



MDMS UPDATE

~ METER DATA MANAGEMENT SYSTEM ~



US Army Corps of Engineers®

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FROM THE PROGRAM MANAGER

Welcome to our February - March 2020 issue of the *Meter Data Management System (MDMS) Update*, designed to keep you informed on the growth and latest developments of the MDMS and the Army Metering Program.

There has been a lot of interest in our new Active Energy Management training session. In this session, and the detailed article below, we teach you how to use five of the modules in MDMS to support your Energy Management and Measurement & Verification requirements.

On page 6, we highlight one new report, as well as the enhancements to another report. The new EUI Commodity Comparison Report provides a comparison report of every building on the selected site/installation for the time period selected. Additional organizational options and more fields have been added to the update Base Load Comparison Report.

We have had some good feedback on the recent training webinars. Vicky Newman, a new REM at U.S. Army Reserve, Fort Shafter FLATS, said "Thank you for all these classes. They are very helpful." And Joseph McClung, Energy Manager at West Virginia Army National Guard shared "You did a great job. Great Job, very useful information." "This is quantum leap compared to the old interface and functionality. I can't wait to get our meters reporting and use the system," shared Energy Manager Ryan Hoesly with the 81st Readiness Division. Keep the feedback coming!

As always, our mission is to improve the MDMS experience for end users. Your input is valuable, and we welcome your feedback via the Army Meter Service Desk (AMSD) at: usarmy.coe-huntsville.cehnc.mbx.armymeterhelp@



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ACTIVE ENERGY MANAGEMENT

Without a continuous diagnostics approach, energy usage will be 20% to 40% higher than required to provide a comfortable and healthy indoor environment. Active Energy Management (AEM) is the cradle-to-grave strategy that highlights facility energy use, pinpoints anomalies, tracks trends, benchmarks installation and/or building performance, identifies effective saving opportunities and verifies energy savings.

The intent of the MDMS training courses/webinars is to show users how to fully utilize the MDMS tools in all functional aspects of energy management and continuous commissioning, thus resulting in energy savings. Building on this intent, and in support of this strategy, the newly offered AEM course is explicitly intended to show Energy Managers (EMs) and Resource Efficiency Managers (REMs) how to validate those estimated savings from their Energy Conservation Measures (ECMs) by using MDMS for Measurement and Verification (M&V).

The first MDMS AEM course was offered in December 2019, with 21 people in attendance. And, as with all the other MDMS training sessions, it will continue to be improved and offered repeatedly. There has been a lot of

interest in future sessions for those EMs and REMs that were unable to make the first few offerings. So, for those of you that were unable to attend this session, or who just want a refresher, this article will brief you on the value and content of the session.

We have identified five tools within MDMS that will support your M&V requirements:

1. Using the Custom Usage report for a quick check on overall numbers
2. Using the Monthly Usage report as a quick check with monthly granularity
3. Using the Daily Usage report to fine tune the analysis to days vs months
4. Using the Interval Usage query for a deeper dive and more detail
5. Using our M&V project method specifically designed to track savings over time

To demonstrate these methods, we are going to use Fort Carson, building 2260 (Brigade Headquarters), as an example. We will compare (*Continued on pg.2*)

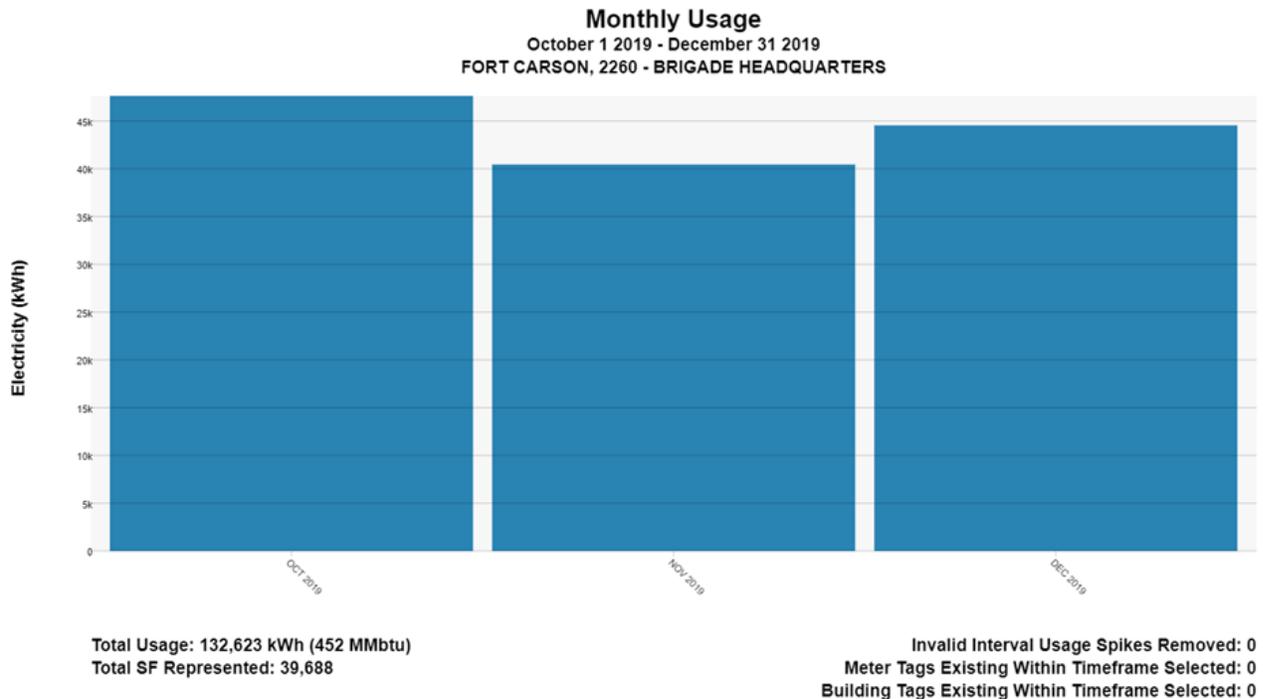
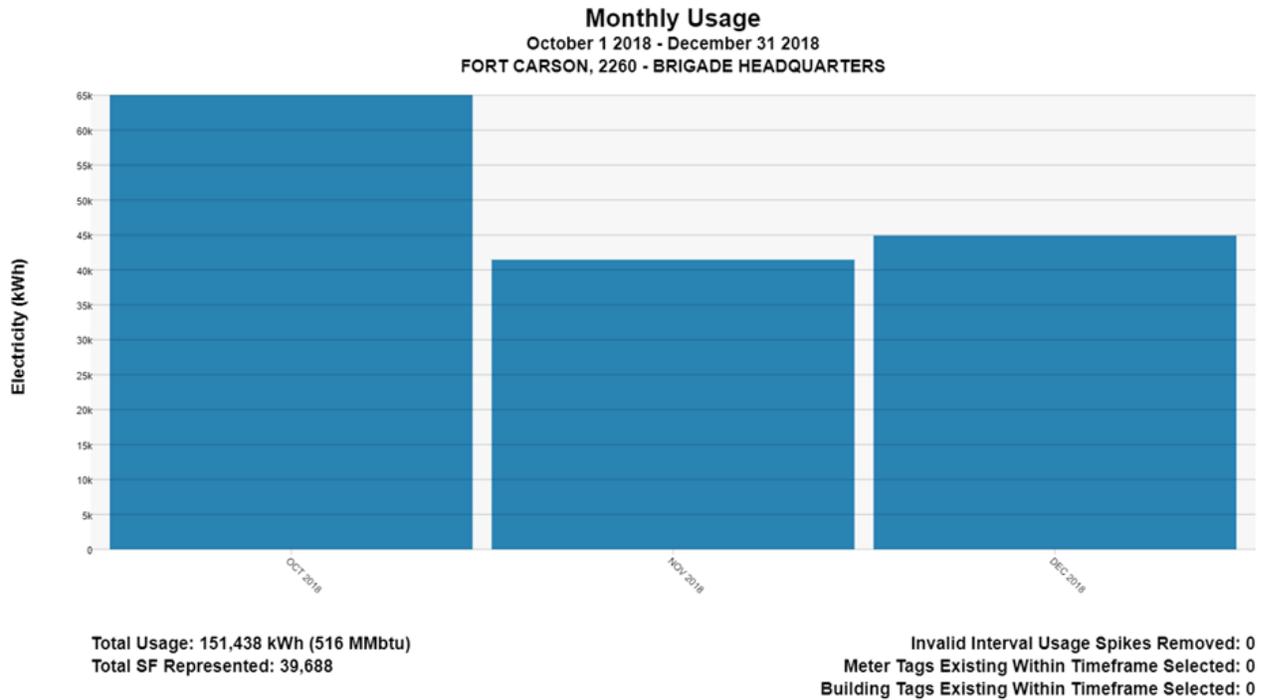


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ACTIVE ENERGY MANAGEMENT (CONT. FROM PG. 1)

electric usage from two weather similar time periods to make a quick determination if there was any usage savings—independent of weather—after an ECM took place in early October 2019. So, let's look at October – December 2018 and October – December 2019.

Let's start with Step 1: Using the Custom Usage report for a quick check on overall numbers. We are going to first pull the October – December 2018 time period for our building and make note of the kWh value returned. You can see in our resulting graph below, that the kWh is 151,438. Then, we will pull the October – December 2019 time period for building 2260 and make note of the 132,623 kWh value returned in our lower graph below. *(Continued on pg.3)*



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Now, to estimate the savings percentage as it pertains to usage, we will apply the following formula: (previous period's usage – post-change period's usage)/previous period's usage. So, $(151,438 - 132,623) / 151,438 * 100 = 12\%$ savings.

Now, let's run Step 2: Using the Monthly Usage report as a quick check with monthly granularity. We are going to run the Monthly Usage report for the same two time periods and export those results to Excel. We are then going to sum up the usage for the two time periods and use the same formula to calculate the savings. See example Excel below. So, we get the same percent savings, which in this instance isn't a surprise since the sum of the usage values match those that we got in the Custom Usage step. So, this step validates the previous report but also provides the results in a tabular form.

Monthly Usage Report									
Building Number	Building Name	Building SqFt	Site Name	Month/Year	Commodity	Usage	Units	Usage MMBtu	Units BTU
2260	BRIGADE HEADQUARTERS	39688	FORT CARSON	Oct2018	Electricity	65051.50	kWh	221.96	MMBtu
2260	BRIGADE HEADQUARTERS	39688	FORT CARSON	Nov2018	Electricity	41466.82	kWh	141.49	MMBtu
2260	BRIGADE HEADQUARTERS	39688	FORT CARSON	Dec2018	Electricity	44920.05	kWh	153.27	MMBtu
2260	BRIGADE HEADQUARTERS	39688	FORT CARSON	Oct2019	Electricity	47629.13	kWh	162.52	MMBtu
2260	BRIGADE HEADQUARTERS	39688	FORT CARSON	Nov2019	Electricity	40446.43	kWh	138.01	MMBtu
2260	BRIGADE HEADQUARTERS	39688	FORT CARSON	Dec2019	Electricity	44548.04	kWh	152	MMBtu
						Oct - Dec 2018:	151438.37		
						Oct - Dec 2019:	132623.60		
						% Usage Savings:	12%		

Now, on to Step 3: Using the Daily Usage report to fine tune the analysis to days vs months. Since we know the day that the changes took effect, we can narrow the dates down to the day with this report. We will pull October 8, 2018 at 00:00 to January 8, 2019 at 23:00 and export to Excel. Then, we will pull October 8, 2019 at 00:00 to January 8, 2020 at 23:00 and export to Excel. We then paste the timestamp and kWh for both time periods side by side and then remove any extra entries on the second time period, so that both time periods have the same number of entries.

We are then going to sum up the Usage for the two time periods and use the same formula to calculate the savings. See the example Excel below. Note that our percent savings is 10%. Thus, using the Daily Usage report results gets the percent savings even tighter because we can get down to the actual dates that the change occurred.

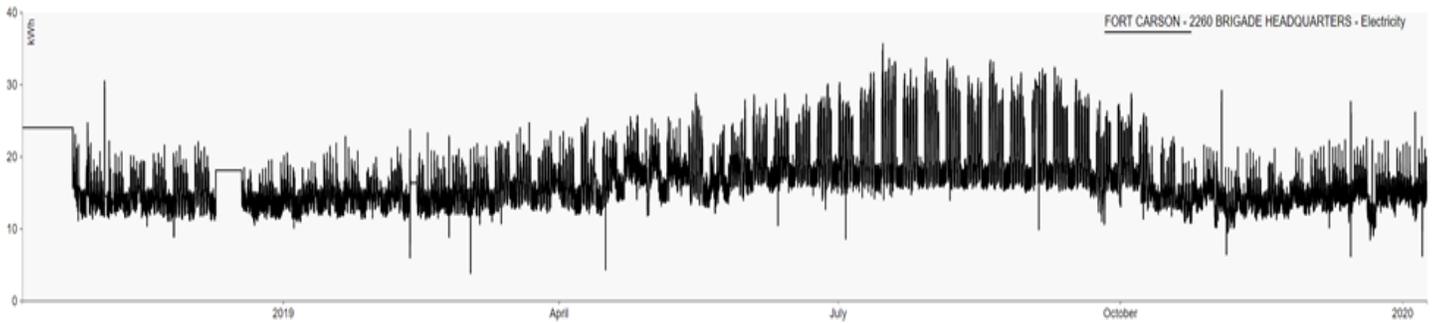
Daily Usage Data										
Site	Building	SF	Meter	Commodity	Timestamp	Usage	Units	Timestamp	Usage	Units
FORT CARSON	2260 BRIGADE HEADQUARTERS	39688	CARS_BLDG_2260	Electricity	2018-10-08	2311.22	kWh	2019-10-08	1774.14	kWh
FORT CARSON	2260 BRIGADE HEADQUARTERS	39688	CARS_BLDG_2260	Electricity	2018-10-09	2311.22	kWh	2019-10-09	1704.30	kWh
FORT CARSON	2260 BRIGADE HEADQUARTERS	39688	CARS_BLDG_2260	Electricity	2018-10-10	2311.22	kWh	2019-10-10	1512.11	kWh
FORT CARSON	2260 BRIGADE HEADQUARTERS	39688	CARS_BLDG_2260	Electricity	2018-10-11	2311.22	kWh	2019-10-11	1490.64	kWh
FORT CARSON	2260 BRIGADE HEADQUARTERS	39688	CARS_BLDG_2260	Electricity	2018-10-12	2311.22	kWh	2019-10-12	1345.12	kWh
FORT CARSON	2260 BRIGADE HEADQUARTERS	39688	CARS_BLDG_2260	Electricity	2019-01-02	1443.22	kWh	2020-01-02	1482.57	kWh
FORT CARSON	2260 BRIGADE HEADQUARTERS	39688	CARS_BLDG_2260	Electricity	2019-01-03	1383.71	kWh	2020-01-03	1497.30	kWh
FORT CARSON	2260 BRIGADE HEADQUARTERS	39688	CARS_BLDG_2260	Electricity	2019-01-04	1362.63	kWh	2020-01-04	1361.12	kWh
FORT CARSON	2260 BRIGADE HEADQUARTERS	39688	CARS_BLDG_2260	Electricity	2019-01-05	1224.88	kWh	2020-01-05	1385.87	kWh
FORT CARSON	2260 BRIGADE HEADQUARTERS	39688	CARS_BLDG_2260	Electricity	2019-01-06	1220.83	kWh	2020-01-06	1571.04	kWh
FORT CARSON	2260 BRIGADE HEADQUARTERS	39688	CARS_BLDG_2260	Electricity	2019-01-07	1376.88	kWh	2020-01-07	1514.14	kWh
FORT CARSON	2260 BRIGADE HEADQUARTERS	39688	CARS_BLDG_2260	Electricity	2019-01-08	1353.20	kWh	2020-01-08	1529.27	kWh
						146040.89			131818.30	
						% Usage Savings:	10%			

For Step 4: Using the Interval Usage query for a deeper dive and more detail, we are going to use the narrowed dates as was done in Step 3 above. We will pull October 8, 2018 at 00:00 to January 8, 2020 at 23:00. The great thing about the Interval Usage query is the graph where you can visually see when the usage changes. Note our example below. Remember that while you are actively on the Interval Usage query page with this graph displayed, you can use the zoom button or your roller wheel on your mouse to zoom into that early October timeframe when the changes were made. (Continued on pg.4)



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In addition, we are going to export the Interval Usage results to Excel. We then paste the timestamp and kW interval readings for both time periods side by side and then remove any extra entries on the second time period, so that both time periods have the same number of entries. Note again that our percent savings is 10%, due to narrowing in on exact dates. While MDMS doesn't include the weather data at this time, it will be added in the future. But, the Cooling Degree Days (CDD) difference was only 2 degrees over 2018, so this is insignificant from a CDD perspective. *(Continued on pg.5)*

Interval Usage: FORT CARSON - 2260 BRIGADE HEADQUARTERS				
10/08/2018 00:00		01/08/2020 23:59		
Electricity				
2018-10-08 00:00	24.08	2019-10-08 00:00	14.68	
2018-10-08 00:15	24.08	2019-10-08 00:15	13.68	
2018-10-08 00:30	24.08	2019-10-08 00:30	14.93	
2018-10-08 00:45	24.08	2019-10-08 00:45	14.78	
2018-10-08 01:00	24.08	2019-10-08 01:00	14.02	
2018-10-08 01:15	24.08	2019-10-08 01:15	14.34	
2018-10-08 01:30	24.08	2019-10-08 01:30	15.29	
2018-10-08 01:45	24.08	2019-10-08 01:45	13.77	
2019-01-08 21:15	13.49	2020-01-08 21:15	14.04	
2019-01-08 21:30	11.91	2020-01-08 21:30	14.61	
2019-01-08 21:45	12.64	2020-01-08 21:45	15.77	
2019-01-08 22:00	13.99	2020-01-08 22:00	14.61	
2019-01-08 22:15	12.55	2020-01-08 22:15	14.73	
2019-01-08 22:30	12.72	2020-01-08 22:30	15.45	
2019-01-08 22:45	13.34	2020-01-08 22:45	14.43	
2019-01-08 23:00	12.59	2020-01-08 23:00	14.45	
2019-01-08 23:15	13.28	2020-01-08 23:15	15.37	
2019-01-08 23:30	13.27	2020-01-08 23:30	14.4	
2019-01-08 23:45	12.5	2020-01-08 23:45	13.92	
	146059.45		131752.21	
% Usage Savings:		10%		



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And finally, let's perform Step 5: Using our M&V project method specifically designed to track savings over time. We used the M&V module to create a new project for our Fort Carson example. Then, we run the Energy project cost analysis for Oct - Dec 2019 and then export to Excel. With some creative formatting, and using the same principal calculations for savings, here is our project cost analysis:

Energy Project Cost Analysis							
Site	Bldg # 2260 - BRIGADE HEADQUARTERS (39688ft2) Meter name: CARS_BLDG_2260						
FORT CARSON							
Title	Project ID	IMCOM ID	Contract ID				
Building 2260 ECM	20192260		192837465				
Project funding source	Program year	Project start date	Project completion date				
Other	2019	9/7/2019	10/8/2019				
Description	Notes						
evaluate savings for 2260							
Project inputs							
MDMS meters - usage							
Commodity	Description	Rate (\$/kWh)	Monthly usage			Total	
Electricity		0.085	Oct - 2019	Nov - 2019	Dec - 2019		
			47629.13	40446.43	44548.04	132623.60	
			Oct - 2018	Nov - 2018	Dec - 2018		
			65051.50	41466.82	44920.05	151438.37	
Manual meters - usage						% Usage Savings:	12%
Commodity	Description	Rate (\$/kWh)	Monthly usage				
Electricity		0.085	Oct - 2019	Nov - 2019	Dec - 2019		
			0 kWh	0 kWh	0 kWh		

Now that we've used all five methods for using MDMS for Measurement and Verification (M&V), it's reassuring that all methods returned results within 1-2% of each other.

As a reminder, here are our recommendations for ECMs:

- Do no-cost/low-cost measures first. The training and guidance from the Association of Energy Engineers (AEE), American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), and the U.S. Department of Energy (DOE) is consistent on this as the priority.
- Then, implement a program on low-cost repair or replacement projects, under the same guidance criteria as before, except the dollar threshold of the project is based on Army guidance and garrison guidance.

Following our Monitoring Commissioning Process (MCx) will effectively provide the Army with the most effective solutions by identifying the highest returns with the low-cost/no-cost solutions. The savings for the first section are based on the M&V results for the buildings evaluated in the early steps of the MCx. The savings realized were 10% based on the hourly reports, which will have the highest degree of accuracy. We have extrapolated the savings based on the lower end of the savings range at 25%, based on the 25-35% cited in many sources, including both the Guide to Energy Management and the Energy Management Handbook. When we started this program, our MDMS reports calculated 99% of the Army buildings had at least one system with overridden schedules. This number has dropped over the past 18 months to 78% buildings with overridden schedules—due to the installations getting involved in MCx—so again the savings potential is extremely large.

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NEW EUI COMMODITY COMPARISON REPORT

In the continuing effort to add more tools to the Energy Manager toolbox, yet another new module has been added to MDMS. The new EUI Commodity Comparison Report provides a comparison report of every building on the selected site/installation for the time period selected. The report is sorted in descending order based on Total EUI. The user has the ability to sort ascending to descending, as well as descending to ascending, on any of the column headings.

The report automatically has your default site selected, so that you can then just select the time period. However, you can unselect the checkbox for default site and then select any installation or site.

This report enables you to quickly compare buildings on your installation/site to see the top EUI offenders. These may be legitimately high intensity users or it may highlight buildings of a particular category that should be nowhere near the EUI they are currently reporting. This gives a very quick look to highlight buildings that need some serious investigation.

EUI Commodity Comparison

Export to Excel

View report options

Site Name	Building Number	Building Name	Building SqFt	Category Code Name	Year Built	Total EUI	Electric EUI	Electric % of Total	Gas EUI	Gas % of Total
REDSTONE ARSENAL	5306	SPARKMAN CENTER.	32911	REF/A-C BL	1994	138.70	138.70	100.00	0.00	0.00
REDSTONE ARSENAL	5286	5286 HEATING PLANT BUILDING	1303	HEAT PLT B	2003	132.13	132.13	100.00	0.00	0.00
REDSTONE ARSENAL	8041	UTILITY BLDG	140	PLT/UTIL B	1979	105.67	105.67	100.00	0.00	0.00
REDSTONE ARSENAL	5201	INFO PROCESSING	38203	INFO PROC	1962	71.38	71.38	100.00	0.00	0.00
REDSTONE ARSENAL	7549	STORAGE GP INST	3200	INST STR O	1966	66.99	13.87	20.71	53.12	79.29
REDSTONE ARSENAL	4488	USAG - REDSTONE HQ	302526	AC/FLT EQ	1956	57.42	57.42	100.00	0.00	0.00
REDSTONE ARSENAL	3313	REF/A-C BLDG	762	COMPRESS A	1955	43.74	43.74	100.00	0.00	0.00
REDSTONE ARSENAL	3710	POST OFFICE	12697	INFO SYS P	1959	31.90	31.90	100.00	0.00	0.00
REDSTONE ARSENAL	3707	LAB/ TST BLDG GP	15858	LAB/TST BL	1971	29.26	19.77	67.58	9.49	32.42
REDSTONE ARSENAL	7250	GM BLDG	7464	GM BLDG	2009	24.46	24.46	100.00	0.00	0.00
REDSTONE ARSENAL	376	CHAPEL	25560	CHAPEL	1976	23.76	13.61	57.26	10.15	42.74
REDSTONE ARSENAL	1500	DFMWR HQ/BINGO HALL	29238	CMTY/CONF	1967	23.03	11.96	51.93	11.07	48.07

UPDATED BASE LOAD COMPARISON REPORT

What used to be known as the Plug Load Comparison report has been renamed to the Base Load Comparison report. Plug load is the theoretical minimum loading for a building when it's unoccupied, whereas base load is the normal minimum loading on a building, which includes the plug load of the building plus everything else that's been left on continually. In addition to Installation and Site as Organizational options, you now have the ability to run the report at the HQDA, Command, and Region level. Also, four new fields have been added to the report: 12 Months Consumption (kWh), Baseload as % Consumption, 12 Month EUI, and Climate Zone.

Base Load Comparison

HQDA

Add Command Add Region

Add Installation Add Site

Generate Report

12 Month EUI

Installation Remove

PICATINNY ARSENAL X

Export to Excel

25 records per page

Command	Region	Installation	Site	Building	Square Footage	Cat Code	Base Load (KW)	Watts/SF	12 Months Consumption (kWh)	Baseload as % Consumption	12 Month EUI (Electric)	Climate
IMCOM	SUSTAINMENT	PICATINNY ARSENAL	PICATINNY ARSENAL	351 - George C. Hale Building (Information System Facility)	32,461	INFO PROC (3131)	36,509	1.125	2168460.232	14.749	227.938	5A
IMCOM	SUSTAINMENT	PICATINNY ARSENAL	PICATINNY ARSENAL	3150 - PRECISION MACHINE SHP / PHYS FIT CTR	135,737	PREC MACH (32110)	52	0.383	1902838.413	23.939	47.833	5A
IMCOM	SUSTAINMENT	PICATINNY ARSENAL	PICATINNY ARSENAL	95 - W. I. BELL BUILDING	79,598	ORDNANCE B (31510)	164,657	2.069	1748946.394	82.472	74.972	5A
IMCOM	SUSTAINMENT	PICATINNY ARSENAL	PICATINNY ARSENAL	3028 - CHEMISTRY/ADM LAB-W CLARK RD	29,564	CHEMISTRY (31010)	105	3.552	1531571.68	60.056	176.767	5A
IMCOM	SUSTAINMENT	PICATINNY ARSENAL	PICATINNY ARSENAL	526 - 2nd LT John T. Wroblewski Bldg (Pyrotechnics Research/Tech)	24,053	AMMO/EXPL (31620)	104,626	4.35	1287183.694	71.204	182.599	5A
IMCOM	SUSTAINMENT	PICATINNY ARSENAL	PICATINNY ARSENAL	60 - LAB GP/ADM GP	31,404	LAB/TST BL (31920)	142	4.522	1250244.549	99.494	135.843	5A
IMCOM	SUSTAINMENT	PICATINNY ARSENAL	PICATINNY ARSENAL	307 - LAB/TST BLDG GP	10,694	LAB/TST BL (31920)	8,798	0.823	1072401.793	7.187	342.172	5A
IMCOM	SUSTAINMENT	PICATINNY ARSENAL	PICATINNY ARSENAL	31 - SOFTWARE ENGINEER BUILDING	78,890	ELCTRN EQ (31320)	0	0	1054815.944	0	45.623	5A

