



# Power Efficiency: Finding Deep Savings Beyond kWh

STREAMLINING OPERATIONS: EFFECTIVE MANAGEMENT OF ENERGY DEMAND CHARGES

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#### WHY POWER EFFICIENCY MATTERS

Rising electric bills are a financial burden on businesses nationwide. Despite the decrease in electric rates in many areas, the increase in demand rates has offset these savings. This report delves into the financial advantages of 'Power' Efficiency, a superior energy management strategy that substantially reduces demand charges and significantly lowers electric bills.

The power bill of Commercial and Industrial (C&I) customers is primarily composed of two costs: consumption charges measured in kilowatt-hours (kWh) and demand charges measured in kilowatts (kW). By understanding these costs and the factors that influence them, you can significantly reduce your energy-associated operating expenses.

Even though efficiency measures can effectively reduce consumption (kWh), the rising cost of demand rates (kW) often diminishes the savings that proponents anticipate. **Consumption charges** are based on the facility's total electricity during a single billing period (typically a month). **Demand charges** measure the rate at which a facility uses energy. Normally, demand represents the

# Two Primary Electric Bill Costs



greatest amount of energy used in a 15-minute interval during a billing cycle. This charge is based on the premise that commercial customers and other large users of electricity who require even brief peaks of power from the grid should pay a share of the infrastructure and maintenance costs associated with the capacity to provide that power when needed. Utility regulators increasingly allow utilities to impose demand charges on large electricity users. Whether to motivate behavior or pay for infrastructure maintenance, the high demand rates are very real.

For the past decade, businesses have implemented energy efficiency measures to save money by reducing energy consumption, changing out lights, insulating buildings, and installing renewables like solar. This energy measure is expected to continue gaining momentum. (IEA, 2013) As businesses strive to control operating expenses through overall lowered electric consumption.

# Demand Charge Impact The "Power" of Power Efficiency

Customer "Load" 100 kW load for 100 hours:

Energy Usage "Profile" Consumption = 100 kW x 100 hours = 10,000 kWh Demand = 100 kW

Monthly Bill Consumption = 10,000 kWh x \$0.15 = \$1,500 Demand = 100 kW x \$25.00 = \$2,500

Total Monthly Bill = \$4,000

Customer "Consumption"

10 kW load for 1000 hours:

Energy Usage "Profile" Consumption = 10 kW x 1000 hours = 10,000 kWh Demand = 10 kW

Monthly Bill Consumption = 10,000 kWh x \$0.15 = \$1,500 Demand = 10 kW x \$25.00 = \$250

Total Monthly Bill = \$1,750

Both customers consumed the same amount of energy during the billing cycle, but their energy usage profile was very different.



Unfortunately, even the most successful energy efficiency measures do not necessarily result in lower monthly electric bills. This is because energy efficiency – a reduction in kWh - doesn't address demand. Although energy efficiency measures save money on base-load energy usage and are often viewed as positively impacting sustainability initiatives, they do not impact the spikes in energy use that trigger demand charges to begin with.

Does Energy Efficiency Equal Lower Power Bills Probably NOT

Demand charges for commercial and industrial operations can account for 30% to 70% of monthly electricity bills. (USDA, 2014).

Similarly, companies have implemented renewable generation—solar and wind—to reduce their base load requirement from the grid. However, these systems alone cannot reliably eliminate peak loads due to their intermittent nature.

An advanced power solution that combines solar and wind with integrated battery storage and intelligent power controls mitigates intermittent. This solution also equalizes consumption by significantly reducing the number of peak power events. With this turnkey solution, businesses can save money on their monthly electric bills by reducing their power use frequency and timing profile.



## POWER EFFICIENCY: THE NEW SAVINGS FRONTIER

## Look out Energy Efficiency—here comes Power Efficiency.

Organizations have done a tremendous job driving energy efficiency in buildings and reducing energy consumption when possible. Economists estimate that adopting more efficient products and services is responsible for 60 – 75% of the increase in energy productivity since 1970 (Natalie Mims, 2009). This future looks even better, with energy use per capita projected to decrease from 2012 to 2040 (EIA, 2014).



Why do commercial businesses continue to see the cost of their power bills increase with all these energy efficiency measures in place?



The answer lies with demand charges. While overall energy rates are falling (even in traditionally expensive markets such as California) due to natural gas, domestic production, and deregulated competition, demand charges are rising. Utilities nationwide are raising demand charges to recover the costs of maintaining their aging

grid infrastructures. For example, PG&E's demand charge rates are up 30 percent in the past three years, and they've gone up by 75 percent compared to 10 years ago, even though overall energy charges (kWh) have fallen by 11 percent in the past three years and have dropped 20 percent over the past ten years. (Reducing Demand Charges, 2014).

Although energy efficiency efforts will continue to be a driving force, they will not deliver the power bill savings that C&I, Healthcare, Government, Higher Education, and Municipal customers strive to achieve.

## **BUSINESSES NEED PRAGMATIC SOLUTIONS TO REGAIN CONTROL**

Over the past decade in California, while the cents per kWh have dropped by 4% a year, the dollars per kW have risen by 7% year over year. (Edison, 2014). Energy (kWh) is no longer the cost driver for commercial and industrial electric ratepayers; power (kW) is where the pain lies. Many ratepayers pay 50% a month on power demand in California and other markets. Yet, they have a limited ability to manage

these charges. They can buy energy on the open market at competitive rates, but the local utility still monopolizes power distribution. As most rate designs only assess demand charges for commercial and industrial (C&I) ratepayers and not for residential customers, the cost burden for infrastructure 0&M increasingly is shouldered by businesses. To level the playing field, commercial and industrial



customers need a new class of solutions that addresses today's reality of "power" inefficiency.



## **POWERING YOUR WAY TO SUCCESS**

Imagine demand response without the hassles of manual interventions and a solution with higher savings than solar alone. A FirmPower<sup>®</sup> Microgrid solution reduces demand charges by counterbalancing the peaks and valleys of a building's variable energy use by discharging from and charging its batteries at critical moments. This flattens the spikes in power usage, significantly reducing demand charges and creating a pathway to electricity cost savings without negatively impacting operational performance or changing building occupant behavior.

Power efficiency requires renewables like solar, sophisticated software, predictive algorithms, and distributed energy storage. Still, if implemented well, advanced power solutions create a nodal, distributed grid infrastructure far more flexible and responsive than today's grid.

With new technology, utility and weather data can predict demand, mitigate solar intermittency, and store energy locally. In doing so, we can significantly reduce stress on the electric grid and the amount of peak energy consumed. By using power more efficiently, we can extend the useful life of existing grid infrastructure, reduce transmission and distribution system upgrades, and create a more flexible grid infrastructure -- making the grid more secure, resilient, and responsive. Most importantly, **Power Efficiency solutions monetize savings for commercial and industrial businesses** in ways that Smart Grid implementation efforts have not yet achieved. This ROI-driven approach optimizes systems to balance the technical, operational, and financial performance of the systems and facilities.

## LET'S APPLY FIRMPOWER® SOLUTIONS TO POWER EFFICIENCY PROBLEMS

Our electric grid is the most significant engineering accomplishment of the 20th century, but the cost to upgrade and maintain the grid is rising exponentially as it ages. Generating power at the point of consumption, rather than centrally, eliminates the cost, complexity, interdependencies, and inefficiencies associated with transmission and distribution. Distributed generation shifts control to the consumer, similar to distributed computing (i.e., the PC) and distributed telephony (i.e., the mobile phone).

All across America, businesses and organizations are beginning to implement advanced power solutions that combine solar energy with intelligent energy storage to deliver a wide array of power efficiency services, cut costs, and relieve strain on the grid. If these technologies were implemented across the United States, some estimate we could save the energy equivalent of 4,000 coal plants annually. If we can utilize power more efficiently, everyone wins in the entire value chain.

ESP enables this capability through turnkey low-voltage FirmPower<sup>®</sup> Microgrid Solutions designed to optimize operational performance, reduce operating expenses, create new revenue streams, and improve safety.