



# Menlo Business Park

## Case Study



Property Manager reduces electricity bill by 30% with lighting, HVAC, and Demand Response savings.

### High-tech office park controls energy demand with Enlighted hardware and software retrofit.

Menlo Business Park is building its reputation as one of the top office parks on the San Francisco Peninsula for young scientific companies. This centrally located campus offers office, lab, and warehouse space to small- and medium-sized pharmaceutical companies and biotech firms.

To keep the space attractive and affordable, Tarlton Properties, the owner/property management firm, is open to short-term leases and tightly manages operating expenses. Vice President Dave Tarlton explains, “We can make a huge contribution to innovation and economic growth by simply providing quality space to our tenants that is free of unnecessary cost and hassle. It takes a phenomenal amount of energy just to keep the lights on and the temperatures right for scientific work. So utility consumption management is a priority.”

Tarlton recently led an integrated lighting and HVAC energy upgrade across about half of its one million square feet, involving the retrofit of some 5,000

fluorescent fixtures with new lamps, dimming ballasts, and an Enlighted control platform, as well as the installation of 250 new programmable thermostat controls. Sensors are installed at each fixture, each with the capacity to read ambient light, measure temperature, and recognize occupancy. For this deployment, each of these sensors is mapped to a zone controlled by a given thermostat. In this way, micro-zonal temperature and occupancy information enriches the HVAC data set. This level of granularity not only equips the campus to save energy costs, it also provides Tarlton with more data on occupancy patterns that it can leverage for better facilities management day to day, as well as during Demand Response events.

### Lighting usage under scrutiny

Installation of the Enlighted network required no design phase. The sensor-per-fixture strategy eliminates any need to determine lighting zones. The sensors were

connected and mounted at the same time as the new dimming ballasts, a 15 to 20 minute-per-fixture job for the electrical contractor. Commissioning was a matter of simply walking through the upgraded space pointing at the sensors with a laser pointer to create a digital identity of each unit. This step took about 30 seconds per fixture.

Appearing as an icon on the Enlighted Floorplan View, this identity was then assigned a profile that captures typical behavior of lights in a given context, e.g., open office, private office, corridor, etc. Each sensor unit includes a microcontroller driven by these pre-programmed templates. A utility-grade power meter chip in the sensor power pack attached to the ballast provides measurement and verification (M&V) of energy savings.

## Per-fixture data informs load-shedding

“Should we get a message from our utility’s grid management office that we need to make an energy reduction for a peak demand event, we can now respond with high precision. From a central dashboard, you can control a light over an individual workstation or a pair of lights in a private office. We can dim down most lights and adjust temperature setpoints, knowing exactly where tenants are occupying space,” Tarlton explains.

This integrated demand-side management (IDSMD) solution also features an Open Automated Demand Response (OpenADR)-capable Building Management System (BMS). Occupancy and temperature data collected by the lighting sensor network is shared with the HVAC control systems via a BACnet interface managed by the BMS. In this way, when the BMS issues a demand response command to the HVAC system, temperature setpoints can be adjusted with awareness of real-time occupancy. In addition, the Enlighted M&V capabilities help to validate the reduction plan and optimize space.

### At a glance

#### Project type

Lab/office campus

#### Location

Northern California

#### Project size

500,000 square feet  
across 12 buildings

#### Network scope

5000 light fixtures, 250 thermostat controls

### Project team

#### Utilities

Pacific Gas and Electric Co.

#### BMS provider

CEPORT

#### HVAC integrator

SiteON

#### Lighting controls

Enlighted

#### DR metering

EnerNOC

#### Auto DR

Global Energy Partners

#### Electrical contractor

Progressive Lighting & Energy Solutions

## More granular sensing means more savings, higher reliability

Fixture-level control maximizes energy savings for more normal, off-peak times as well. With conventional zone controls, sensed occupancy inevitably goes up beyond the actual just because people walk through a zone and trip the lights. The micro thermal data captured by the Enlighted sensor network is helping the facilities team fine-tune HVAC setpoints as well.

“Now we have better knowledge of temperature patterns across a zone,” explains Tarlton. “The thermostat may read 72 degrees at the interior wall, while at the windows it may be as high as 78 degrees.”

The distributed architecture approach has reliability benefits: after commissioning, each sensor contains the profile information required to make local decisions about lighting levels without need for connectivity to the wireless network. Tasks that are not critical to the lighting function, such as reporting, data collection, monitoring and analytics, are sent over the wireless network in five-minute intervals. This implementation reduces wireless chatter to a minimum and thus opportunity for signal interference.

### Projected annual energy savings



## Real-time view into energy

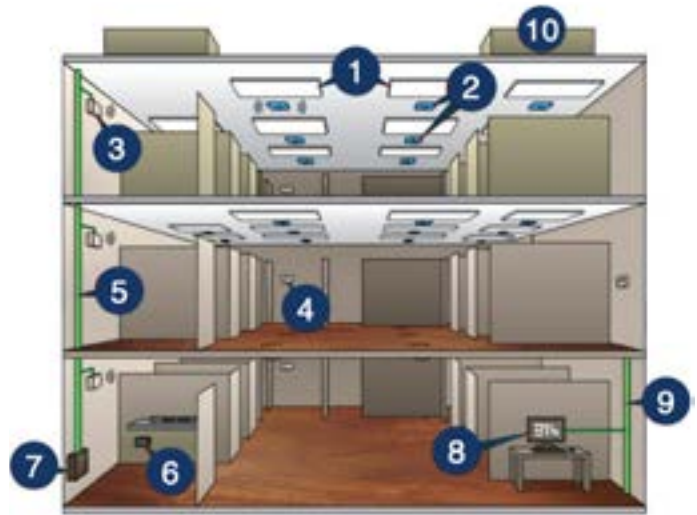
Much of the space in this R&D office complex is dedicated to energy-intensive laboratory facilities and amenities required by scientific companies. The baseline for the building studied here changes from month-to-month as tenants move in and out.



## Menlo Business Park retrofit overview

The retrofit buildings are now practicing Integrated Demand Side Management of both lighting and HVAC. The system is plug-load enabled as well.

- 1** 5,000 fluorescent light fixtures upgraded to T5 lamps with dimming ballasts
- 2** Enlighted Smart Sensors connected to ballast at each fixture for task tuning, occupancy sensing and daylight harvesting
- 3** Enlighted gateway to capture signals from sensor network
- 4** 250 programmable thermostats installed to control HVAC zones
- 5** Ethernet connectivity to transmit micro-zone data from Enlighted sensor network
- 6** Plug-based, power-line HVAC Control Server collects thermostat data sent via RF
- 7** Enlighted Energy Manager aggregates data
- 8** Workstation with standard secure web browser to access Enlighted dashboard
- 9** BacNet connection to Building Management System allows data sharing between Enlighted solution, HVAC and remote Open ADR-enabled BMS
- 10** Rooftop AC units controlled by thermostats



### Project economics

HVAC demand response controls and lighting efficiency upgrades received more than \$500,000 in incentives, in categories including:

- Lighting controls
- HVAC controls
- Demand Response enablement
- Demand Response program participation

Menlo Business Park's approximate annual energy spend prior to the retrofit approached \$1.5M. The project is expected to generate in excess of \$400,000 in energy savings, combining the results of lighting and HVAC upgrades.

By enhancing the comfort and attractiveness of the properties, the retrofit also has potential to keep current tenants in their space longer and make leasing to new tenants easier, impacting the revenue line.



## Floorplan view

The Floorplan View displays an icon for the digital identity of each sensor associated with a light fixture. As part of a simple commissioning phase, each sensor is assigned a profile that captures typical behavior of lights in a given context, e.g., open office, private office, corridor, etc. Each sensor unit includes a microcontroller driven by these preprogrammed templates.

The combined project of HVAC demand response controls and lighting efficiency upgrades received more than \$500,000 in incentives. Menlo Business Park anticipates lighting energy savings between 50 and 70 percent annually through the use of Enlighted's lighting control system. They further anticipate additional savings from the automated demand response and integration of occupancy data with the HVAC systems. Over time, the team responsible for programming the BMS expect to find new ways to leverage the Enlighted information for better decision-support and even more savings.

## Whole building approach

Greater energy savings are possible by taking advantage of data from multiple control systems. The Menlo Business Park strategy involved the following steps:

- Enlighted Energy Manager provided per sensor occupancy and temp data via BACnet to a BMS
- The BMS integration provider mapped sensors to physical HVAC zones
- BMS integration provider wrote light-logic to make decisions using sensor data

## HVAC Optimizations Now Possible

- Turning off or down HVAC when occupancy is reduced or there is none
- Reducing airflow (close or partially shut VAVs) when occupancy is reduced
- Using micro-zone temperature data to fine-tune thermostat setpoints

According to the energy auditor, the business park is realizing about five percent HVAC energy savings through optimized scheduling and another 15 percent by making the per-lighting fixture occupancy and temperature data available to the HVAC controller. The lighting controls reduce heat and produce an additional 10 percent HVAC savings throughout the year.



## Easy reprovisioning

With their short-term leases, Menlo Business Park tenants can frequently move to bigger, smaller, or differently equipped spaces whenever their space needs change. Tarlton is challenged to deliver on this promise of month-to-month flexibility. Easy electronic reprovisioning using the Enlighted Floorplan View is another advantage of the solution. With the sensor-per-fixture approach, there is no need to physically move around sensors to accommodate a change in tenant space.

“A prospective tenant recently visited and, upon seeing our retrofit, recognized our awareness to utility consumption management,” said Tarlton. He turned to his broker and said, “No need to look further. This is the right place for us.”

## Summary

“After an extensive analysis of technologies available, the potential for a fast return on our investment was an incredibly compelling reason to adopt Enlighted’s solution,” said Tarlton. “Through this combined hardware and software platform, we are able to collectively address HVAC, demand response, and lighting optimization and also get the best rebates available. We proved that it is possible to lower energy costs and enhance the work environment for occupants across an entire campus, with an easy-to-install, reasonable-cost solution.”



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