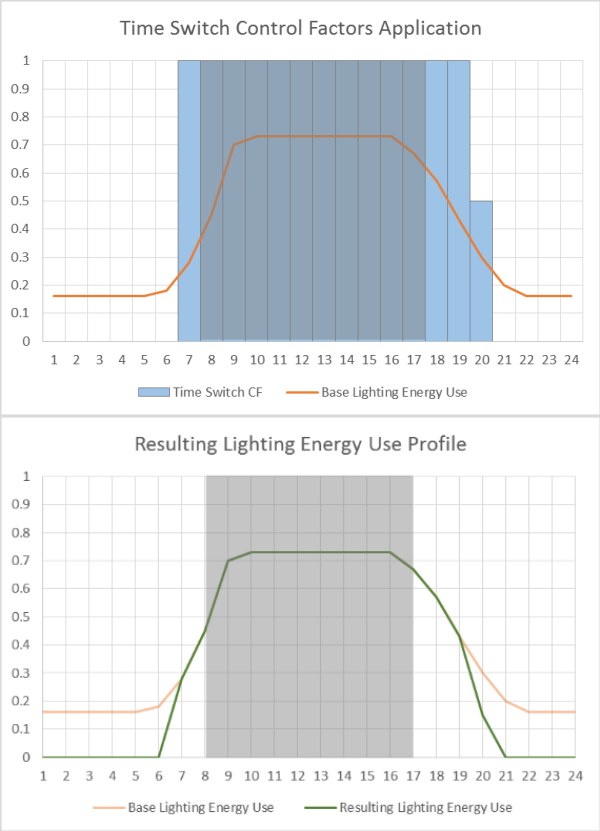

Figure 12: Application of Time Switch Control Factor for a space with 8:00am to 5:00pm operation schedule (grey) and 1.5 hour delay time on override switch

This allows for a conservative savings estimate, as occupancy profiles (See Figure 1), have higher energy use closed to the last hour of occupancy schedule, which gradually tapers over time toward midnight. This adjustment effectively increases the number of hours the lights are on, by the delay time on the override switch setting, as shown in Figure 12.

CONCLUSION AND FUTURE RESEARCH NEEDS

The ALCS Calculator provides a comprehensive calculation methodology for lighting controls savings, based on the best available research studies on various subjects related to lighting energy use and lighting controls. However, it is possible to further improve this methodology with more research studies.

The study on 'Statistical Modeling of Occupancy Patterns' (Chang and Hong 2013) provides a model, which can serve as a replicable template for future studies. Over time, with data from other building added, such statistical models can serve as valuable reference datasets to accurately estimate occupancy sensors savings.

Further research is also needed on factors influencing occupant manual switching and dimming behavior to develop a basis for savings from manual dimming.

The ALCS Calculator uses the DEER dataset of 23 commercial building and its 164 baseline lighting energy profiles to provide users with a reliable baseline energy use profile on which to base the lighting energy savings. This dataset is derived from historic data from energy measurement and verification (EM&V) studies that date back to 1994 CCID study profiles, and updated in 2005 (Itron 2005). Updates to the DEER dataset with more recent EM&V data will provide a more accurate lighting baseline for savings calculation.

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