



The measurement of base building and tenant-specific equipment electricity consumption, through sub-meter applications, is increasing in importance within the commercial real estate industry. With a continued emphasis in energy initiatives, such as Leadership in Energy & Environmental Design - LEED, *“how much and when we use energy”* is becoming even more important to the real estate manager-operator.

With electricity representing the most widely used building energy source, and often the greatest building operating expense, advancements in metering technology play a significant role in how we effectively manage the consumption of electricity in an environmentally prudent and cost effective manner. A significant technological advancement, in web-based electrical metering development, is the ability to measure and monitor electricity on a real-time basis.

“Computerized metering systems, coupled with internet-based platforms, provide property owners and operators with instantaneous electricity demand consumption information at their office or mobile device”.

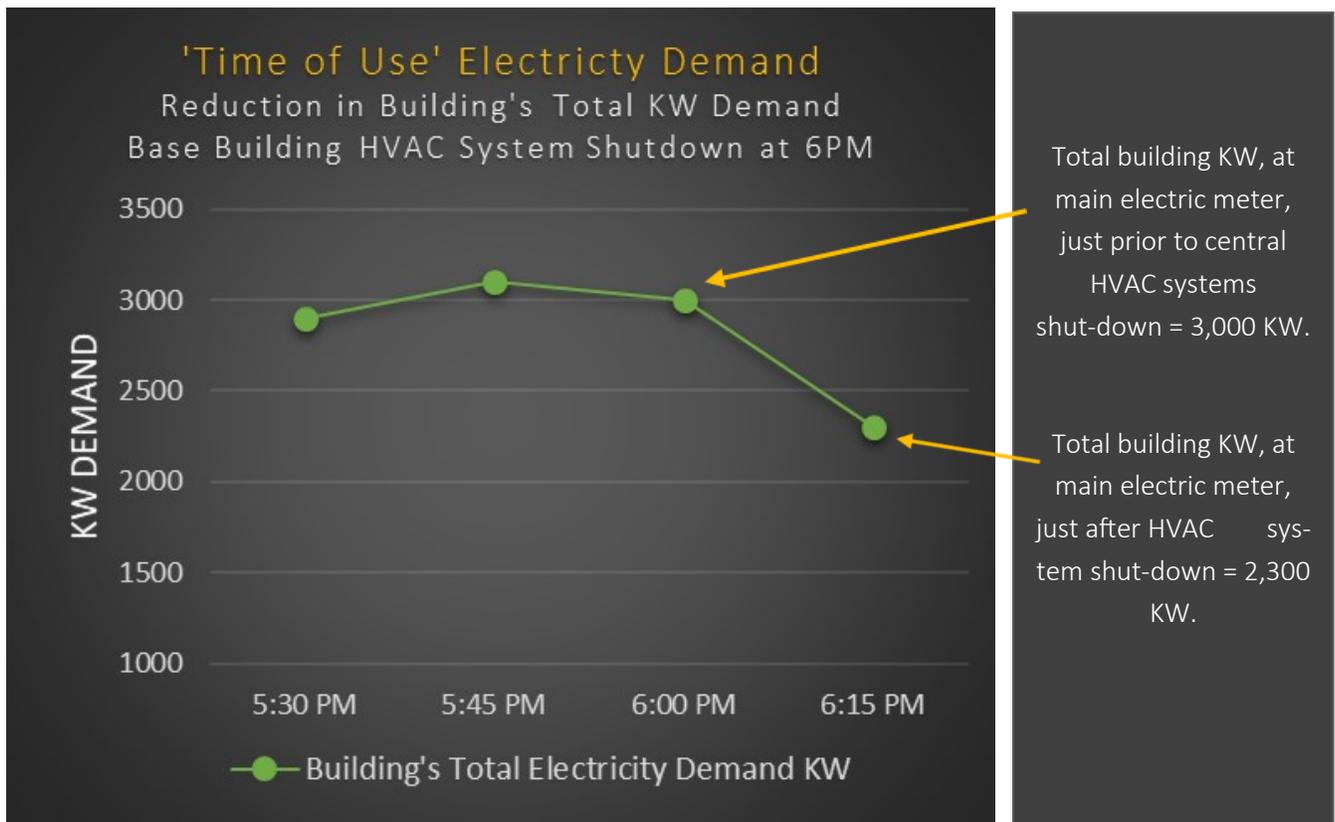
Because electricity can't be stored on the national electric grid, the actual costs associated with its generation, transmission, and delivery is very much dependent on when the electricity is consumed. In **periods of high demand**, generally weekday business hours, particularly during times of extreme warm or cold outside air temperatures, electricity generated by primary power plants' reserve capacity, and alternative power plants' additional capacity, is significantly **more costly than in periods of average and lower demand**. Building owners and managers, with opportunities to consume or shift consumption to lower demand periods, should take advantage of metering technology in order to measure and pay for building electricity consumption at relatively lower off-peak rates.

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Electricity Metering & Sub-Metering Concepts and Applications

The continuous metering and measurement of electricity consumption is referred to as **Time of Use 'TOU' metering**. While the costs associated with implementing time of use metering should be evaluated against potential cost savings, associated with relatively lower off-peak electricity rates (ROI/payback analysis), investment in this technology is often worthwhile when implemented at the building's primary main electric meter. Time of use metering provides many other advantages in addition to the benefits associated with off-peak consumption and pricing.

At a typical property, the HVAC system's electricity cost represents a significant portion of building operating expenses. Determining a building's HVAC equipment KW design rating (convert equipment horsepower to KW), then multiplying the utility electricity rate in \$ / KWH, is one method of estimating the HVAC system's electricity consumption and cost. Alternatively, for properties monitoring electricity demand at the main electric meter, the graphic below illustrates how the building operator can estimate the building's HVAC system electricity demand (in KW) on a macro analysis basis.

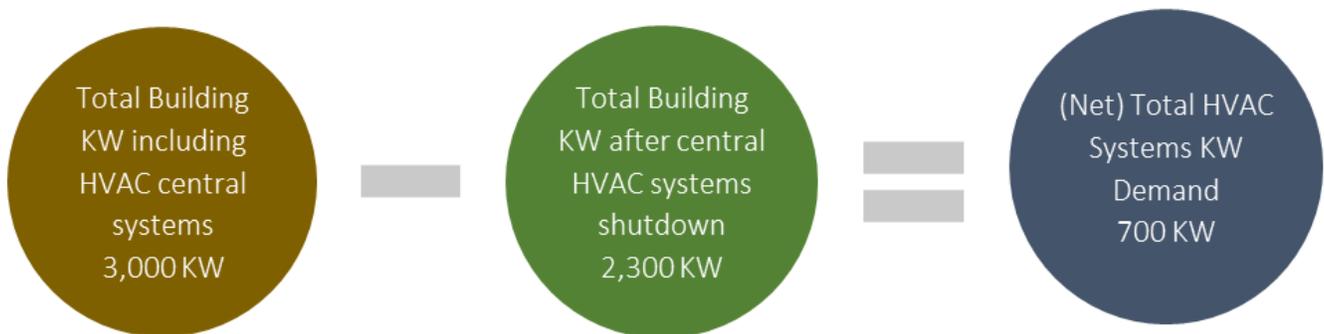


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HVAC SYSTEM - ELECTRICITY KW DEMAND (see chart on preceding page)

KW Demand - Entire building electricity including base building HVAC systems @ 6PM Common area & tenant lighting, tenant outlets, elevators + HVAC.	3,000 KW
KW Demand - Entire building electricity not including HVAC systems after 6PM Common area & tenant lighting, tenant outlets, elevators (and no HVAC)	2,300 KW
Difference = Total Building HVAC Systems Electricity Demand	700 KW



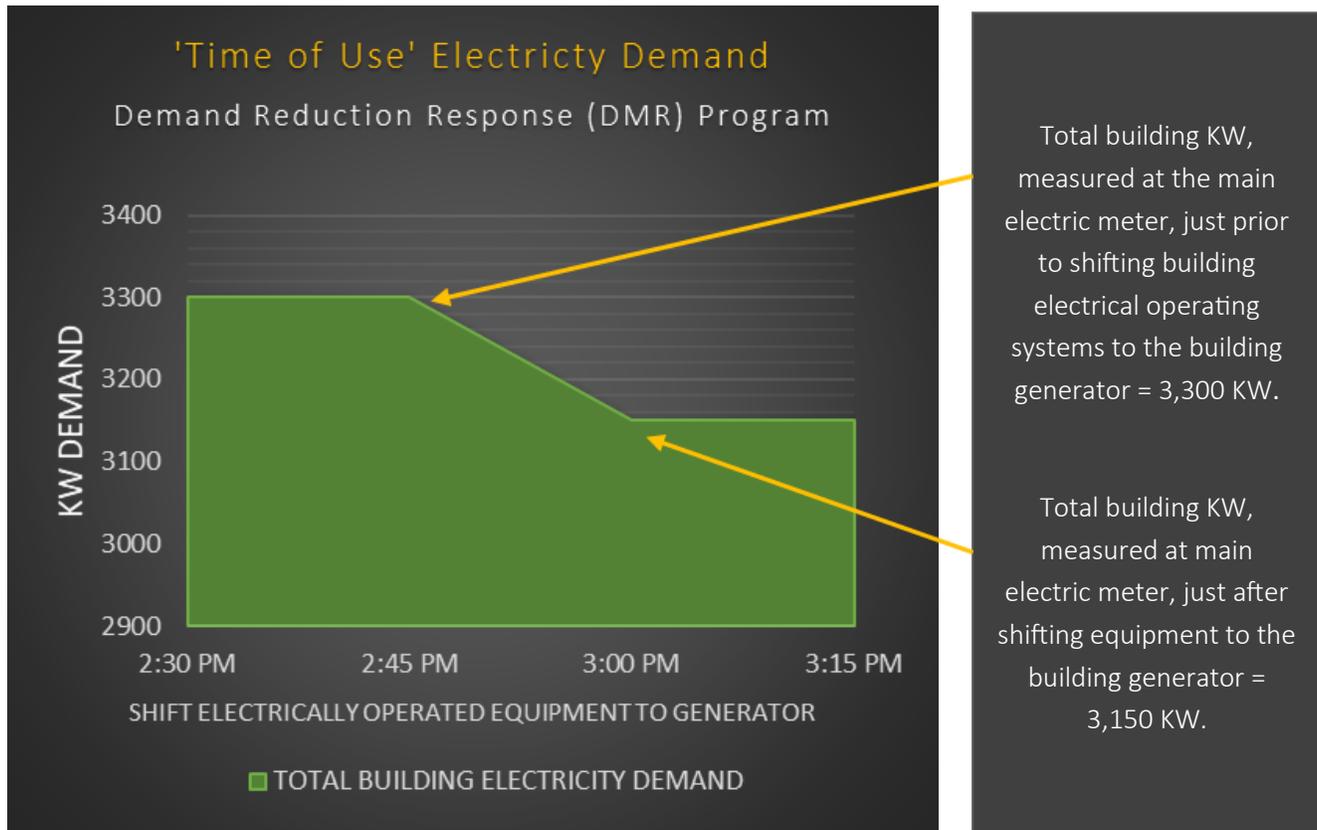
The real estate manager | operator can now calculate the estimated hourly cost of the base building HVAC System = KW Demand X Electricity Rate.

At an electricity rate of \$.10 per KWH the cost is 700 KW x \$.10/KWH = \$70/hour.

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The chart below depicts how time of use metering can benefit building owners participating in an electricity **Demand Response** (DR) program. The electric meter measures instantaneous electricity use, *Demand*, enabling the building owner | operator to calculate the reduction in electricity, following a *source shift* of electrically operated building systems and equipment from the local power grid to the building's stand-by generator. This reduction in electricity demand would result in the utility provider's incentive payments, to the building owner, based on the reduction in KW.



ELECTRICITY DEMAND RESPONSE REDUCTION PROGRAM (see chart above)

Building KW demand prior to shifting electrical load to the building standby generator	3,300 KW
Building KW demand after shifting electrical load to the building standby generator	3,150 KW
Difference = KW load shifted to the generator (KW demand reduction)	150 KW