



## Reducing the High Costs of Electric Peak Demand

by Tom Stroozas - CFE, RCGC, CFSP

The all too familiar phrase, “a penny saved is a penny earned,” has never been truer than it is today. And saving a penny here and there can often make the difference whether an operator makes a profit or not. This month we’ll focus on the electric commodity and how employing more natural gas in your foodservice operation can put more money in your pocket by reducing the high costs of electric peak demand charges.

### Electric Demand

The demand charge on commercial electric rate schedules is key when comparing electric to gas cooking technologies. So what is electric demand and how does it impact your energy bill? Simply put, the demand charge is an additional fee levied by the electric utility to insure you would have ample electricity available to operate all of your lights, refrigerators, HVAC, cooking appliances and other equipment simultaneously. In essence, you pay to have enough electricity available for your maximum usage whether you ever use it or not.

The demand charge is set for the month based typically on either a short time interval (15 or 30 minutes depending on your local utility’s rate design) or on the actual peak set during the month.

Since there is generally only one electric meter on a facility, it is not easy to determine which piece or pieces of electric equipment are the principal factors in producing the maximum demand. Furthermore, some equipment must be running continually such as lights, fans, mixers, refrigeration, HVAC, etc. All of these

uses make up that initial pattern of the demand curve and help establish your “basic” demand charge.

If more electric cooking equipment is installed, the question is how to estimate what percentage of the added connected load (rated nameplate capacity of each appliance) will affect an increase in the basic load demand charge for your facility. The cost of any such increase must be added to the estimated energy charges to determine the total operating costs of the electric appliances.

### What is Electric Demand?

Fees levied by the electric utility for being able to have ample electricity available to operate all of your lights, refrigerators, cooking appliances, HVAC systems, mixers and other electric equipment simultaneously “ON DEMAND.” These fees are in addition to the rates for the electricity that each piece of equipment uses while operating.

### Cooking Demand

When a number of electric cooking appliances are operated in a foodservice facility, it is apparent that there will be a variation in usage between individual appliances and also between the various heating elements contained within those appliances. The relationship between the connected load and the maximum kitchen demand is variable, but is generally accepted to be roughly 50%. If great care is exercised in turning off units as soon as possible and if baking is done at off-peak hours, then the

maximum demand becomes a smaller percentage of the connected load, possibly as little as 35%. But if operating habits are not carefully monitored, the percentage may rise to 65% or more!

### Appliance Demand

Situations may occur in which a single piece of electric cooking equipment is under consideration rather than all or a majority of the cooking

equipment. In this case, it becomes necessary to estimate the diversity factor (what percentage of time the unit operates at full nameplate rating) for the particular appliance involved. Knowing this can be a big help in determining what electric appliances should be replaced with gas models to reduce the largest amount of electric demand charge and decrease energy and overall operating costs. The accompanying Operating Diversity Chart (Figure 1) shows that the oven in this foodservice example would have the highest maximum diversity factor, so if that oven was

electric, replacing it with a gas model would reflect a reduction in demand charges and an increase in bottom line profits.

## Billing Demand

On the surface, it may be nice to have information on the magnitude of cooking and appliance demand, but as an operator, your primary interest is the effect on the billing or total demand for your facility —“what does it cost?” The operator

# Denny's Beer Barrel Pub



When Denny Liegey, owner of Denny's Beer Barrel Pub, decided to expand his operation, he reasoned that having one energy source for cooking was the “order of the day,” so he called GFEN member, PPL Gas Utilities, for advice and expertise. Lou Stubbs, a PPL Energy Sales Representative, took the call and met with Denny to discuss his future plans.

Prior to the kitchen renovation, Denny's cooking process was all electric. But with the need to purchase additional equipment, it just made sense to go all gas due to the superior performance and economics that only gas appliances can provide. And the energy saved will amount to a nice tidy sum over the life cycle of the equipment.

Denny's original kitchen used only four pieces of equipment, but now through this renovation project, it has expanded to a full-line with fourteen appliances that feature natural gas technology. Let's take a look at what Denny's will save by switching to natural gas.

## Electric Demand Reduced

By eliminating two 22 kW electric fryers from the cooking battery, Denny's is expected to save nearly \$200/month in electric demand charges alone (44 kW x the current PEC demand rate of \$4.38 kW = \$192.72). Couple that with additional electric savings of around \$3500 annually (44 kW x current PEC electric rate of \$0.11/kWh = \$4.84/hour x 2 hrs./day = \$9.68/day x 360 days = \$3,484.80) and the savings quickly becomes enough to pay for a couple of the new natural gas fryers.

The cost of running 2 gas fryers is roughly \$2,071 annually (two fryers at 110,000 BTUs/hr. each = 2.2 therms/hr. x 2 hrs./day = 4.4 therms/day x 360 days = 1584 therms/year x current PPL Gas rate of \$1.308/therm = \$2071.87.)

Still gas saves about \$3,800 — and that's only for the fryers! With the switch to natural gas for cooking, Denny's will reduce their electric demand charges and have a dependable energy source to run their kitchen more efficiently.



## Operating Diversity of Appliances

Figure 1

Appliance	Average Diversity	Maximum Diversity
Range	70.0%	93.2%
Convection Oven	69.5%	98.6%
Fryer	63.2%	88.0%

needs to know how much the total demand is increased by having an electric kitchen. And, this can really only be answered by studying each individual operation to determine how much of the kitchen load occurs at the time of peak load for the rest of the facility.

The Kitchen Demand Chart (Figure 2) shows data taken from a number of different foodservice establishments. The first column shows the total connected load of the kitchen appliances. The second column shows the maximum billing demand, which includes not only the demand for the kitchen appliances, but also that for lighting and incidental uses. The third and fourth columns show the relationship between the maximum billing demand and the total connected load of the kitchen appliances.

### Convert to Gas and Save

Removing the most limited use pieces of electric cooking equipment first and replacing them with gas will go a long way towards reducing electric demand and lowering your overall energy bills. In addition, the rapid start-up and recovery of gas equipment may improve hedonics and contribute to a more efficient operation by reducing the labor associated with longer cook times. Remember, even in these days of volatile pricing, gas gives you more for less!

To learn more about natural gas cooking technologies that will help reduce your cooking costs, log onto the Gas Foodservice Equipment Network at [www.gfen.info](http://www.gfen.info).



## Kitchen Demand in Terms of Connected Appliance Load

Figure 2

Business	Connected Load of Kitchen Appliances, kW	Maximum Billing Demand	Billing Demand % Kitchen Connected Load	Average % Demand to Connected Load
Institution A	140.8	36	26.0	(
Institution B	223.6	113	50.5	(442
Institution C	214.0	120	36.0	(
QSR – A	50.4	34.6	68.6	(
QSR – B	40.8	32	80.0	(
QSR – C	92.0	45	49.0	(66.7
QSR – D	53.7	36	66.7	(
QSR – E	80.87	56	69.1	(
Rest – A	141.95	90.5	64.1	(
Rest – B	70.0	74	105.7	(
Rest – C	93.0	65	70.0	(77.2
Rest – D	111.0	76	69.1	(
School – A	76.45	44.7	59.2	(
School – B	175.2	139.4	79.4	(73.3
School – C	302.5	245.7	81.2	(
Cafeteria	183.2	158	86.3	86.3
<b>Overall Average 67.6%</b>				