Energy $mart Tips for Convenience Stores

Ring Up Super Savings with Energy Saving Strategies

Convenience stores are a ubiquitous part of the American retail landscape. Whether it's the White Hen Pantry, Bigfoot, or "Kwik-E-Mart" featured in the "Simpsons" we all have experienced the unique combination of the old hometown general store and modern mega-marketing typified by convenience stores.

Convenience stores that sell gasoline have become the largest retail outlet of gasoline in the United States. Yet, paradoxically, because of the relatively small profit margin on gasoline sales (average about 12.4 cents per gallon) in-store sales account for a significant portion of overall convenience store revenue. Typical in-store sales volume is approximately $400 per square foot of floor space per year.

Convenience stores with service stations generate revenue from motor fuel sales and in-store sales. In-store sales account for between 40 and 45 percent of store revenue, but account for a larger proportion of profit because margins are greater on in-store sales than on motor fuel sales.

In addition to gasoline sales, some convenience stores may be co-located with fast food chains such as McDonalds, Subway, and Burger King, and others are part of travel plazas that include vehicle washing, truck servicing and parking, shower facilities, game rooms, and full service restaurants.

Balanced Use for Bigger Profits

Convenience stores provide such a wide variety of services that their energy consumption profile is actually a composite of several building types; retail, restaurant, supermarket, and vehicle service. The overall energy consumption profile is dependent on the "mix" of these types in a given store. Some stores may lean more to the grocery end of the spectrum with greater refrigeration energy usage. Some stores may have more extensive food service and food preparation and may have greater energy consumption in these areas. However, interior and exterior lighting and refrigeration usually vie for the spot of greatest energy consumer at convenience stores and should be targeted for efficiency improvement.

Consistent with the significant revenue generation per square foot, convenience stores also have the highest per square foot annual energy costs of any business type served by SEDAC to date, ranging from $6 per square foot up to $14 per square foot. This compares with costs of about $2 per square foot for building types such as commercial offices.

Because per-square-foot energy costs are high at convenience stores, efficiency should be an important priority of store management. Read more to learn the basic tools and information needed by store owners and managers to make sound energy efficiency and cost reduction decisions.

If you need assistance in finding qualified contractors or suppliers, the Smart Energy Program team at the Smart Energy Design Assistance Center can help. Our database of pre-qualified service providers includes reputable professionals in a variety of fields, including energy auditors, financing providers, and dealers/installers of geothermal heat pumps / high efficiency HVAC, efficient lighting, solar, and more.

SEDAC.ORG

Illinois' Energy Efficiency Information Clearinghouse

Keep Your Cool

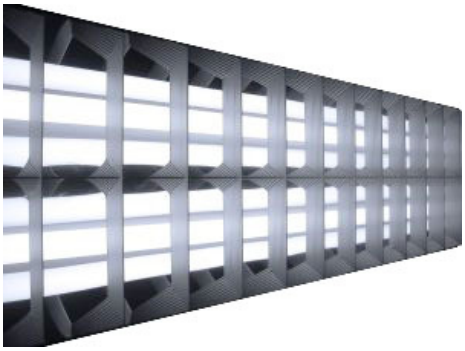
Typically the walk-in coolers, open shelf, and closed door display cases in convenience stores are served by exterior pad or roof mounted condensing units. Open tub display cases, cold drink vending machines, and ice machines are usually standalone units which reject heat to the store interior.

Energy conservation measures include selecting walk in coolers with adequate insulation, use of anti-sweat heater controllers on display case doors, using energy efficient display cases, using floating head pressure controllers on condensing units, and selecting modern scroll compressor condensers.

Take a Bite Out

Facilities with in-store restaurants or food vending can benefit from a variety of energy efficient equipment options. ENERGY STAR kitchen equipment should be specified when available. Vent hoods used in food preparation should be chosen to allow air flow to be adjusted depending on cooking load. Ice makers should be chosen to be energy efficient. A list of energy efficient ice maker products is available at: www.energystar.gov/ia/products/prod_lists/ice_machines_prod_list.pdf

Additional information on kitchen equipment can be found in SEDAC's "Energy $mart Tips for Restaurants".



Light the Path to Increased Profits

Indoor Illumination

Overall lighting power density (LPD) should not exceed 1.3 W/sf.

For general interior lighting use Super T8 fluorescent lighting with high efficiency electronic ballasts.

Lighting in walk-in refrigeration units should be low temperature CFLs—look for a "starting temperature" of -20°F.

For display and accent lighting use compact fluorescent lamps (CFLs). CFLs are available in PAR reflector shapes for use in recessed can or track lighting.

Ceramic metal halide (CMH) lamps and Halogen-IR lamps are other alternatives that are an improvement over standard metal halide and halogen lamps.

Utilize occupancy sensors for lighting in restrooms, game rooms, and mechanical rooms. Utilize occupancy sensors or wall switch timers for walk-in coolers and shower rooms.

Exit sign lighting should be LED.

Remember lighting efficiency pays off quickly when you operate the lights 24/7 and follow easy-to-implement procedures.

Shedding More Light on the Matter

Outdoor Oasis

Consistent with the current "light war" in the industry, lamp wattage is often excessive. Store owners may believe that customers choose the most brightly lit fuel canopy and try to be the brightest store on the block.

Savvy operators have learned that painting pump islands a bright color and choosing lighting fixtures which direct light towards the island can have the same effect with lower lamp wattage.

Fuel canopy lighting power density (LPD) should not exceed 1.25 W/sf, open parking lot lighting should not exceed 0.15 W/sf or 2 footcandles illuminance.

Motor-fuel canopy lighting and general parking lighting typically use inefficient probe start HID lamps. Probe start HID lamps are inefficient because over a lamp's life, the starting probe blackens the the bulb, thus reducing the amount of light output per watt.

Energy conservation measures for exterior lighting might include replacing inefficient probe start metal halide lamps and ballasts with new efficient pulse start lamps and ballasts and high performance reflectors.

Unlike probe start HID lamps, pulse start HID lamps do not have a starting probe so the bulb does not blacken. The efficiency of the pulse start HID is further increased by optimized ballasts that provide the appropriate ammount of electrical current. High performance reflectors can additionally be used to direct light to where it is needed.

At existing stores, pulse start lamps and ballasts increase lumen output and allow lower wattage lamps to be used. In new construction pulse start lamps and ballasts result in the need for fewer lamps.

Outdoor lighting should utilize timers or photosensors. Photosensors are devices that respond to daylight levels. They ensure that outdoor lights are only turned on when it is dark outside.

Parking area lighting should be zoned to allow multilevel lighting based on available daylight and to allow lights in seldom used or unused areas to be turned off.

Road display signs, channel letter lighting, and fascia bands should be LED. Exterior building lighting should be T8 lamps or low temperature CFLs.

Be a Picky Shopper

Building Envelope

Insulation
Roof insulation should be at least R-25, and wall insulation should be at least R-13. More is better.

Windows
Low-E windows with U-values of 0.3 or less should be used. Solar heat gain coefficient (SHGC) for the windows should be chosen based on whether the store is in the northern or southern portion of Illinois. Use a SHGC of between 0.4 and 0.55 for the mid to northern portion of the state and a value of less than 0.4 for the southern half.

Shading Devices
Use proper shading devices like overhangs or awnings on south-facing windows to reduce unwanted summer heat gain. Interior shading devices can improve employee comfort and reduce glare, but are not as effective as exterior shading when it comes to minimizing heat gain.

Air Sealing
A continuous air barrier should be maintained in new and existing construction. Perform air sealing at the top and bottom of the structure. Perform air sealing between attic and occupied space, and between occupied space and slab-on-grade. Use an air-tight drywall ceiling instead of a suspended acoustical ceiling.

Vestibules
All public access doors should be equipped with vestibules.

A vestibule is a building entry area which has two doors; an exterior door between the entry area and the outside, and an interior door between the entry area and the inside of the building. From an energy efficiency standpoint vestibules serve to reduce the flow of air between the inside of the building and the outside.

If a vestibule heater is used, be sure to operate the heater only during the winter months and keep the thermostat set no higher than 55 degrees F.

Increase Efficiency without Sacrificing Convenience

Building HVAC

Rooftop, slab-mounted, and interior located split air-conditioning and heating systems are often used to provide heating, ventilating, and air conditioning in convenience stores. Alternatively, geothermal systems can be used to provide the same comforts at greater efficiencies.

Interior Furnaces
Interior located residential type furnaces have the advantage of being available with efficiencies up to 93 percent. They are also easy to service.

Rooftop and Slab Mounted Furnaces
Rooftop and slab mounted furnace systems can be purchased with efficiencies around 82 percent.

Air Conditioning
Air conditioning system EER should be the highest available, at least EER 12 (SEER 13 or better). Air conditioners should be equipped with economizers to take advantage of free cooling when outdoor air temperatures permit.

Forced Ventilation
Forced ventilation should have heat recovery.

Geothermal
Geothermal heating and cooling systems can be chosen to integrate heating, cooling, refrigeration and hot water heating for maximum energy cost savings. They work well for car washes and slab heaters also. A 5-ton geothermal heating & cooling system installed in a convenience store would eliminate about 5 kW of electricity demand by integrating the store's appliances into the geothermal system.

By using water-cooled compressors, waste heat from the refrigeration can be discharged into ground loops shared with the space conditioning system. This makes the water loop a constant temperature. A constant temperature in the water loop allows the store to use smaller compressors for the coolers and freezers further reducing electricity use. Such an application would reduce electricity consumption by 40 percent compared to air-cooled equipment of the same size. Cooler and freezer compressor sizes would be reduced from 5 hp and 3 hp to 3 hp and 1 hp, respectively thereby reducing electricity demand by another 3 KW for a total of 8 KW.

Slab Heater Controls
Some stores may utilize in-slab heaters for snow and ice melting on sidewalks or around car wash areas. In many cases these systems are turned on seasonally and heat the slab whenever temperatures are below freezing. Controls are now available that allow the system to provide heat only when snow or ice are actually present. In some cases significant savings can be achieved.

$aving Energy Makes Good Business Sense

Since convenience stores use so much energy per square foot, they are usually prime candidates for energy conservation.

Many opportunities for conservation are simple to implement, particularly during the planning stages of a new store. Some conservation opportunities do not even require capital investments, they rely on operational procedures.

Conservation strategies, operational and technical, result in increased profits month after month and frequently contribute to a more comfortable environment.

Conserving energy is not only good for the environment, it's good for business.

If you have any quick questions about the information presented in this brochure, feel free to contact the Smart Energy Design Assistance Center (SEDAC) by calling 1-800-214-7954 or by e-mailing info@sedac.org.

If you would like a personalized analysis of your convenience store, download and fill out an application for services from SEDAC.org. Submit the application in accordance with the mailing or e-mailing instructions listed on the website.

Personalized analyis services offered by SEDAC include energy audits, design assistance, and implementation assistance.

More About SEDAC

Who We Are

The Smart Energy Design Assistance Center (SEDAC) provides advice and analyses enabling facilities in the State of Illinois to increase profitability through the efficient use of energy resources. SEDAC is sponsored by the Illinois Department of Community and Economic Opportunity and provides valuable services at no cost to small businesses and public facilities. SEDAC is managed by the School of Architecture at the University of Illinois at Urbana-Champaign and the 360 Energy Group.

What We Do

SEDAC provides advice and analyses enabling facilities in the State of Illinois to increase their profitability through the efficient use of energy resources. The free technical services can identify opportunities for energy savings through intelligent building design and efficient building components and systems.

How to Reach Us

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