



Reducing Energy Costs Through Demand Management and Reduction

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How are you billed?



- ✔ Energy charges - measured in kilowatt hours
- ✔ Watt - A measurement of the amount of energy used
- ✔ Kw – Kilowatt = 1000 watts of energy
- ✔ Kwh – Kilowatt hour = 1000 watts of energy for 1 hour
 - Example
 - 10 100 watt light bulbs = 1000w or 1Kw demand
 - Running for 1 hour = 1 Kwh





What is “Demand”?




- ✔ Sometimes referred to as “peak demand”
- ✔ The highest 15 or 30 minute average usage of electricity for your facility
- ✔ Caused by all/most of the electric loads running at the same time



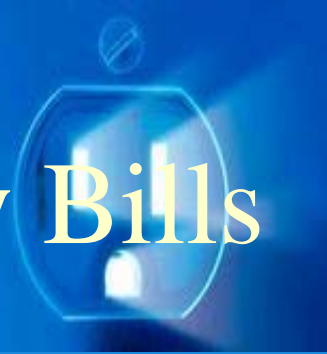
Why Utilities Charge for Demand



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- ✔ Utilities must build enough infrastructure to support everyone's peak demand
 - ✔ Regulatory agencies require utilities to supply excess generation capacity and transmission capacity over and above their customers needs
 - ✔ Utilities must recoup costs for unused capacity



Decoding Electric Utility Bills



✔ How utilities charge

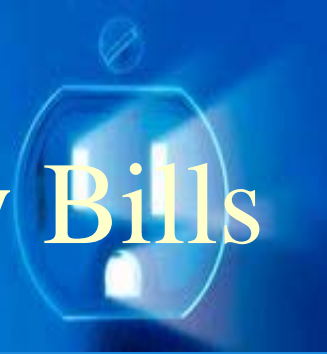
- Energy charges (kWh)- overall electrical usage
- Demand charges (kW) – also known as Peak Demand charges
- Surcharges, often times to cover higher fuel costs at the utility generator
- Taxes

✔ No uniformity amongst utilities





Decoding Electric Utility Bills



▼ Types of rates:

- General Service
- Time Of Use (TOU)
- Ratchets





General Service Rates




- ✔ The default rate offered by the electric utility
- ✔ Measures demand 24/7
- ✔ Bills you based on your highest demand (kW)
- ✔ Monthly bill includes energy you consumed (kWh), demand (kW), surcharges and taxes





Time Of Use (TOU) Rates



- 
- ✔ The utility charges you for demand only during certain hours (on-peak time)
 - ✔ On-peak times - times of higher cost or capacity constraints for the utility
 - ✔ Off peak demand is ignored or levied at a lower rate
 - ✔ Monthly bill includes energy you consumed (kWh), demand (kW), surcharges and taxes



Ratchet Rates




- Utility measures demand during a certain on-peak period and bills you based on that all year
- Example, 90% Ratchet:
 - 90 kW peak reached in July, you are billed 81 kW (90%) for the next 11 months
- Monthly bill includes energy you consumed (kWh), demand (kW), surcharges and taxes
 - Very onerous rate





Where are rates going?

- 
- ✔ Higher!!!
 - ✔ Energy input costs are skyrocketing
 - Gas is up 150% since 2002, coal up dramatically
 - ✔ Demand charges are increasing due to major capital expenditures
 - ✔ Making up for lost time - No major improvements to the grid system in over 40 years
 - ✔ Reliant up 24%, LIPA up over 25%
 - ✔ Every utility is raising prices



Electrical Grid Improvements



- ✓ Northeast Blackout spurs major investment across the US
- ✓ MN Power, Xcel, Otter Tail and Great River Energy announce 5 year, \$1 billion system wide upgrade
- ✓ Annual rate increases next 5 years
- ✓ 9% increase in 2008
- ✓ An example of things to come?



Other Programs by Utilities



- Long Island Power Authority
 - Promoting demand management systems
 - Goal: 800 small commercial installs in 3 years
- Southern California Edison
 - 2nd year of a pilot program for small commercial customers is completed
 - Awarded Converge a 50 megawatt demand response program
 - Substantial savings for participants





What Should You Do Now?



- ✔ Make sure new/existing stores are on one meter
- ✔ Retrofit lighting
- ✔ Conserve wherever possible
- ✔ Automate lighting
- ✔ Be wary of setback thermostats - these lead to higher demand charges
- ✔ Install a demand management system





What Will A Demand Management System Do for Me?



- ✔ Measure energy usage in the facility
- ✔ Monitor temperatures in your store, coolers and freezers
- ✔ Monitor light level
- ✔ Reduce Demand - Control cycled loads so not all run at the same time
- ✔ Reduce overall Kwh usage - Automate and control lighting and anti sweat door heaters





Controllable Electric Loads



- ▼ Coolers/Freezers
- ▼ Air conditioning
- ▼ Electric water heaters
- ▼ Electric heat (supplemental or primary)
- ▼ Concrete slab heat
- ▼ Anti sweat door heaters
- ▼ Lighting



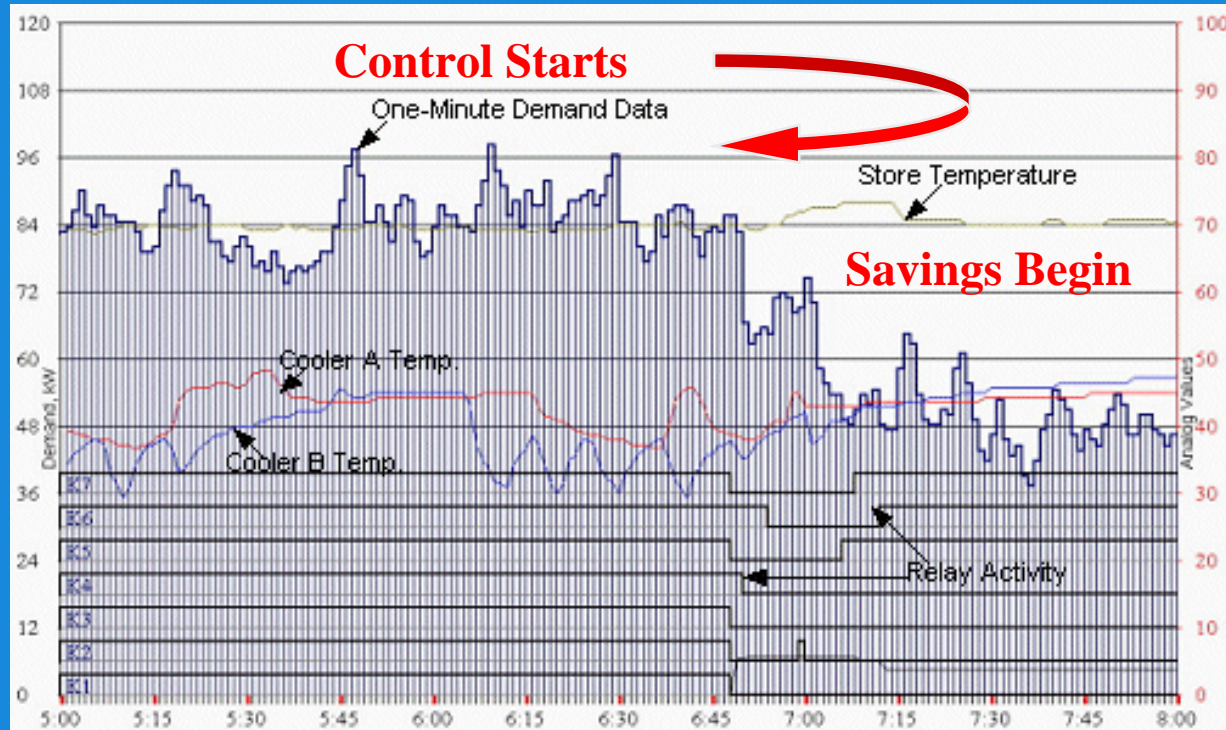


Results



✓ Lower electric costs without sacrificing comfort levels and overall efficiencies

Actual graph with Reduction of 15 kW





Unprecedented Control of Power



The first step to reducing cost is gaining control.

An Energy Management System will do this for you.

Control demand level, power factor, onsite generator set and the peak shaving automatic transfer switch.

Dencor can control up to 24 blocks of load with 5 primary modes of control.

The operation at each relay can be modified by temperature or demand level.

Primary modes of control are:

- Standard Priority
- Rotating Ring
- Variable Duty Cycle
- Duty Cycle
- Fixed Time Control

Relay Operation Selection 1

K1 Waterheaters

Load Control Method

1 Priority Relay Operation Selection 21

Load Control Manual

On K21 Enter description for your load

Load Control Method

1 Priority 2 Rotating 3 Duty Cycle 4 Variable

Load Control Options

Manual Override Latch Critical Interval Override Latch Normal Shed Only During On-Peak SP

On Off Normal On Off Normal

Normally Energized Priority Shed Ovrds Timed On Interval Invest, Always on, Timers Turn Off

Priority Shed Ovrds Analog On Signal Analog Control Ovrds Timed Control

Function	400	Disk	Function	400	Disk	Function	400	Disk
Aux Priority Level	[0]	[0]	Sun On End Time 2	[25:5]	[25:5]	Thu On Start Time 1	[25:5]	[25:5]
Main Priority Level	[19]	[19]	Mon On Start Time 1	[25:5]	[25:5]	Thu On End Time 1	[25:5]	[25:5]
Minimum On-Time	[0:0]	[0:0]	Mon On End Time 1	[25:5]	[25:5]	Thu On Start Time 2	[25:5]	[25:5]
Minimum Off-Time	[0:0]	[0:0]	Mon On Start Time 2	[25:5]	[25:5]	Thu On End Time 2	[25:5]	[25:5]
Analog Sensor Input	[0]	[0]	Mon On End Time 2	[25:5]	[25:5]	Fri On Start Time 1	[25:5]	[25:5]
Deadband	[2]	[2]	Tue On Start Time 1	[25:5]	[25:5]	Fri On End Time 1	[25:5]	[25:5]
On When Above	[0]	[0]	Tue On End Time 1	[25:5]	[25:5]	Wed On Start Time 1	[25:5]	[25:5]
On When Below	[0]	[0]	Tue On Start Time 2	[25:5]	[25:5]	Wed On End Time 1	[25:5]	[25:5]
Off When Above	[0]	[0]	Wed On End Time 2	[25:5]	[25:5]	Wed On Start Time 2	[25:5]	[25:5]
Off When Below	[0]	[0]	Wed On Start Time 1	[25:5]	[25:5]	Wed On End Time 2	[25:5]	[25:5]
Sun On Start Time 1	[25:5]	[25:5]	Wed On Start Time 2	[25:5]	[25:5]			
Sun On End Time 1	[25:5]	[25:5]						
Sun On Start Time 2	[25:5]	[25:5]						

This window shows the choices with the Timed Control Method. Timed Load Control permits separate schedules for each day.

Report



Detailed Reporting

- ✓ Capture and document your savings
- ✓ Generate detailed reports
- ✓ The ability to see minute by minute energy use and temperature data
- ✓ Daily Interactivity isn't required

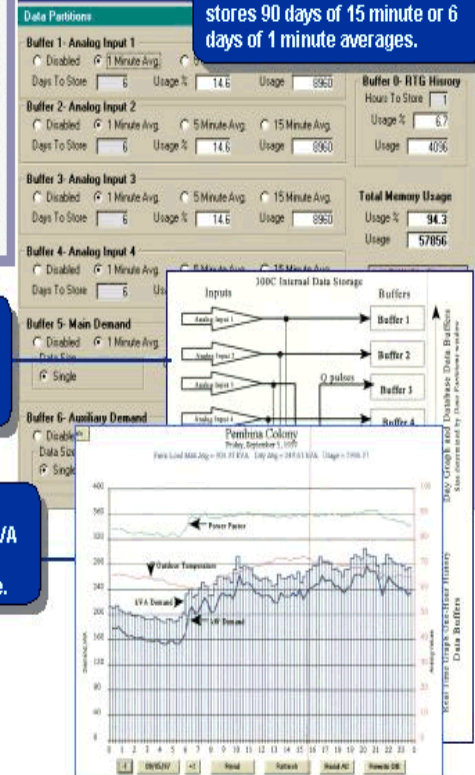
Storing Data
Dencor uses six buffers to store data for later downloading into a PC.

Extensive graphic output makes it easy to implement and track control systems.

For 6 channels the system stores 90 days of 15 minute or 6 days of 1 minute averages.

Example of possible buffer assignments when using the Q pulse input and generator control.

Example of a Day Graph showing Power Factor, kVA demand and kW demand plus outdoor temperature.





Easy to use



- Intelligent and Powerful Software
- Interfaces with any PC running Windows
- Remote monitoring capability

The Dencor System is programmed and monitored by any standard PC with Windows.

The System is completely menu-driven



The drop-down Set-up menu has 17 screens to define:

- Power inputs
- Control levels
- Monitoring frequency
- Power shed priorities
- Graph and report outputs
- and more.

Load control may be **hard-wired** or use a **Frequency Line Carrier (FLC)** system. This uses **existing wiring** without affecting equipment and can control loads up to **3000 meters** from the main transmitter.





Conclusion



- ✔ Costs can be reduced significantly
 - 10% - 20% depending on steps taken
- ✔ Functions can be automated reducing work for your staff
- ✔ Gain control - know what's going on in your store

