



Marketing and Managing Electricity Through Electric Thermal Storage (ETS)

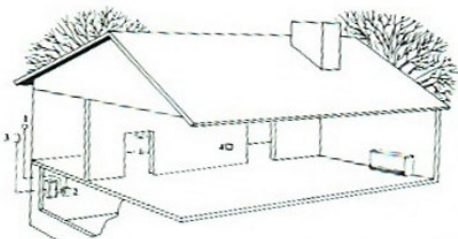
Today, many power companies are faced with:

- High consumer energy costs.
- The need for increased revenue.
- The need for grid optimization.
- Increasing variable renewable generation.
- Conservation mandates.

More and more power companies are finding Electric Thermal Storage (ETS) Space and water heating to be an important part of the full menu of products now needed to address these issues and to compete successfully in the energy world. Although ETS is not the total answer, this report addresses what a power company and its consumers can gain by including ETS as part of their marketing and load management programs.

The Concept of ETS

Electric Thermal Storage is a clean, safe, comfortable and reliable method of space and water heating for residential and commercial applications. This heating choice is growing in popularity because it is 100% efficient and provides consumers with cozy comfort and considerable savings in heating costs.



1. Outdoor sensor monitors outside air temperature.
2. Control panel automatically adjusts heater charge level accordingly for optimum comfort and energy savings.
3. Utility meter records off-peak power usage.
4. Individual room thermostats regulate temperature in each area of the home. (Numbers 1 and 2 are optional. Room unit charge level may be manually controlled by the consumer.)

These savings are realized by taking advantage of off-peak rates. These off-peak hours are the times during the day when there is a surplus of available electricity. Because of this surplus, the power company charges lower rates for electricity used during that time. Electric Thermal Storage units convert electricity into heat during these off-peak hours and store that heat in specially designed high density ceramic bricks. These bricks are capable of storing vast amounts of heat for extended periods of time. At any time, as a room thermostat calls for heat, fans in the unit circulate the stored heat evenly and quietly throughout the room.

The History of ETS Heating:

Relatively new in North America, ETS heating was promoted heavily by utilities in Europe after WWII as a load management tool. Not only did it provide the consumer with safe, efficient, and comfortable heat; it allowed the utilities to control their load during the heavy postwar rebuilding era. Today, millions of homes in Europe utilize some form of ETS heating for a total connected load approaching 50,000 MW. In Germany, more than 7% of all dwellings have ETS. This increases to 14% in England and Wales where 17 million households utilize some form of ETS heating. In both countries, more than 20% of all residential electricity sales are made to storage and/or billed under off-peak rates.

ETS greatly improves utility daily load patterns and can have a positive impact on annual load factors. In West Germany, midDecember daily load factors increased from 77% to 88% between 1964 and 1974. During that same period, total kWh sales increased 109%; but, the kW demand increased only 84%. That is an effective 30% increase in kWh sales without the demand penalty.

The British Electricity Council estimates that storage in Great Britain typically shifts 2,000 to 3,000 MWs off-peak. On a cold day, that number can increase to 10,000 MWs.

The growth of ETS heating was more rapid than the European utilities or manufacturers of ETS equipment expected. 100 MWs of installed capacity in Germany in 1960 grew to 1,000 MWs just four years later. By 1977 that number grew to 26,400 MWs.

Similar results have been realized by American utilities, some having been active in researching and developing successful ETS marketing programs for over a decade. Many more are now taking a close look at how creative ETS marketing strategies will give them control of their loads and increase kWh sales with minimal increase of demand.

Evolution of English, German, and American ETS Heaters:

The English Style:

The English weather changes with the four seasons; but, typically there are not great daily weather changes. This, combined with the fact that English homes have small rooms, has allowed them to develop an acceptable ETS room unit that can have very little insulation and no fans. Since the weather is quite predictable, the charge level can be set such that the radiant heat coming out of the front of the unit is adequate to heat the room. If a little more heat is needed, a damper opens allowing air to pass through the hot brick and provides more heat to the room.

This simple method works in areas where the weather is not likely to change quickly. In the case where the weather warms up quickly, a situation of overheating will occur because there is very little insulation; and, the heat, whether needed or not, is coming out of the brick core at a fast rate. In the case where weather cools down quickly, a situation of not having enough heat will occur because not enough heat has been stored to carry the room through an expected cold day. The English room unit would typically have 70 pounds of brick per kilowatt input.

The German Style:

The German weather also changes with the four seasons but has significant daily changes as well, and their room unit design reflects this. The Germans have gone with more insulation to keep the heat in the unit until it is needed, and then fans are used to pump the heat out. Since the average room size is larger in Germany, the fans also yield a more uniform heat throughout the area being heated. In the case where the weather warms up quickly, the possibility of overheating the room is somewhat reduced because there is more insulation around the brick core.

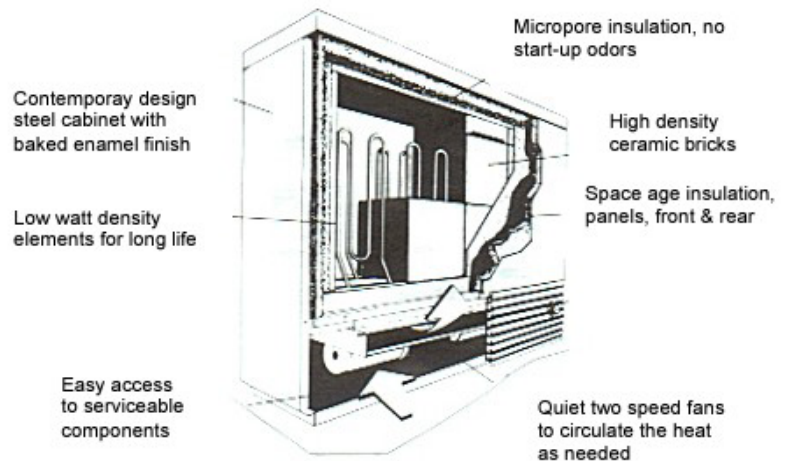
In the case where the weather cools down quickly, more insulation helps maintain a higher charge level, which reduces the risk of not having enough heat to maintain comfort.

The German room unit would typically have 65 pounds of brick per kilowatt input.

The American Style:

In 1986, fifteen Rural Electric Cooperatives (REC) from five states who were experienced in ETS heating developed a list of features their members desired. This list of features was used to “Americanize” the existing styles of ETS room units.

1. More insulation to reduce the skin temperatures and the radiant heat loss out the front of the heater.
2. A world class brick from domestic materials.
3. Easier to install.
4. A quality wall-mounting bracket to prevent unit from tipping over.
5. A factory installed wiring harness
6. Eliminate foul start-up odors.
7. Ability to service and repair anything without having to disturb the insulation or removing any brick.



In an effort to make the American room unit better than the imports in every way, the design team at Steffes ETS went to work and addressed each point on the REC list.

1. A full inch of super efficient insulation, chemically equivalent to the space shuttle tile, is used on the front and back panels to reduce skin temperatures. Although enough heat radiates out to give the nice, cozy feel; there is enough insulation to minimize the overheating situation if suddenly turns warmer the weather
2. A high density ceramic brick was developed from domestic materials. This allows the American-made heater to be slim and trim and still hold vast amounts of heat.
3. To make it easy to install, a factory installed wiring harness is standard equipment.
4. For safety, a quality wall mounting bracket is provided.
5. All inorganic insulations are used to effectively reduce start-up odors.
6. The serviceability of the American units is outstanding. All electrical components including fans, control thermostat, and heating elements are easily serviced or replaced.

The American (Steffes ETS) room unit has 75 pounds of brick per kilowatt input.

ETS Heating as a Load Management Tool:

As a load management tool, ETS is used to build and shape load. Heating systems are designed and sized to fit most heating needs, and their operation may be controlled in various ways to fit each power company's operating system. Peak load times vary from region to region. Proper ETS sizing allows flexibility in cutting peaks and filling valleys. It is important to size ETS systems based on long-term assured load valleys. Mid-day valleys fill fast and, once filled, may create problems for normal demand growth. ETS systems are sized in accordance with off-peak times to allow them to heat the home while achieving their designed charge.

ETS room units can handle control periods up to 20 hours. This becomes a valuable feature in load management. Even though a current peak may only be 4 to 6 hours long, successful load shifting may create longer control periods in the future. ETS equipment can support a power company's long-term load management objectives.

ETS Heating as a Load Growth Tool:

Those power companies that have no peaking problems and are looking for a means to create and control load growth have also found ETS heating a viable solution. They are now able to offer their consumers an efficient, economical way to heat their homes while increasing load with negligible increase in demand.

ETS as a Marketing Tool:

One key to a successful load growth program is an aggressive ETS marketing program. To successfully market ETS heating, power companies have had to educate the consumer concerning its benefits, offer off-peak rate incentives which are competitive with alternative fuels, and offer financing and/or equipment rebates to offset the cost of the systems. Incentives other than off-peak rates vary in accordance to budgets, market growth, and attainment of set goals. They range from rebates on kW's installed to a set amount which defrays the equipment and installation costs. To justify offering an offpeak rate, the utility must be assured that increased kWh sales will not add to their demand costs.

Listed next is a table of typical off-peak or time-of-day rate strategies. There are different rate strategies depending on the objectives or situations faced by different power companies.

Typical Off-Peak/Time-of-Day Rate Strategies				
Type of Rate	Definition	Advantages	Disadvantages	Comments
Time-of-Day for all Electricity.	Where all electricity is billed at one rate during certain hours and at another rate during all others	Can be implemented simply by changing the meter	If on-peak rate is higher than the regular residential general service rate, the consumer may feel they are not gaining anything.	If power company is billed for demand based on peak of the month, it is fairly safe being locked into specific hours. If demand charges are based on peak of the year or peak of record, it is more risky being locked into set hours.
Time-of-Day for specific appliances.	Uncontrolled appliances are billed at one rate. Controlled appliances are billed at another.	Gives power company a better handle on what various appliances are doing for its program. Consumers know what appliances are doing for them.	Requires additional meter or subtracting metering equipment. In most cases the installation expense is greater than the disadvantage above.	
Off-Peak rate for specific appliances where load is controlled only at the need of the power company.	Same as the one above but the on-peak times are controlled by the power company	Allows power to be sold as many hours as possible without affecting the peak. Allows load to be easily staged on and off.	Requires radio transmitting and receiving equipment. May or may not need additional meter.	Requires monitoring when charging is allowed to prevent shoulder peaks. If peak hours are unpredictable or controlling peak is of the utmost importance this may be an important option

Marketing methods will depend upon load management goals and objectives. In areas where peak control is a high priority; whole house systems are most often used. Whole house is defined as total home heating with ETS. Some power companies allow either controlled or uncontrolled resistance in areas of the home that require minimal heating. These power companies are actively marketing to the new construction and retrofit markets.

In areas where load growth is desired, ETS is being promoted in new construction and in recapturing the heating market from wood, oil, and gas.

Many power companies are meeting their objectives by promoting the warm room concept. With the warm room concept, one or two ETS units are used as the primary heat source to condition the space most often used. The other areas are left slightly cooler and generally backed up with resistance heat. Room unit sizes and placement vary according to heat loss factors and family lifestyles. The majority of their consumers already have some form of electric heat. Many consumers have turned to alternative heating methods and created their own warm room concept in order to reduce their electrical costs.

It has been the task of the power company to inform their consumers that electricity is cost competitive; and, that they can offer a stable rate with a system that provides incomparable, safe, efficient, cozy heat that will pay for itself in short period of time, generally less than five years.

Marketing strategies include pointing out the unstable cost and hazards of fossil fuels; the safety, reliability, convenience, efficiency, and comfort of ETS heat; and, the hidden expense and hassles of wood heat. Though wood heat is romantic, it is costly in labor and equipment; also, in many areas, insurance rates are higher. In many parts of the country, pollution from wood heating is becoming a growing concern, and ETS promotion would be beneficial for all. Once ETS programs are in place, power companies have found "word of mouth" advertising by their consumers to be a bonus. Their consumers are truly satisfied with the system's performance, the quality of heat, and the heating cost savings.

Another key to successful marketing is having a marketing staff that is knowledgeable in ETS sizing, control, and operation. Steffes ETS offers factory support with presentations, training/certification seminars, sizing programs, installation videos, and technical and promotional material. Electric Thermal Storage heating is a versatile tool in many power companies' Load Management and Marketing Programs. Thanks to the cooperative efforts of the NRECA, several generators and transmitters, many distribution cooperatives, investor Owned Utilities, municipals, and the North American manufacturer (Steffes ETS), North American consumers are benefiting from the world's finest ETS room units.

Steffes ETS, Inc.'s mission, "Commitment to Innovation," has led to the development of a family of ETS products:

- Room Units
- Force Air Furnaces
- Hydronic Furnaces

Steffes ETS desires "To be the Company of Choice" for all Electric Thermal Storage needs. Call Steffes for further information about their equipment.



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