lose half of the voltage due to line-losses, the power that is available at the end of the line would only be 25%, and if this voltage dropped by 68% only 10% of the original energy would still be available.

As we can see from the above example, the solution is not "pumping in more energy", but rather reducing the peak loads by implementing "smart-building solutions" (leveling off the peaks and valleys so that power can be produced and transported more efficiently).

Why Prestyl?

By nature of its design and technology, Prestyl not only offers significant energy savings (12-53% [1]) over traditional heating methods, it also offers a very simple and inexpensive solution to the peak demand problem and has a myriad of other incredible benefits:

- Operating costs - - costs are similar to Geo-thermal heating, but at a fraction of the installation expense
- Reliability - - Prestyl's proprietary metal-hybrid thin-film technology has been successfully produced and implemented for over 17 years; besides buildings it is also used in highly demanding applications (100% of all recently built passenger trains in France and many in Canada are heated with Prestyl's film)
- Saving energy - - Prestyl uses a self-regulating Aluminum-based metal hybrid thin-film that uses less energy the warmer it gets; others use heating wire or carbon. The latter is plagued by "hot-spots" and fire risk as carbon does not self-regulate and uses more energy the hotter it gets.
- Quality - - the quality of Prestyl's film is still controlled by its inventor and founder; nearly all of Prestyl's competitors have seen adverse changes as their raw material became unavailable, companies down-size and some were sold repetitively
- Best performance obtainable - - because it is only microns thick, Prestyl's far-infrared film is mounted directly on the radiating surfaces of its transmission medium; others incur "heat transmission losses"
- Unique capabilities - - besides the traditional applications, the nature and design of the Prestyl thin-film allows for "instant-on" versions (used for the chemical and medical industries) that heat up in merely 6-8 seconds and maintain a temperature of +/- 1 degree Celsius.
- Healthy - - Prestyl operates in the healthy far-infrared spectrum (7,500-10,000 nanometer). By nature of its operating wavelength, Prestyl offers many known and documented health benefits (especially to the elderly, recovering patients, immobile people, repetitive motion workers, and school children)
- Comfort - - Prestyl's warmth is extremely comfortable; no "hot head, cold feet syndrome"
- Demand Shifting - - Prestyl is designed to facilitate peak-demand shifting (load leveling); it simply stores the heat energy in the floor, walls and objects when energy is readily available; this stored warmth is simply used when needed. (The floor and objects heated by infrared lose the stored energy very slowly, similar to a wall that remains warm at night after the sun has been shining all day).
- After we store the heat energy in the building and its contents, the power to a Prestyl system can be switched off while other demands are being met; it can be switched on again (without the building's occupants realizing this) when power is readily available. Because we do not rely on fans or hot air, the system may be off for a few minutes or many hours depending on the storage capacity of the building. Concrete takes longer to warm up, but is a great medium for storing heat energy; wood warms up faster but also loses its stored energy faster. Concrete (and brick) can be used to store heat energy for the larger part of the day, while wood loses its stored energy in a few hours.
- Simplicity - -"peak-shifting" can be done with a simple "set forward" thermostat (a standard "setback thermostat" programmed in reverse), or with a sophisticated building (energy) management system. At night or at other times when electrical energy is plentiful (or in some states inexpensive) we simply increase the thermostat's setting slightly and elevate the energy level (temperature) stored in the floor and objects exposed to Prestyl's infrared slightly so it can be shut off when electrical demand is high and no one will notice
- Additional solutions available - -Prestyl's parent company is very active in the field of energy management at the local level and offers additional peak mitigating solutions for other high-demand devices which may be in use or contemplated in a new building.
- Support in the early stages - - working with Prestyl's engineers and sales team can make it possible for buildings to be constructed in areas where the lack of adequate energy infrastructure could otherwise result in building permit denials.

[1] Energy savings are dependent on many factors, such as: building type, the building's age and condition. Buildings with standing water on, or touching the floors, are not IR candidates (water causes evaporative cooling as it evaporates).

Prestyl's far infrared uses no fans, pumps, ducts or any other auxiliary "energy hogs" which are often overlooked in energy comparisons. Hot air/Convection systems suffer from many losses and even a 99% efficient furnace may have a dynamic performance of only 25-35% due to these losses. When a door opens the heat escapes and it may take a long time for the space to recover; with infrared this would take seconds to minutes. Based on placement, prestyl converts 80% of the electrical energy into far-infrared energy (ceiling mounted) or 60% when wall mounted.

Though it is true that with "electric heat all electrical energy is converted to heat energy", the common assumption that it is therefore 100% efficient is false! Because these use convection (with its associated problems and losses), baseboard heaters and heating aides inserted in geothermal systems are typically very inefficient; a properly installed Prestyl system typically outperforms these antiquated energy wasters by 20-53%.

With a few exceptions, in the worst possible, IR unfriendly buildings we have managed to save at least 12% on actual energy usage; considering that even 5-8% would have been considered a success.