

Taming the Escalating Cost of Escalators with Reduced Operation and Voltage Controllers

📅 August 21, 2009 / 👤 By John Scaggs

Many full-service hotels use escalators to move high volumes of guests to and from the lobby and meeting rooms during functions. Considering that these types of vertical transportation needs only occur during certain times of the day, escalator operation could be significantly scaled back, while having a minimal, if any, negative impact on a guest's overall experience. In fact, with proper messaging, reduced escalator operation could actually be a net positive component of a guest's experience. Hoteliers should analyze escalator usage patterns and simply shut down escalators during periods of minimal use. Encourage guests to either walk up the escalator to help improve their own physical fitness, or utilize alternate modes of vertical transportation, such as elevators, which are often located in close proximity to escalators in public spaces.

In addition to saving money on utility expenditure, this initiative presents hoteliers with a unique opportunity to convey their environmental commitment to guests and staff. Signage posted near escalators explaining why elevators are not in service will clearly convey to guests and staff that the hotel has a logical sustainability plan in place that not only reduces the environmental impact of the hotel, but also helps guests stay fit while on the road. Sure, some guests will balk at this measure, but if properly trained staff can clearly articulate the reasoning behind the measure, it is tough to argue with the facts. Considering that a typical escalator operating around the clock consumes in excess of 45,000 kWh of electricity annually, reducing the operation by say, one-third, would save approximately 15,000 kWh of energy. To put that figure in perspective, the average home in the United States consumes on average 11,500 kWh per year.

Depending on the type of hotel, operators can also have fun with how they message this initiative to guests and staff. For example, signage could be posted saying that the hotel has recently expanded its fitness center and has invested in an innovative new piece of exercise equipment called "a flight of stairs". This type of cheeky message will likely encourage playful banter between guests and hotel staff, who if properly trained, can leave the guests with a positive, memorable story about your hotel that they will recount to friends. It is also important to indicate the location of alternative vertical transportation means, such as elevators.

Hoteliers can also install voltage controllers, which are electronic devices that sense the load on a motor and reduce the voltage applied to the motor's terminals when it's operating at low load. When motors operate at partial load, they draw excess magnetizing current, creating unnecessary losses in the motor core that increase the amount of electricity consumed by the escalator. Voltage controllers reduce this excess current, thereby reducing core losses and result in a direct reduction in a hotel's utility expenditure. In order to be cost-effective, voltage controller applications require motors that operate at very low load for long periods, such as hotel escalators.

Escalators that run at least twelve hours per day are perfect candidates for voltage controllers, because the motors that drive escalators typically spend the majority of their run time at very low load. In these applications, voltage controllers can be highly cost-effective, frequently providing payback in less than three years.

Escalator manufacturers Kone and Otis now offer voltage control as an option for new systems. However, voltage controllers can easily be retrofitted on existing escalator motors as well. At least two electric utilities, Nevada Power and Southern California Edison, currently offer rebates for the installation of voltage controllers on

Summary

Shutting down escalators during periods of low use and installing voltage controllers lowers utility costs, reduces the environmental impact of a hotel, and clearly conveys a hotel's environmental commitment to guests and staff.

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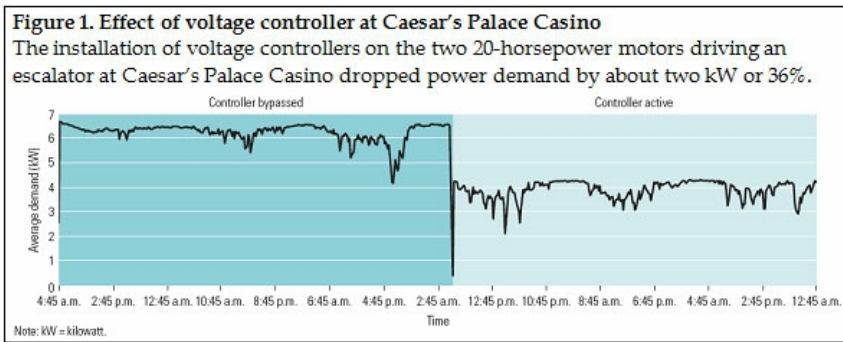
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escalator motors.

Voltage controllers are available from several manufacturers, and they frequently use different names for these devices. Sometimes they are referred to as "power factor controllers" because by reducing voltage, they also improve a motor's power factor at low load. This points out a secondary benefit of voltage controllers: by improving power factor, they may reduce any fee that a utility company charges for low power factor.

Las Vegas probably has the highest density of escalators anywhere on the planet. It is also home to numerous voltage controller installations, thanks in part to the incentives that Nevada Power offers for installing them. One installation at Caesar's Palace casino resulted in an average power reduction of over 36% during periods when the escalators were lightly loaded, resulting in a payback of about 2.8 years (see Figure 1 and Table 1).



Source: Esource; data from Power Efficiency Corporation

Table 1: Payback calculation for a voltage controller on an escalator at Caesar's Palace
 Voltage controllers from Power Efficiency Corporation reduced demand by about two kilowatts on two escalators at this casino in Las Vegas, Nevada, resulting in a payback of about 2.8 years. Note that many new escalators are now being installed with soft starters. Where that's the case, the incremental cost of voltage control is quite low, and payback is often well under one year.

Measurement	Metrics
Baseline power draw (kW)	6.3
Controlled power draw (kW)	4.0
Power reduction (kW)	2.3
Energy savings at 8,760 hours/year (kWh)	20,148
Average energy rate (\$/kWh)	0.0684
Annual energy cost savings (\$)	1,378
Total installed cost (\$)	3,800
Payback (y)	2.8

Source: Esource; data from Power Efficiency Corporation

Like most environmental sustainability solutions for hotels, a bit of common sense coupled with technological upgrades can help hoteliers quickly meet sustainability goals. The nominal capital investment associated with installing voltage controllers will clearly illustrate to guests that the hotel has committed financial resources to reducing the environmental impact of their hotel. This financial commitment will make guests more eager to play a role in improving a hotel's energy efficiency.