**State of Illinois**

**Energy Efficiency**

**Technical Reference Manual**

**Commercial Lighting Load Shapes**

**Change to Existing Load Shape**

**Electrical Loadshapes (kWh), Section 3.5**

**Qi Jin, Navigant Consulting**

**6/20/2018**

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Table 5‑1 Work Paper Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **MM/DD/YY** | **Author, Company** | **Summary of Changes** |
| 1 | 6/20/2018 | Qi Jin,  Navigant Consulting | Navigant made changes to the existing load shapes for commercial indoor and outdoor lighting |
| 2 | 6/28/2018 | Qi Jin,  Navigant Consulting | Added commercial sector-level load shapes using weighting scheme detailed in accompanying documentation memo. |

# Overview

Navigant is submitting this TRM workpaper to propose several new commercial lighting load shapes to the IL TRM. Navigant developed the updated load shapes by summarizing commercial lighting logger data collected during a recent EmPOWER Maryland metering study. Navigant completed a long term metering study for EmPOWER to capture both summer and winter peak periods and determine whether commercial lighting consumption varies from month to month throughout the year and to provide statistically robust estimates of peak demand impacts during both summer and winter PJM interconnection performance periods.

Additionally, Navigant prepared an accompanying memo to document the study design, fieldwork, data cleaning, and analytic methodology used to support the load shape development process. This memo will be uploaded to the Stakeholder Advisory Group’s Sharepoint along with the other load shape reference materials.

Navigant also prepared an accompanying Excel workbook with the new commercial and industrial lighting load shapes summarized in both day type and 8760 formats. These formats are summarized below:

* Day type format – summarizes typical daily load profiles for each unique combination of month and day type (weekday or weekend/holiday) by building type
* 8,760 format – summarizes the load shape by building type using 8,760 hourly values, the sum of which add to 100%

# Proposed Changes to Existing Measures

## Electrical Loadshapes (kWh)

Loadshapes are an integral part of the measure characterization and are used to divide energy savings into appropriate periods using Rating Period Factors (RPFs) such that each have variable avoided cost values allocated to them for the purpose of estimating cost effectiveness.

For the purposes of assigning energy savings (kWh) periods, the TRM TAC has agreed to use the industry standards for wholesale power market transactions as shown in the following table.

Table 3‑1. On and Off Peak Energy Definitions

| **Period Category** | **Period Definition (Central Prevailing Time)** |
| --- | --- |
| Winter On-Peak Energy | 8AM - 11PM, weekdays, Oct – Apr, No NERC holidays |
| Winter Off-Peak Energy | Oct – Apr, All other hours |
| Summer On-Peak Energy | 8AM - 11PM, weekdays, May – Sept, No NERC holidays |
| Summer Off-Peak Energy | May – Sept, All other hours |

The developed 8,760 hours of load profiles by building type were utilized to calculate the RPFs for the above four periods. ComEd uses the DSMore™ (Integral Analytics DSMore™ Demand Side Management Option/Risk Evaluator) software to screen the efficiency measures for cost effectiveness. Since this tool requires a loadshape value for weekdays and weekends in each month (i.e., 24 inputs), the percentages for the four period categories above were calculated by weighting the proportion of weekdays/weekends in each month to the total within each period. The results of these calculations are also provided below. The following pages provide the loadshape values for most measures provided in the TRM.

Table 3‑2. Loadshapes by Season

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Load Shape Name | Winter Peak | Winter Off-Peak | Summer Peak | Summer Off-Peak | Total |
|  | Oct-Apr, M-F, non-holiday, 8AM-11PM | Oct-Apr, All other time | May-Sept, M-F, non-holiday, 8AM-11PM | May-Sept, All other time |  |
| Education Indoor Lighting | 34.7% | 26.2% | 23.6% | 15.5% | 100.0% |
| Grocery Indoor Lighting | 28.0% | 30.2% | 20.3% | 21.5% | 100.0% |
| Health Indoor Lighting | 29.1% | 28.9% | 21.6% | 20.3% | 100.0% |
| Office Indoor Lighting | 29.9% | 28.2% | 22.3% | 19.6% | 100.0% |
| Other Indoor Lighting | 28.0% | 30.2% | 20.4% | 21.4% | 100.0% |
| Retail Indoor Lighting | 32.6% | 25.4% | 24.2% | 17.9% | 100.0% |
| Warehouse/Industrial Indoor Lighting | 26.0% | 29.0% | 22.4% | 22.6% | 100.0% |
| Commercial Indoor Lighting | 30.1% | 27.5% | 22.8% | 19.7% | 100.0% |
| Commercial Outdoor Lighting | 16.8% | 44.6% | 9.3% | 29.3% | 100.0% |

Table 3‑3. Loadshapes by Month and Day of Week

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Load Shape Name | Jan | Jan | Feb | Feb | Mar | Mar | Apr | Apr | May | May | Jun | Jun | Jul | Jul | Aug | Aug | Sep | Sep | Oct | Oct | Nov | Nov | Dec | Dec | Total |
| W-F | S-S | W-F | S-S | W-F | S-S | W-F | S-S | W-F | S-S | W-F | S-S | W-F | S-S | W-F | S-S | W-F | S-S | W-F | S-S | W-F | S-S | W-F | S-S |  |
| Education Indoor Lighting | 5.1% | 2.8% | 5.7% | 3.3% | 7.8% | 1.9% | 6.9% | 2.5% | 7.2% | 2.1% | 5.5% | 1.6% | 4.2% | 1.7% | 6.4% | 1.6% | 6.3% | 2.4% | 6.6% | 2.1% | 6.2% | 2.1% | 4.9% | 3.0% | 100.0% |
| Grocery Indoor Lighting | 5.7% | 2.8% | 5.5% | 2.2% | 6.3% | 2.2% | 5.5% | 2.8% | 6.0% | 2.5% | 6.0% | 2.2% | 5.4% | 3.0% | 6.3% | 2.2% | 5.5% | 2.8% | 6.0% | 2.5% | 5.7% | 2.5% | 5.5% | 3.0% | 100.0% |
| Health Indoor Lighting | 5.4% | 2.9% | 5.3% | 2.4% | 6.4% | 2.2% | 5.5% | 2.7% | 6.0% | 2.4% | 6.0% | 2.1% | 5.5% | 3.0% | 6.4% | 2.3% | 5.5% | 2.7% | 6.0% | 2.4% | 5.8% | 2.4% | 5.2% | 3.3% | 100.0% |
| Office Indoor Lighting | 5.2% | 3.0% | 5.1% | 2.6% | 6.3% | 2.4% | 5.3% | 3.0% | 5.7% | 2.6% | 6.0% | 2.4% | 5.3% | 3.2% | 6.3% | 2.3% | 5.2% | 2.9% | 5.5% | 2.7% | 5.5% | 2.8% | 5.2% | 3.3% | 100.0% |
| Other Indoor Lighting | 5.6% | 2.7% | 5.4% | 2.3% | 6.4% | 2.2% | 5.5% | 2.8% | 6.1% | 2.5% | 6.0% | 2.2% | 5.4% | 3.0% | 6.2% | 2.2% | 5.5% | 2.8% | 6.0% | 2.5% | 5.8% | 2.5% | 5.4% | 3.1% | 100.0% |
| Retail Indoor Lighting | 5.6% | 2.8% | 5.4% | 2.3% | 6.3% | 2.3% | 5.5% | 2.8% | 6.0% | 2.5% | 6.0% | 2.2% | 5.4% | 3.0% | 6.4% | 2.3% | 5.5% | 2.7% | 5.9% | 2.5% | 5.7% | 2.5% | 5.5% | 3.1% | 100.0% |
| Warehouse/Industrial Indoor Lighting | 5.4% | 2.8% | 4.7% | 2.1% | 5.8% | 1.9% | 5.0% | 2.3% | 6.5% | 2.3% | 7.1% | 2.2% | 6.2% | 2.8% | 7.3% | 2.2% | 5.8% | 2.6% | 6.0% | 2.3% | 5.9% | 2.4% | 5.3% | 3.2% | 100.0% |
| Commercial Indoor Lighting | 5.5% | 2.8% | 5.2% | 2.3% | 6.2% | 2.2% | 5.4% | 2.7% | 6.1% | 2.4% | 6.2% | 2.3% | 5.5% | 3.0% | 6.5% | 2.2% | 5.5% | 2.7% | 5.9% | 2.5% | 5.7% | 2.5% | 5.4% | 3.1% | 100.0% |
| Commercial Outdoor Lighting | 6.1% | 3.2% | 6.3% | 2.5% | 6.8% | 2.4% | 5.3% | 2.7% | 5.8% | 2.4% | 5.2% | 1.9% | 4.8% | 2.6% | 5.8% | 2.0% | 5.5% | 2.7% | 6.0% | 2.5% | 5.8% | 2.5% | 6.0% | 3.4% | 100.0% |

# References

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