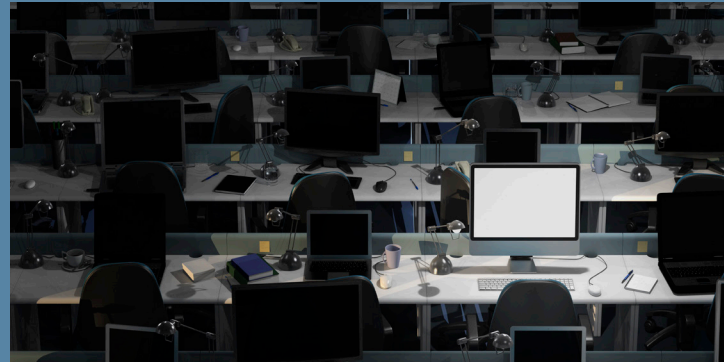


Controlling Plug Loads in Commercial Buildings >

Commercial buildings cost around \$2.14 per square foot in energy alone, around a third of the total non-fixed operating expenses. Of this plug loads account for up to 50%, but they are often ignored in energy efficiency drives.



Plug loads in commercial buildings

“Plug load” refers to energy used by any equipment that is plugged into an outlet. This ranges from office electronics and meeting room AV to data centers, kitchen appliances and even elevators.

Depending on the efficiency of the rest of the building, plug loads can account for 25-50% of the total energy consumption. Up to 30% of this can be attributed to “parasitic” or “vampire” loads – power drawn by equipment that is not performing useful work and may even be switched “off” . While some equipment needs to have access to power 24/7, such as fridge/freezers and air conditioning, PCs, printers and microwaves are some of the worst offenders for drawing unnecessary power.

Energy efficiency legislation

This wastage is not just bad for the bottom line, it can have a significant impact on the environment. In the US, approximately 5% of primary energy consumption is accounted for by plug loads in commercial buildings. The office plug loads of California alone consume more than 3,000 gigawatt hours annually, costing business owners more than \$400 million each year. This is the equivalent to the carbon dioxide emissions of 140,000 cars (700,000 metric tons) per year.

Jurisdictions and organizations around the world have responded by introducing targets relating to energy use and/or carbon neutrality in commercial real estate. Commercial buildings can be assessed and certified by a number of national or international schemes such as BREEAM, LEED and Green Star.

Plug monitoring technology

Plug power draw is not straightforward to manage as the use of plugs is not typically managed by a single department. For example, the teams that manage office equipment and vending machines rarely oversee data centers or air conditioning. Power outlets are not naturally networked and can be physically difficult to access. This makes developing and implementing any sort of strategy difficult.

As a basic solution, plug monitoring devices exist that enable power draw to be tracked over time and the power to be switched on and off at scheduled times or even remotely. These devices sit between outlet and equipment plug and communicate wirelessly with a dedicated control system. However more advanced functionality can be obtained by integrating plug monitoring technology into a smart building solution.

Integrating plug load control into a smart building solution

Connecting plug load management into a central smart building management system eliminates the need for a second system to maintain and monitor. It enables facilities managers to easily take ownership of plug loads as part of equipment management or energy efficiency mandates.

Smart buildings use information from a range of sensors to control a range of systems such as HVAC and lighting. That same data can also be used to inform decisions about plug power, for example based on whether or not a room is occupied at any given time. This can be used for everything from meeting room AV systems to break room microwaves. Room usage patterns generated from smart building data can be used to inform plug scheduling across a building, on a room-to-room or even device-to-device basis, ensuring that energy savings are optimized.

Connecting plug load sensors to a PoE system

PoE smart building systems such as the Molex CoreSync solution offer a range of options for building owners and managers to dynamically manage their assets and energy usage. Running data and power over the same cable, Power over Ethernet (PoE) eliminates the need for additional wiring installs, saving on costs and redundant cabling, and making changes and upgrades easy. Moreover, a low voltage IP based network backbone is ideal to power, control and manage multiple



CoreSync Wireless PoE Gateway. Wireless gateways enable the system to connect to self-powered devices, including switches (above right) and sensors (below right).



applications, such as connected lighting, automated shading, IP cameras and access control, all over the same infrastructure.

However, unlike other PoE systems, CoreSync is not limited to wired connections. Wireless gateways enable the system to connect to self-powered devices such as plug load relays, meters, sensors and keypads. EnOcean energy harvesting technology enables the plug receptacles to power back up when mains power is switched off.

The ability to port EnOcean wireless devices into IP ethernet based CoreSync system offers unique advantages when it comes to plug loads and line voltage loads.

Multiple CoreSync EnOcean-based wireless relays can be paired to CoreSync PoE gateways during the commissioning phase. Through the CoreSync software they are then zoned or grouped together with other wired and/or wireless devices such as occupancy sensors and wall switches.

This approach offers considerable cost savings because the plug load control shares sensors and controls used, for instance, in smart lighting and shading control. Additionally, design, installation, commissioning and maintenance will be drastically simplified and ultimately all these systems can be seamlessly managed from a Single-Pane-of-Glass CoreSync smart building dashboard. Facility managers can implement effective plug load energy saving strategies based on time schedules, granular occupancy-based data and finally take ownership of the “plug loads orphans” with drastic savings in time and effort.

An integrated approach to energy savings

Energy consumption is a major cost in commercial real estate management. Plug loads represent a significant portion of this, with up to 30% of plug draw being “parasitic” energy that serves no business purpose.

In energy efficiency drives plug load monitoring has often been overlooked as power outlets tend to fall between departments. Controlling plug use on an individual basis is difficult to manage as there can easily be hundreds of outlets across a building, and they may not be easily accessible.

CoreSync offers an integrated solution for managing a range of building functions, including energy usage. CoreSync can utilize a range of types of data, but occupancy and room scheduling information in particular can be used to manage plug power usage in order to optimize energy use, reducing costs and resulting in more sustainable, more compliant commercial buildings.



A version of this application note was also published in the EnOcean magazine Perpetuum in April 2022. You can download the magazine here: [Perpetuum 2022 1.](#)

MORE INFORMATION

Molex CoreSync

www.molexces.com/coresync/

Molex PoE Solutions

www.molexces.com/solutions-overview/poe/

CoreSync Applications: Energy Efficiency

www.molexces.com/coresync/applications/energy-efficiency/

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