



CITY OF FORT LAUDERDALE

How to Create a Heat Map for Energy Usage



March 2019

Purpose:

The City of Fort Lauderdale uses heat maps to visualize hourly energy usage. This allows the City to identify opportunities for savings and evaluate the impacts of efficiency measures. The instructions below detail how the City of Fort Lauderdale creates its heat maps. The steps below describe how City of Fort Lauderdale staff extract hourly data from the Florida Power and Light (FPL) website and then create a heat map in Microsoft Excel with that data. Most, but not all FPL, accounts will allow access to hourly data. If FPL is not your utility but you can obtain hourly energy usage data, you can still create heat maps by starting at “To Sort and Organize Data in Excel” on page 2.

For more information on how to use and interpret heat maps, please see pages 4 and 5.

To Access Account Information in the FPL Portal:

Log on to FPL website using login credentials here: <https://www.fpl.com/my-account/account-landing.html#list>.

If the desired account is listed in the FPL online portal, skip to the next step. If the account is not already added to your online view, follow the instructions on the FPL site to do so and then continue with the steps below.

Use the search boxes to search for the desired account.

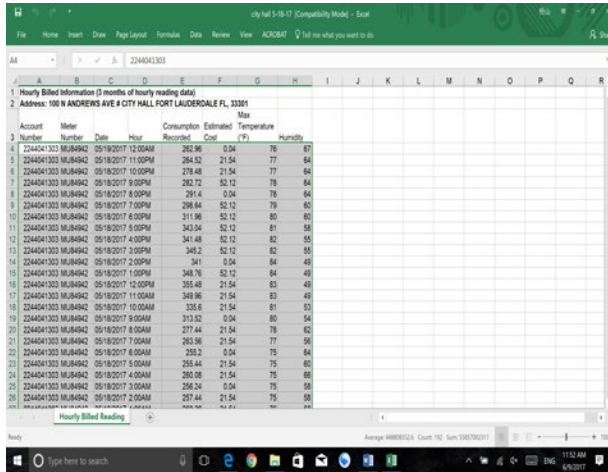
- o Search by: *Account Number* or *Address*
 - o Enter Keyword: Enter account number or address
- 1) Press *Search*.
 - 2) Click on the account name that comes up in the search.
 - 3) Click the blue lettering in the first column (“Name”) of the row containing the account you want to select.

To Access Hourly Energy Data in the FPL website:

- 1) Scroll down and click on the link that says *Visit Energy Dashboard* (to the right of *Energy Usage* and above the usage graphics).
 - o A notice might come up regarding bill projection and entitled “Important Note About My Energy Usage”, close this notice and view the Chart.
- 2) On the top right of the bar chart graph, click on *Hour* for accessing hourly data (another pop up notice may appear).
 - o FPL keeps approximately 3 months on most accounts—if an ongoing record without gaps is required, a download schedule should be established (e.g., once every two weeks or once a month).
- 3) Click on *Download* and select *.xls* format.

To Sort and Organize Data in Excel:

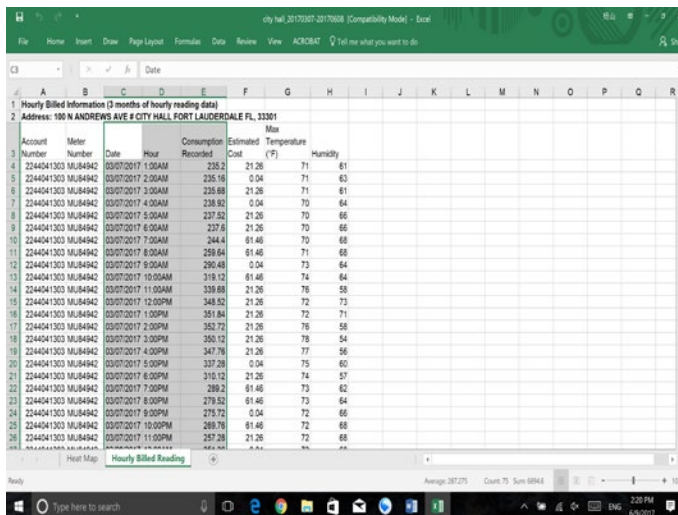
- 1) Open the downloaded data in Microsoft Excel.
- 2) Verify data is complete and hourly.
- 3) Select all data in the spreadsheet except titles. (Figure 1)



Account Number	Meter Number	Date	Hour	Consumption Recorded	Estimated Cost	Temperature (F)	Humidity
2244041303	MU84942	05/18/2017	12:00AM	282.96	0.04	78	87
2244041303	MU84942	05/18/2017	1:00PM	284.52	21.54	77	64
2244041303	MU84942	05/18/2017	10:00PM	278.48	21.54	77	64
2244041303	MU84942	05/18/2017	8:00PM	282.72	82.12	78	64
2244041303	MU84942	05/18/2017	7:00PM	291.4	0.04	78	64
2244041303	MU84942	05/18/2017	6:00PM	288.84	52.12	79	60
2244041303	MU84942	05/18/2017	5:00PM	311.96	52.12	80	60
2244041303	MU84942	05/18/2017	4:00PM	343.04	52.12	81	58
2244041303	MU84942	05/18/2017	3:00PM	341.48	52.12	82	55
2244041303	MU84942	05/18/2017	2:00PM	345.2	82.12	82	55
2244041303	MU84942	05/18/2017	1:00PM	341	0.04	84	49
2244041303	MU84942	05/18/2017	12:00PM	348.76	52.12	84	49
2244041303	MU84942	05/18/2017	11:00AM	355.48	21.54	83	49
2244041303	MU84942	05/18/2017	10:00AM	349.96	21.54	83	49
2244041303	MU84942	05/18/2017	9:00AM	335.6	21.54	81	53
2244041303	MU84942	05/18/2017	8:00AM	315.52	0.04	80	54
2244041303	MU84942	05/18/2017	7:00AM	277.44	21.54	78	62
2244041303	MU84942	05/18/2017	6:00AM	283.56	21.54	77	56
2244041303	MU84942	05/18/2017	5:00AM	255.2	0.04	75	64
2244041303	MU84942	05/18/2017	4:00AM	255.44	21.54	75	60
2244041303	MU84942	05/18/2017	3:00AM	260.08	21.54	75	66
2244041303	MU84942	05/18/2017	2:00AM	256.24	0.04	75	58
2244041303	MU84942	05/18/2017	1:00AM	237.44	21.54	75	58

Figure 1

- 4) Under the *Data* tab, click *Sort*. First, select the *Sort By* dropdown menu and click *Date*, then click the *Add Level* button in the upper left. A new drop down menu will appear—in the *Then By* drop down select *Hour*. In the *Hour* row in the *Order* column, select *Custom List* and create a list that follows the chronology of a day—12:00AM, 1:00AM, 2:00AM, etc. (this will appear as a drop down option for future heat maps). Click *OK* on the *Sort* popup box.
- 5) A pop-up box entitled *Sort Warning* will appear—click on the first button, *Sort anything that looks like a number, as a number*. Click *OK*.
 - o If the data spans two years, the sorting results should be checked to ensure that years are not sorted incorrectly.
- 6) Select spreadsheet cells containing data in the *Date*, *Hour* and *Consumption Recorded* columns, including the headers. (Figure 2)



Account Number	Meter Number	Date	Hour	Consumption Recorded	Estimated Cost	Temperature (F)	Humidity
2244041303	MU84942	05/07/2017	12:00AM	235.2	21.26	71	81
2244041303	MU84942	05/07/2017	2:00AM	235.16	0.04	71	83
2244041303	MU84942	05/07/2017	3:00AM	238.88	21.26	71	81
2244041303	MU84942	05/07/2017	4:00AM	238.92	0.04	70	64
2244041303	MU84942	05/07/2017	5:00AM	237.52	21.26	70	66
2244041303	MU84942	05/07/2017	6:00AM	237.6	21.26	70	66
2244041303	MU84942	05/07/2017	7:00AM	244.4	81.46	70	68
2244041303	MU84942	05/07/2017	8:00AM	259.84	81.46	71	68
2244041303	MU84942	05/07/2017	9:00AM	290.48	0.04	73	64
2244041303	MU84942	05/07/2017	10:00AM	319.12	81.46	74	64
2244041303	MU84942	05/07/2017	11:00AM	339.68	21.26	76	58
2244041303	MU84942	05/07/2017	12:00PM	348.52	21.26	72	73
2244041303	MU84942	05/07/2017	1:00PM	351.84	21.26	72	71
2244041303	MU84942	05/07/2017	2:00PM	352.72	21.26	76	58
2244041303	MU84942	05/07/2017	3:00PM	350.12	21.26	78	54
2244041303	MU84942	05/07/2017	4:00PM	347.76	21.26	77	66
2244041303	MU84942	05/07/2017	5:00PM	337.28	0.04	75	60
2244041303	MU84942	05/07/2017	6:00PM	310.12	21.26	74	57
2244041303	MU84942	05/07/2017	7:00PM	289.2	81.46	73	62
2244041303	MU84942	05/07/2017	8:00PM	278.52	81.46	73	64
2244041303	MU84942	05/07/2017	9:00PM	274.72	0.04	72	66
2244041303	MU84942	05/07/2017	10:00PM	268.76	81.46	72	68
2244041303	MU84942	05/07/2017	11:00PM	257.28	21.26	72	68

Figure 2

- 7) Under the *Insert* tab, click *Pivot Table*, then click *OK*.
- 8) On the right side of the worksheet a *Pivot Table Field List* box will appear. In the box at the top of the right panel, choose the *Date*, *Hour*, and *Consumption Recorded* as fields to add to report. In the four boxes at the bottom of the right panel, drag the word *Date* in the top box to the *Row Labels* box below, *Hour* to the *Column Labels* box and *Consumption Recorded* to the *Values* box. (Figure 3).
 - o If *Consumption Recorded* comes up as '1', click the arrow in the *Value* box, then click *Value Field Settings*, click *Sum* and then press *OK*. The original values should populate the sheet.

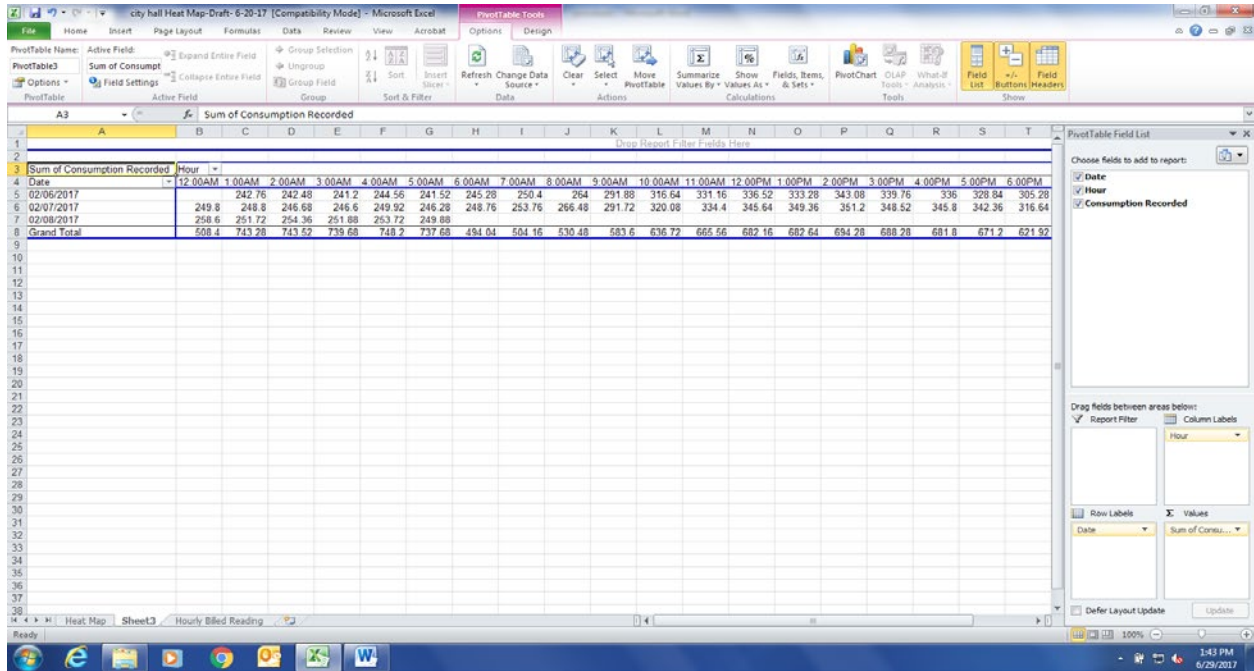


Figure 3

To Create a Heat Map:

- 1) Select all consumption data that you want color coded. Do not include the *Grand Total* row or *Grand Total* column. (Figure 4)

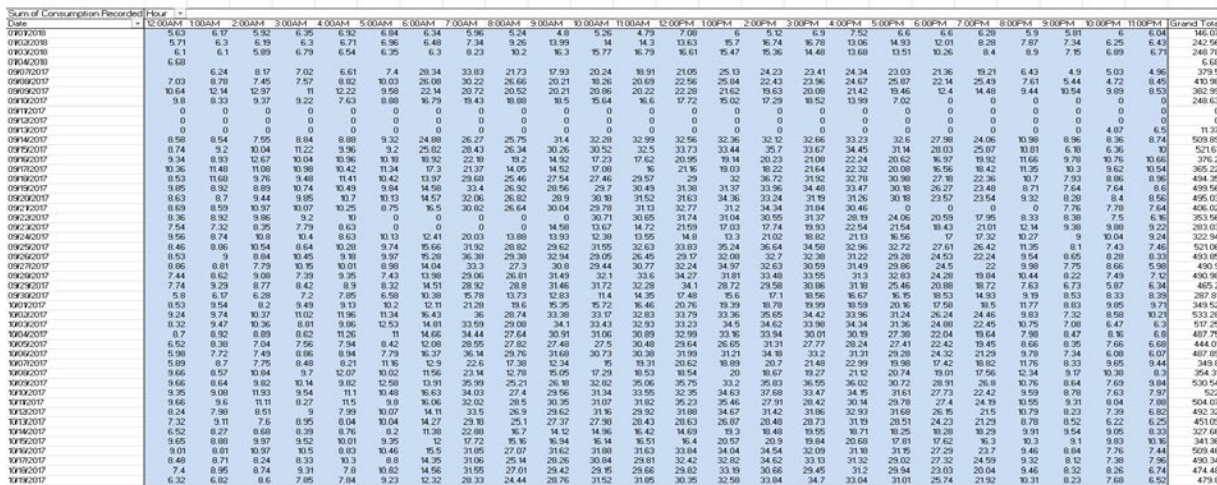


Figure 4

- 2) Under the *Home* tab, click on *Conditional Formatting* and move mouse to *Color Scales*. Select “*Red-Yellow-Green*” color scale.
 - o To manually select a different color scheme, see below (colors choices can be changed as desired):
 - Click *More Rules...*
 - Select *Format Style as 3-Color Scale* or click 2nd Red Map
 - Under *Minimum*, choose color *Green*.
 - Under *Midpoint*, choose color *Yellow*. (The percentile may be the best visually when set somewhere between 45-70, depending on the account usage.)
 - Under *Maximum*, choose color *Red*.
 - Click *OK*.
- 3) The conditional formatting can be applied to the *Grand Total* row or column separately if desired. However, conditionally formatting the hourly and total columns in one step will produce undesirable results (total columns will be more red and hourly columns will be greener than desired).
- 4) Add title, unit of energy, and other explanatory information for the map as desired. (Figure 5)

Heat Map for City Hall (2018.05.10 - 2018.11.15) Unit: kWh

9:00AM	10:00AM	11:00AM	12:00PM	1:00PM	2:00PM	3:00PM	4:00PM	5:00PM	6:00PM	7:00PM	8:00PM	9:00PM	10:00PM	11:00PM	Day	High	Low	Avg of Hourly Temperatures	Precip (in)	Daily Total Consumption
290.12	315.08	323.96	326.68	323.04	323.92	321.6	317.32	307.16	284.48	275.88	271.56	263	260.6	252.64	Thursday	85	74	78	0	6688.84
291.24	312.12	323.44	326.04	324.96	324.2	317.04	313.72	298.8	272.6	255.44	254.36	251.76	248.24	255.28	Friday	85	74	79	0	6606.36
243.92	247.2	249	248	249.92	250.12	247.4	247.16	248.12	249.04	246.68	247.68	246.12	245.16	246.68	Saturday	86	75	77	0	5932.56
245.96	246.68	247.28	244.8	246.56	248.56	251.32	250.92	248.48	247.48	246.84	245.24	244.16	242.8	240.8	Sunday	80	76	78	1.67	5919.28

Figure 5

- 5) Add events column if necessary. (e.g., closures, dates of upgrades, or other events which would impact energy consumption).
- 6) Add legend. (Figure 6)

Weather Data (Optional):

- 1) If weather information is desired, add columns for weather data (e.g., average, high temperature, low temperature, and precipitation).
- 2) Information can be found here: <https://www.ncdc.noaa.gov/cdo-web/search>
- 3) To search for daily temperature and precipitation, select *Daily Summaries* as the *Weather Observation Type/Dataset*, choose a *Date Range*, search for *Cities* and type the name of the appropriate city (e.g., Fort Lauderdale).
- 4) After clicking search, a list of possible locations will appear-select the appropriate city name and click *ADD TO CART*. This option will include all of the stations associated with the City, to narrow the results, see below.

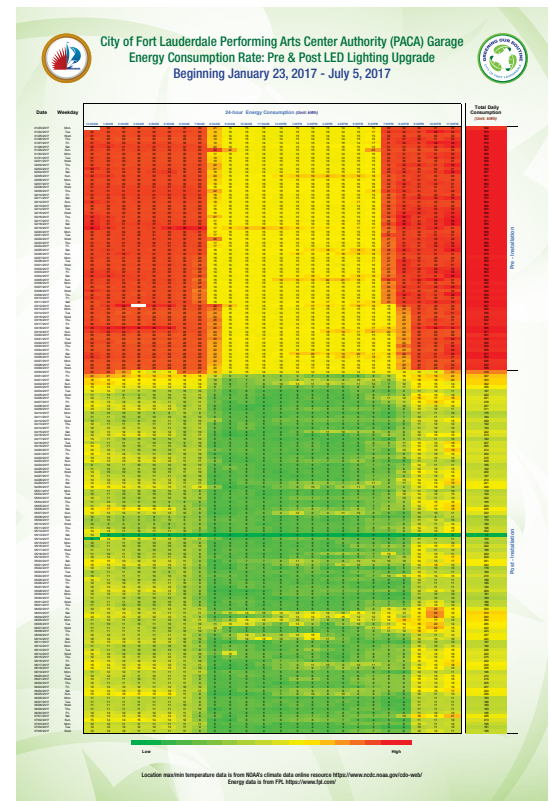


Figure 6

- 5) For more specific information, click the name of the city, a table named *Daily Summaries Location Details* will appear. The table has a row entitled *Included Stations*—within that row you can click *See station list below* in order to select specific weather stations by using the *ADD* button. This will produce the most specific temperature and precipitation data based on facility locations.
 - o To determine the location, data sets (e.g., temperature, precipitation, both), and date ranges of the data set, click on the station name in the *STATION NAME & ID* column.
- 6) Within the Cart a list of options for the output format will appear. In order to open the data in an Excel file, select the *Custom GHCN-Daily CSV* and verify the dates in the *Select the Date Range* box. Click *CONTINUE*.
- 7) On the next page, under *Station Detail & Data Flag Options* include the *Geographic Location* in addition to the *Station Name* in order to receive the weather station coordinates.
- 8) Select the desired data types in the *Select data types for custom output* box (e.g., Precipitation, Average Temperature, Minimum temperature, and Maximum temperature). Click *CONTINUE*.
- 9) Specify an email address in the *Enter email address box* and *SUBMIT ORDER* to have the data emailed to the specified email account.
- 10) Once the email arrives, click *Download*. Note: if multiple requests are submitted at once (i.e., single cart), the data will be combined into a single spreadsheet.
- 11) Align the dates between this spreadsheet and the heat map and copy and paste the weather data. Note: some dates may be missing information and some dates may be missing.
- 12) In order to easily view temperature and energy usage, *conditional format* the desired temperature columns as *Red-White-Blue* to create a scale with blue being the coldest and red being the hottest. (Figure 7)

High	Low	Avg of Hourly Temperatures	Precip (in)
85	74	78	0
85	74	79	0
86	75	77	0
80	76	78	1.67
82	72	76	0.54
81	71	78	1.2
85	74	77	0
85	71	77	0.44
84	70	78	0.01
82	70	76	0.87
77	70	76	5.27
81	71	79	0.25
83	77	79	0
86	80	80	0.14
85	78	80	0.17
85	76	78	0.67
81	77	77	0.71
81	74	78	1.29
82	74	79	0.03
85	76	80	0.49
87	78	82	0
89	77	80	0.22
90	79	81	0
90	75	81	0
89	75	83	0
92	78	84	0.01
94	78	84	0
95	79	83	0.2
92	75	79	2.49
91	71	80	0.08

Figure 7

- 13) Align weather data with energy consumption data by date and paste into the heat map.

For More Information, Contact:

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 954.828.6190