

Load Profile Application

I. General

The Electric Generation Supplier (EGS) is responsible for developing an aggregated hourly load forecast for its customers' load. The customer's load consists of load that is metered monthly and load that is interval metered on an hourly or sub-hourly basis. The aggregated load forecast shall include real power losses pursuant to the FirstEnergy Open Access Transmission Tariff and the Company's Electric Generation Supplier Coordination Tariff.

Below are instructions for the application of FirstEnergy's load profiles. Load profiles are provided for each customer record that is processed by the Company's Supplier Settlement system. In some cases one customer will have two or more records passed to the settlement system; generally multiple records represent portions of the customer's total load to which different Rate Schedule computations apply. When multiple records exist each will have a load profile assigned to it. If a profile is assigned to a customer record that is metered by interval metering equipment, the data produced by the interval metering will be used and the load profile will not be used. Load profiles are established for three Residential retail customer groups, six Commercial and Industrial retail customer groups and two "Deemed" retail customer groups, as described below. The same set of eleven profiles is used for customers at all three of FirstEnergy's Operating Companies.

II. Select the Load Profile associated with each customer record.

A. Residential Customers

1. Identify the customer's assigned load profile(s) from the Pre-Enrollment Customer Information List or the most recent quarterly update of that list.
2. Customers on Residential Rate schedules will generally be assigned to one or more of the following load profiles. (Note – The labels shown below are for identification purposes and in some cases may not be descriptive of the Customer's Rate Schedule or use.)

Profile RS Residential Summer Intensive
Profile RG Residential General
Profile RH Residential Heating

B. Commercial and Industrial Customers

1. Identify the customer's assigned load profile(s) from the Pre-Enrollment Customer Information List or the most recent quarterly update of that list.
2. Customers on General Service, Commercial and Industrial Rate Schedules will generally be assigned to one or more of the following load profiles. (Note – The labels shown below are for identification purposes and in some cases may not be descriptive of the Customer's Rate Schedule or use.)

Profile CS	Commercial and Industrial Summer Intensive
Profile CG	Commercial and Industrial General
Profile C1	Commercial and Industrial – Load Factor Cluster 1
Profile C2	Commercial and Industrial – Load Factor Cluster 2
Profile C3	Commercial and Industrial – Load Factor Cluster 3
Profile CH	Commercial and Industrial – High Load Factor Group

C. Outdoor Lighting and Flat Load Customer Records

1. Identify the customer's assigned load profile(s) from the Pre-Enrollment Customer Information List or the most recent quarterly update of that list.
2. Customers' records that are identified with Street Lighting service, Private Outdoor Lighting Service or other metered or unmetered service associated with levels of available daylight will generally be assigned to the SL profile. Customers' records that are identified with Traffic Lighting service or any other service characterized by an essentially flat load pattern will generally be assigned to the TL profile.

Profile SL	Street Lighting and other light sensitive use
Profile TL	Traffic Lighting and other flat use

III. Select the Season that contains the day for which the load profile is to be developed (Winter, Summer, or Shoulder).

A. Residential, Commercial and Industrial Customers

For the Residential groups and the Commercial and Industrial groups each profile is divided into three seasons defined as Summer (the months of June, July and August), Winter (the months of December January and February), and the Shoulder season which consists of the other six months.

B. Outdoor Lighting and Flat Load Customer Records

The Street Lighting (SL) load profile is not differentiated by Season, but by month only. The same profile is used for each day in a given month. Select the appropriate load profile based on the month of the year.

The Traffic Lighting (TL) load profile is not differentiated by Season or by month. The same profile is used for each day in the year.

IV. Select the Day-Type of the day for which the load profile is to be developed (Weekday, Saturday or Sunday/Holiday)

A. Residential, Commercial and Industrial Customers

For the Residential groups and the Commercial and Industrial groups each profile is further divided within each season into three Day-Types. The Day Types are defined as

Weekdays (Mondays through Fridays, exclusive of defined Holidays)
Saturdays, and
Sundays and Holidays.

The defined Holidays use the same profiles as Sundays. The Holidays are New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day.

B. Outdoor Lighting and Flat Load Customer Records

The Street Lighting (SL) load profile is not differentiated by Day-Type, but by month only. The same profile is used for each day in a given month, and the values in the profile are equal to the "Percent On" for the hour. Thus if the load is profiled to be on for the entire hour the kW index value is 100% or 1.0. Select the appropriate load profile based on the month of the year.

The Traffic Lighting (TL) load profile is not differentiated by Day-Type or by month. The values in the profile are equal to the "Percent On" for the hour which is assumed to be 100% or 1.0 for every hour. The same profile is used for each day in the year.

V. Select the hourly Weather Response Function for each hour of the day for which the load profile is to be developed

A. Residential, Commercial and Industrial Customers

For the Residential groups and the Commercial and Industrial groups, within each Season and Day-type grouping, each profile is computed using 24 Weather Response Functions (WRFs). The 24 Weather Response Functions correspond to the 24 hours of the day. For each hour (within each Season and Day-type grouping) either one, two or three Weather Response Functions are available. Where more than one is available it is necessary to choose among the available WRFs basing the choice on the average temperature for the hour, as shown on the tables of load profiles that can be downloaded from this web site.

The temperature range to which each WRF applies is also shown on those tables of load profiles; for convenience, the temperature ranges are also presented there in machine readable format (numeric low-end and high-end values for each temperature range).

Hourly Temperature data to be employed are the temperatures recorded by the National Weather Service at the following weather stations:

For Illuminating Company customers	Cleveland Hopkins Airport
For Ohio Edison Company Customers	Akron Canton Airport
For Toledo Edison Company customers	Toledo Express Airport

Some historic and forecast weather information from the National Weather Service and from the Midwest Regional Climate Center can be found at the following internet addresses:

<http://www.nws.noaa.gov/er/hq/>

<http://mcc.sws.uiuc.edu/Summary/Ohio.html>

B. Outdoor Lighting and Flat Load Customer Records

Weather Response Functions are not used for the Street Lighting (SL) or Traffic Lighting (TL) load profiles.

VI. Apply the selected Weather Response Function for each hour of the day for which the load profile is to be developed

A. Residential, Commercial and Industrial Customers

For the Residential groups and the Commercial and Industrial groups, within each Season and Day-type grouping, each profile is computed using 24 Weather Response Functions (WRFs). Each hourly Weather Response function is of the form

$$y = mx + b$$

where y = the computed profile kW index value for the hour.

m = a coefficient from the tables of Weather response functions representing the slope of the Weather Response Function (kW per degree Fahrenheit)

x = the temperature for the hour (in ° F), using data from the same weather station described in the previous section, and

b = a constant from the tables of Weather Response Functions representing the y-intercept of the WRF

The coefficients (m) and the constants (b) for each Weather Response Function – as well as the temperature range to which each WRF applies – are shown on the tables of load profiles that can be downloaded from this web site.

Application of the 24 appropriately selected $y = mx + b$ Weather Response Functions will produce a series of 24 kW index values for the 24 hours of the day. These constitute the daily profile for the day in question.

B. Outdoor Lighting and Flat Load Customer Records

Weather Response Functions are not used for the Street Lighting (SL) or Traffic Lighting (TL) load profiles.

VII. Constructing a monthly load profile

A. Residential, Commercial and Industrial Customers

For the Residential groups and the Commercial and Industrial groups, the procedures outlined in the above steps produce a series of daily load profiles, one for each of the days that constitute the month (or other period) for which a profile is to be constructed. These daily profiles will have been generated using the specific season and day-type that is applicable to each day, as well as the temperature (° F) for each hour in the day. Construction of a monthly profile is achieved by simply concatenating the daily profiles together in the proper chronological sequence. Thus, a monthly profile for a 31-day period would consist (31 x 24 =) 744 hourly kW index values.

B. Outdoor Lighting and Flat Load Customer Records

Monthly load profiles for the Street Lighting (SL) or Traffic Lighting (TL) customer records are also developed by concatenating together the appropriate daily profiles for the customer record. For Street Lighting records, a monthly profile for a calendar month will consist of a series of identical load profiles. If the month to be profiled spans two calendar months, the proper number of daily profiles for each of the months will be concatenated in the appropriate chronological sequence. Since all Traffic Lighting daily profiles are the same (1= “On” for all hours) monthly profiles will simply be a string of the appropriate number of such daily profiles.

VIII. Applying a monthly load profile to a customer’s kWh energy use - applies to all (Residential, Commercial, Industrial, Outdoor Lighting and Flat Load) Customer Records

Monthly load profiles for a customer record are expressed as a series of kW index values, one for each hour of the month. These are not actual hourly kW values (or kWh values) for the specific customer record. To convert the profile values to hourly kWh values it is necessary to ratio each of them up or down so that their sum matches the energy use (the number of kWh) measured at the customer location. The ratio applied to each profile value is computed as:

$$\frac{\text{Actual kWh for the period}}{\text{Sum of kW index values for the same period}}$$

The result of multiplication of each profile number by this ratio produces a list of hourly kW values (or kWh values) for the specific customer record.