

Rhode Island Infrastructure Bank Efficient Buildings Fund Detailed Guidance on Writing an Energy Baseline Narrative

The *baseline narrative* is a concise description of historical energy consumption and trends for all properties in your entity’s facility portfolio. For Efficient Buildings Fund (EBF) applications, an energy baseline must include at least two years of consumption and expenditure data for all properties (see “*General Guidance on Submitting your Energy Usage Baseline*” for more information). Your baseline narrative should be no longer than one page and should outline the major findings of the energy data baseline.

The analysis should include observations on:

- ✓ Facilities with the highest energy consumption and/or expenditure
- ✓ Facilities with the highest energy use intensity and/or cost per square foot (SQFT)
- ✓ Facilities that have a noticeable increase or decrease in energy consumption and/or expenditure over time
- ✓ Potential reasons why facilities are showing certain data trends

The remainder of this document provides helpful information for answering the above questions and writing your energy baseline narrative. Your narrative should demonstrate that you have analyzed your data for ALL buildings (not just those applying for project funding). After considering all facilities, see what data jumps out and include those facilities in your baseline narrative. The narrative may help justify why you are applying for project funding in specific sites. Use of this guidance is optional, but may be helpful to ensure your baseline narrative is sufficiently thorough.

Working with Energy Data

The University of Rhode Island Extension Outreach Center’s energy team has partnered with many entities through the RI Public Energy Partnership, and may either have your energy data on record in EPA Portfolio Manager (a no cost online energy analytics tool) or can assist you in getting your data together. Contact information for the URI team is listed at the end of this document. Ideally, you should have at least the two most recent years of data.

The table below shows a snapshot of the energy baseline report customized for EBF applications from Portfolio Manager, with fictional data for a Library. Each row shows total energy use and energy use intensity (EUI) per year. The first row shows data for the year ending on 12/31/2016. Since this year is not complete, the site energy use and site EUI values are “Not Available”. The second row shows data for the year 2015. The site energy use for that year was 2,642,546 kBtu. The site EUI is calculated by dividing site energy use by square footage of the building (the value in the column labeled “Property GFA- Self-Reported (ft²)”: $2,642,546 \text{ kBtu} / 20,985 \text{ ft}^2 = 125.9 \text{ kBtu/ ft}^2$. This particular building has data back to 2010. The report also provides values for greenhouse gas emissions, and use and cost by utility (omitted from the table below).

Table 1: Snapshot of Portfolio Manager Report

Data Request: Annual Energy Usage Template					
Date Generated: 09/26/2016 08:30 AM EDT					
Number of properties in report: 3					
Property Id	Property Name	Year Ending	Property GFA - Self-Reported (ft ²)	Site Energy Use (kBtu)	Site EUI (kBtu/ft ²)
4926428	Library	12/31/2016	20,985	Not Available	Not Available
4926428	Library	12/31/2015	20,985	2,642,546	125.9
4926428	Library	12/31/2014	20,985	2,602,632	124.0
4926428	Library	12/31/2013	20,985	2,621,433	124.9
4926428	Library	12/31/2012	20,985	2,586,244	123.2
4926428	Library	12/31/2011	20,985	2,567,365	122.3
4926428	Library	12/31/2010	20,985	2,459,301	117.2

How to calculate average energy use

For the energy baseline, you should take an average of at least two years of recent energy use and EUI. The table below shows how to do so for the years 2014-2015 in Microsoft Excel. In the cell where you want to put the average, type “=AVERAGE()”. With the cursor in the parentheses, use the mouse to highlight the cells you want to average. Press enter to perform the calculation. More help on using Excel can be found here: <https://support.office.com/en-us/excel>

Table 2: How to calculate average energy use

	A	B	C	D	E	F
	Property Id	Property Name	Year Ending	Property GFA - Self-Reported (ft ²)	Site Energy Use (kBtu)	Site EUI (kBtu/ft ²)
7	4926428	Library	12/31/2015	20,985	2,642,546	125.9
8	4926428	Library	12/31/2014	20,985	2,602,632	124.0
9			Average		=AVERAGE(E7:E8)	=AVERAGE(F7:F8)
10	4926441	Town Hall	12/31/2015	3,388	247,849	73.2
11	4926441	Town Hall	12/31/2014	3,388	250,846	74.0
12			Average		249,347.5	73.6
13	4926485	Senior Center	12/31/2015	4,369	456,918	104.6
14	4926485	Senior Center	12/31/2014	4,369	456,768	104.5
15			Average		456,843.0	104.6

How to calculate total cost and cost per square foot

First, you need to calculate total expenditure by adding the values for Electricity Cost (\$) and Natural Gas Cost (\$). You can average total expenditure in the same manner as described above. To calculate cost per square foot, divide total cost by the square footage. The table below shows energy use and EUI averages for 2014-2015 for five buildings.

Table 3: How to calculate total cost and cost per square foot

Property Name	Year Ending	Property GFA - Self-Reported (ft ²)	Site Energy Use (kBtu)	Site EUI (kBtu/ft ²)	Total Cost (\$)	Cost per Square Foot (\$/ft ²)
Library	Average	20,985	2,622,589	125.0	\$ 215,052	\$ 10.25
Town Hall	Average	3,388	249,348	73.6	\$ 17,454	\$ 5.15
Senior Center	Average	4,369	456,843	104.6	\$ 36,547	\$ 8.37
DPW	Average	5,880	361,987	61.5	\$ 26,787	\$ 4.56
Fire Dept.	Average	15,279	1,892,356	123.9	\$ 151,388	\$ 9.91

Using the Data to Make Observations

Recall the observations suggested for the baseline narrative, described in more detail below:

- ✓ Facilities with the highest energy consumption and/or expenditure
- ✓ Facilities with the highest energy use intensity and/or cost per square foot (SQFT)
- ✓ Facilities that have a noticeable increase or decrease in energy consumption and/or expenditure over time
- ✓ Potential reasons why facilities are showing certain data trends

Facilities with the highest energy consumption and/or expenditure

You should first look at average energy use and cost to determine which facilities have the highest energy consumption and/or expenditure. For the example table below, the highest consuming facilities are the Library (2.6 billion Btu) and the Fire Department (1.9 billion Btu). Together, these two facilities comprise just over \$366,440 in energy expenditures each year (\$215,052 + \$151,388).

Facilities with the highest energy use intensity and/or cost per SQFT

When accounting for size of the building (i.e. square footage), the Library and Fire Department still stand out as the highest consuming facilities (125.0 kBtu/ ft² and 123.9 kBtu/ ft²). The Senior Center also has a relatively high EUI: 104.6 kBtu/ ft². The EBF applicant for this entity should note these facilities as high-consuming and reflect on why these facilities consume the energy they do.

Facilities that have a noticeable increase or decrease in energy consumption and/or expenditure over time

Referring back to Table 1's report of the Library's energy use and EUI from 2010-2016, we can make some inferences on the energy use trends. Energy use has increased steadily over time (117.2 kBtu/ ft² in 2010 to 125.9 kBtu/ ft² in 2015). The (Efficient Buildings Fund) EBF applicant for this entity should note this trend and reflect on why energy consumption may be increasing.

Potential reasons why facilities are showing certain data trends

It is important to understand trends in energy consumption and expenditure, as any significant increases, decreases, or abnormal bills could indicate potential areas of energy efficiency improvement. Examine the energy consumption and expenditure for each property on a month-to-month basis. There will be seasonal trends, such as high consumption in the cold winter months and hot summer months, and relatively low consumption in the mild spring and fall months. Look for consumption or expenditure that stick out as being very high or very low, and use your intuition and external resources to investigate why these trends or abnormalities may have occurred.

Some possible causes of energy consumption or expenditure trends may include:

- Changes to energy supply costs
- Energy efficiency measures implemented
- Changes in infrastructure, machinery, or appliances
- Changes in operating hours or number of employees in the building
- Abnormal weather patterns (e.g. a mild winter or temperate summer)
- Other causes (e.g. see an example baseline narrative)

Assistance from the University of Rhode Island

The URI team is available for assistance with energy data collection, baseline narrative descriptions, and energy management plan development. You can schedule a meeting with URI to discuss your energy data, including training on how to use Portfolio Manager for energy data tracking. Contact Simona Trandafir at mtrandafir@uri.edu for more information.