



MDMS UPDATE

~ METER DATA MANAGEMENT SYSTEM ~



US Army Corps
of Engineers®

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FROM THE PROGRAM MANAGER

Welcome to our April - May 2022 issue of the *Meter Data Management System Update (MDMS)*, designed to keep you informed on the growth and latest developments of the Meter Data Management System and the Army Metering Program.

The Advanced Metrics for Systems course joined the MDMS webinar training rotation in September 2020. This class combines a series of three metrics together into a stop-light chart. Up until now, the MDMS Outreach Team has been manually generating these charts based on color-coding and if-then logic to highlight buildings that are performing well, those that need work and those that may have a bad meter.

We are excited to introduce the new

module that automates the process of generating these color-coded stop-light charts. This newsletter is dedicated to the introduction of this tool and provides many examples of how to use the chart, and then perform further analysis with the MDMS Benchmarking module to determine if a meter is bad, not reporting properly, or is showing excessive energy usage.

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: cehnc-army-meter-help@usace.army.mil



From the Program Manager 1

Advanced Metrics—Stop Light Chart 1-5

ADVANCED METRICS—STOP LIGHT CHART

The newly added module “Advanced Metrics – Stop Light Chart” automates the color-coded stop-light chart that previously was manually created and taught in our Advanced Metrics for Systems course. The chart combines a series of three metrics together into a stop-light chart and is tied to a category code for the 30 largest category codes in the Army. The chart is color-coded for each of the three metrics to show where each building falls compared to its peers. There is an if-then logic for each category to tell you if your meter is bad, where you stand against other buildings i.e., top 25% or bottom 25 %, etc.

What are the three factors to compare?

- Baseload
 - Not affected by weather
 - Minimum point of usage that establishes the base for flat non-variable usage
 - Very good factor for telling us certain things
 - Includes plug plus whatever systems were left on
 - Calculated in watts per square feet (Watts/sf)
- % Baseload of Consumption
 - Not affected by weather
 - Divided by your total consumption
 - Theoretically 10-18% is the bottom boundary
 - The top boundary is set at 75%
 - Sets the base for energy savings potential
- Extrapolated EUI
 - Dependent on weather zone
 - Usage based on unit of size for easy comparison
 - Very good metric for the Army (Continued on pg. 2)



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ADVANCED METRICS—STOP LIGHT CHART (CONT. FROM PG. 1)

Let’s look at one example, generated by the Base Load Comparison module, where we’ve got all three factors for Company Headquarters (CO HQ) Category Codes (Cat Code). The yellow highlighted column shows the Watts/sf, the green column is the Baseload as % of Consumption, and the blue column is the Extrapolated EUI for 12 months. This is a very quick and easy way to do this comparison.

Base Load Comparison										median	0.257	29.33	25.321	27.337		
Comma	Reg	Ir	Site	Building	RPAUIT	Square	Cat Code	Base Load	Watts/Sf	12 Months C	Baseload	12 Months	12 Months	% of D	Climate	
IMCOM	READI	FOFFORT	HOOD	29016 - CO	181636	18818	CO HQ BLDG (14185)	4.95	0.263	169,049.96	25.58	30.653	30.737	99.726	2A	
IMCOM	SUSTA	ABERDEEN	PROV	4403 - 179	230789	14314	CO HQ BLDG (14185)	10.898	0.761	125,855.63	75.643	30.001	30.083	99.726	4A	
IMCOM	TRAINI	FOFFORT	BENNING	5020 - CO	282371	3570	CO HQ BLDG (14185)	0.007	0.002	31,288.08	0.199	29.904	29.904	100	3A	
IMCOM	TRAINI	FOFFORT	BENNING	2944 - CO	282558	23987	CO HQ BLDG (14185)	6.885	0.287	209,954.73	28.726	29.866	29.866	100	3A	
IMCOM	READI	FOFFORT	HOOD	18021 - CO	181606	5945	CO HQ BLDG (14185)	0.358	0.06	51,704.29	6.065	29.676	29.676	100	2A	
IMCOM	TRAINI	FOFFORT	BENNING	2838 - TRA	282477	40536	CO HQ BLDG (14185)	22.158	0.547	350,849.54	55.325	29.533	29.533	100	3A	
IMCOM	READI	FOFFORT	BLISS	21145 - CO	1103437	63463	CO HQ BLDG (14185)	16.899	0.266	548,687.12	26.979	29.5	29.5	100	3B	
IMCOM	READI	FOFFORT	HOOD	39022 - CO	595828	25168	CO HQ BLDG (14185)	7.783	0.309	212,823.99	31.947	28.853	28.933	99.726	2A	
IMCOM	TRAINI	FOFFORT	BENNING	2883 - TF	281624	8181	CO HQ BLDG (14185)	2.254	0.276	68,994.80	28.624	28.776	28.776	100	3A	
IMCOM	TRAINI	FOFFORT	BENNING	5015 - CO	282366	5157	CO HQ BLDG (14185)	0.067	0.013	43,261.42	1.353	28.624	28.624	100	3A	
IMCOM	READI	FOFFORT	BRAGG	M7123 - C	1051645	26622	CO HQ BLDG (14185)	1.998	0.075	223,282.41	7.841	28.618	28.618	100	3A	
IMCOM	PACIFI	OKII	TORII	COMMUNIC	123 - SIGN	583302	7328	CO HQ BLDG (14185)	3.993	0.545	45,770.75	56.954	21.312	28.599	74.521	3A
IMCOM	READI	FOFFORT	BLISS	1034 - CO	1313810	15152	CO HQ BLDG (14185)	4.088	0.27	125,359.44	28.564	28.23	28.23	100	3B	
IMCOM	TRAINI	FOFFORT	RUCKER	5901 - WC	1106682	4730	CO HQ BLDG (14185)	1.794	0.379	33,753.42	40.186	24.349	28.214	86.301	3A	
IMCOM	TRAINI	FOFFORT	BENNING	2945 - CO	282559	30357	CO HQ BLDG (14185)	8.285	0.273	250,763.60	28.942	28.186	28.186	100	3A	
IMCOM	READI	FOFFORT	BRAGG	B2128 - CO	1047682	12804	CO HQ BLDG (14185)	6.716	0.524	50,086.58	55.992	13.347	27.999	47.671	3A	
IMCOM	READI	FOFFORT	BRAGG	X4916 - CO	1063572	14751	CO HQ BLDG (14185)	5.808	0.394	119,354.69	42.627	27.608	27.608	100	3A	
IMCOM	READI	FOFFORT	BRAGG	A2444 - CO	297753	20096	CO HQ BLDG (14185)	8.743	0.435	161,004.22	47.57	27.337	27.337	100	3A	
IMCOM	READI	FOFFORT	CARSON	7450 - CO	611198	27613	CO HQ BLDG (14185)	10.871	0.394	220,625.50	43.164	27.263	27.263	100	5B	
IMCOM	PACIFI	USA	SCHOFIELD	BARF	2089 - CO	573476	19221	CO HQ BLDG (14185)	7.627	0.397	152,052.21	43.578	26.992	27.216	99.178	1A
IMCOM	PACIFI	USA	SCHOFIELD	BARF	2094 - CO	605501	9072	CO HQ BLDG (14185)	4	0.441	71,579.99	48.55	26.922	27.145	99.178	1A
IMCOM	READI	FOFFORT	BRAGG	M7242 - C	1034470	55333	CO HQ BLDG (14185)	8.627	0.156	432,217.66	17.484	26.653	26.653	100	3A	
IMCOM	READI	FOFFORT	BLISS	1033 - CO	1313674	15156	CO HQ BLDG (14185)	3.013	0.199	118,058.58	22.356	26.579	26.579	100	3B	
IMCOM	READI	FOFFORT	HOOD	39042 - CO	570816	24200	CO HQ BLDG (14185)	6.803	0.281	187,366.49	31.717	26.418	26.491	99.726	2A	
IMCOM	READI	FOFFORT	BLISS	21265 - CO	1119068	63463	CO HQ BLDG (14185)	12.937	0.204	492,172.05	23.026	26.462	26.462	100	3B	
IMCOM	READI	FOFFORT	HOOD	91232 - CO	286140	5968	CO HQ BLDG (14185)	1.084	0.182	46,027.35	20.576	26.315	26.388	99.726	2A	
IMCOM	PACIFI	USA	SCHOFIELD	BARF	766 - CO	594873	17377	CO HQ BLDG (14185)	7.613	0.438	132,586.60	49.888	26.034	26.25	99.178	1A

In our updated course offering, we break this comparison down further using the stop-light charts – which you can now generate automatically with the “Advanced Metrics – Stop Light Chart” module at the Army Headquarters, Command, Region, Installation, or site-level. The report can be found under the Benchmarking sub-menu on the Energy Management page. While we will analyze and clarify specific examples in this article, the legend below shows the classifications of the color-coding in each of the three metrics analyzed.

Legend	Watts/SF	Baseload as % Consumption	Extrapolated EUI
Bad Meters	Red	Red	Red
Needs Help	Yellow	Yellow	Yellow
OK	Green	Green	Green
Median	Blue	Blue	Blue
Good	Light Green	Light Green	Light Green
Great	Light Blue	Light Blue	Light Blue
N/A*	Grey	Grey	Grey

*No other buildings in Cat Code for reliable comparison data.

In our course, the first example we look at is the Watts/SF for the top range of the report results, shown below. We ran the report for IMCOM, filtered the exported report on the CO HQ Cat Code and then sorted the Watts/SF column, outlined with the purple box, in descending order. You can see the Median is 0.267 for the ~386 buildings in this IMCOM category code. Notice the color-coded cells based on their values against the median and other entries within that column. The red cells are greater than 2 times the median which has been the point where we find the probability of being a bad meter is above 85%. These indicate bad meters or a baseload that was not set properly. We apply the color-coding on the other two columns, the Baseload as % of Consumption and the Extrapolated EUI, which we cover in our training course, one thing to note here in this example is we have a row in the middle where all three of our factors are red. This indicates a very high likelihood that this is a bad meter. (Continued on pg. 3)

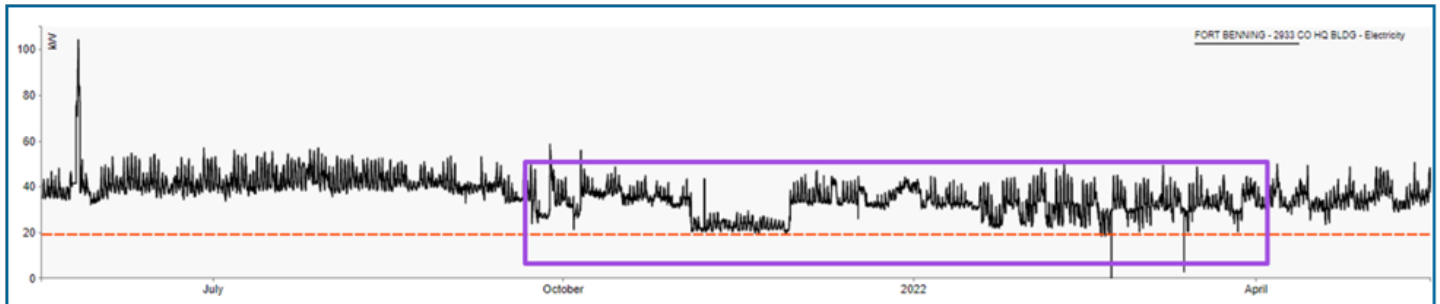


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ADVANCED METRICS—STOP LIGHT CHART (CONT. FROM PG. 2)

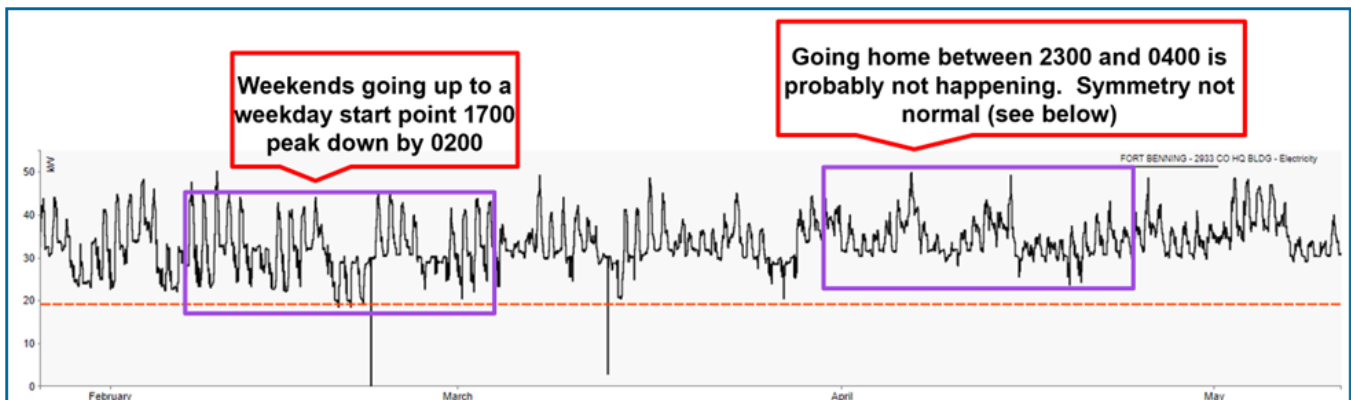
Comm and Site	Building	Square Footage	Cat Co	Base Load (KW)	Watts/Sq Ft	2 Months Consumption (kWh)	Baseload as % Consumption	12 Months EUI (Electric)	12 Months Extrapolated EUI (Electric)	% of Data Availat	Climat
IMCOM FORT BRAGG C4626 - COMPANY HEADQUARTERS		10,927,493		285.25	0.267	148,457.146	991.458	12.704	21.568	58.904	3A
IMCOM FORT RUCKER 6814 - SECURITY GUARD HOUSE		4,149	CO HQ BL	21.03	5.069	411,920.451	44.728	338.764	338.764	100.000	3A
IMCOM FORT CARSON 517 - COMPANY OPERATIONS		16,710	CO HQ BL	39.24	2.349	394,470.927	87.161	80.550	80.550	100.000	5B
IMCOM FORT STEWAR 1531 - 14185 - CO HQ BLDG		13,595	CO HQ BL	31.40	2.310	5,111.499	103.210	1.283	66.895	1.918	2A
IMCOM FORT BENNING 2932 - CO HQ BLDG		6,824	CO HQ BL	13.99	2.051	159,714.709	76.750	79.861	79.861	100.000	3A
IMCOM FORT HOOD 43030 - COMPANY HEADQUARTERS		5,939	CO HQ BL	11.51	1.939	169,014.676	59.683	97.104	97.104	100.000	2A
IMCOM FORT BENNING 2884 - 14TH CSH CO HQ BLDG		6,335	CO HQ BL	12.25	1.934	206,548.508	51.959	111.259	111.259	100.000	3A
IMCOM FORT BENNING 2933 - CO HQ BLDG		10,761	CO HQ BL	19.19	1.784	327,657.156	51.318	103.895	103.895	100.000	3A
IMCOM CAMP ZAMA 106 - USANEC Office (Fort Benning)		2,261	CO HQ BL	3.98	1.761	53,956.417	64.651	81.427	81.427	100.000	3A
IMCOM TORII COMMUN 100 - Demo - 1-1ST COMMUN		34,215	CO HQ BL	55.10	1.611	2,560,738.832	13.015	255.373	369.896	69.041	3A
IMCOM FORT BRAGG A2547 - CO HQ BLDG		41,925	CO HQ BL	56.75	1.354	796,190.039	62.441	64.799	64.799	100.000	3A
IMCOM FORT CARSON 2757 - CO HQS BLDG/A		24,000	CO HQ BL	32.00	1.333	355,662.804	78.816	50.565	50.565	100.000	5B
IMCOM FORT LEWIS 12931 - READINESS MCH		16,317	CO HQ BL	21.74	1.333	197,936.772	81.993	41.392	48.579	85.205	4C
IMCOM FORT BRAGG A4251 - CO HQ BLDG		41,925	CO HQ BL	54.42	1.298	700,170.319	68.093	56.985	56.985	100.000	3A
IMCOM FORT BRAGG D1713 - CO HQ BLDG		1,584	CO HQ BL	1.99	1.261	47,267.555	37.016	101.820	101.820	100.000	3A
IMCOM FORT RUCKER 5911 - MCCAFFERTY HALL		27,660	CO HQ BL	34.26	1.239	688,533.803	43.592	84.938	84.938	100.000	3A
IMCOM FORT MYER 249 - 4th BN/3rd INF/Co		26,002	CO HQ BL	31.43	1.209	963,075.831	28.590	126.381	126.381	100.000	4A
IMCOM FORT BRAGG A6057 - COMPANY HEADQUARTERS		1,821	CO HQ BL	1.95	1.075	36,182.437	47.390	67.798	67.798	100.000	3A
IMCOM FORT BENNING 259 - COMPANY HEADQUARTERS		16,432	CO HQ BL	17.60	1.071	242,667.914	63.554	50.391	50.391	100.000	3A
IMCOM FORT BENNING 2930 - 75TH CO HQ's BLDG		14,077	CO HQ BL	14.28	1.015	224,137.873	55.830	54.329	54.329	100.000	3A
IMCOM FORT BRAGG 33327 - PrchtTeamHQ/G		36,000	CO HQ BL	35.56	0.988	751,259.641	41.470	71.206	71.206	100.000	3A

We then dive into several of these buildings in the red range utilizing the MDMS Benchmarking tool.



As you can see from the example at Ft Benning the meter has been inconsistent over time. It started last July with the symmetry that we expect but then went bad around October. It never really recovered so this meter is bad or not reporting properly.

And as we drill in further on the timeframe in the left purple box, shown below, note that in our first purple box we see the weekends going up to a start point at 1700 that mirrors that of a weekday and then peak bottoms around 0200. The pattern shown in the right purple box indicates that the workforce is going home between 2300 and 0400, which is not likely, and the symmetry of the pattern is somewhat symmetrical but not consistent. Therefore, this is clearly not normal operations, as show in the next image after scrolling in further. (Continued on pg. 4)



MDMS UPDATE

ADVANCED METRICS—STOP LIGHT CHART (CONT. FROM PG. 3)



Next, we look at the bottom range for that column, as shown below, which shows values down to the mid-point—or our median in the blue cell—all the way down to the bottom. Yellow means it may or may not be a bad meter, but it definitely has excessive energy use. The beige highlighted cells above the median may have some savings, but those savings could be hard to find or justify economically since these are just slightly above the median. The green highlighted cells indicated good energy management, as they are in the top 50 – 75% of the overall category code. The light blue cells indicate exceptional energy use, probably the top 75 percentile. However, there is a slight chance that the meter could be bad as it is on the boundary of small values. The red highlighted cells indicate that most likely the meter is bad, which in general is a wrong meter multiplier or meter connectivity issue—as in the meter is not successfully reporting to MDMS enough to produce a good baseline.

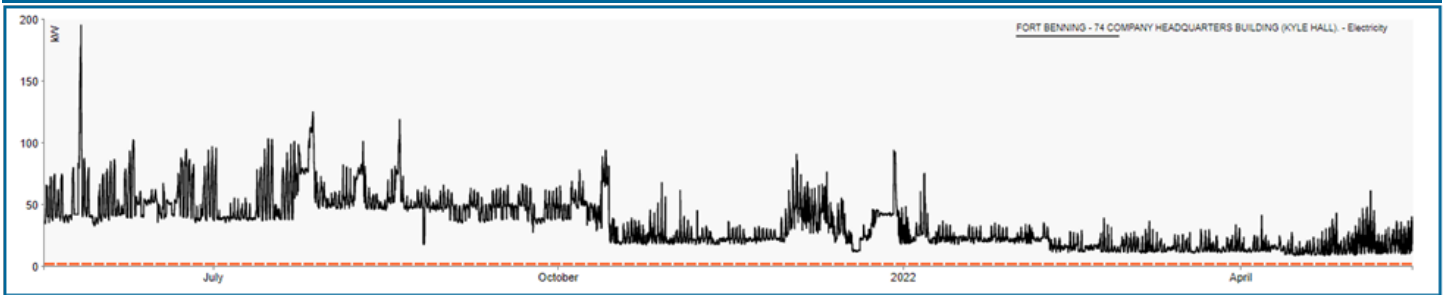
Comm and	Site	Building	Square Footage	Cat Co	Base Load (KW)	Watts/S	2 Months Consumption (kWh)	Baseload as % Consumption	12 Months EUI (Electric)	12 Months Extrapolated EUI (Electric)	% of Data Availat	Climat
IMCOM	FORT BRAGG	C4626 - COMPANY HEA	39,873	CO HQ BL	285.25	7.154	148,457.146	991.458	12.704	21.568	58.904	3A
IMCOM	FORT RUCKER	6814 - SECURITY GUAF	4,149	CO HQ BL	21.03	5.069	411,920.451	44.728	338.764	338.764	100.000	3A
IMCOM	FORT CARSON	517 - COMPANY OPER	16,710	CO HQ BL	39.24	2.349	394,470.927	87.161	80.550	80.550	100.000	5B
IMCOM	FORT BENNING	1697 - CO HQ BLDG	3,480	CO HQ BL	1.77	0.511	42,175.299	36.938	41.353	41.353	100.000	3A
IMCOM	FORT BENNING	2891 - CO HQ BLDG	6,400	CO HQ BL	3.26	0.510	107,205.885	26.680	57.157	57.157	100.000	3A
IMCOM	SCHOFIELD BA	2094 - CO HQ BLDG	8,950	CO HQ BL	4.00	0.447	68,667.730	51.028	26.179	26.179	100.000	1A
IMCOM	FORT BRAGG	D3349 - CO HQ BLDG	15,664	CO HQ BL	6.99	0.447	140,599.424	43.599	30.627	30.627	100.000	3A
IMCOM	FORT BRAGG	D2949 - CO HQ BLDG	39,520	CO HQ BL	17.57	0.445	318,928.974	48.271	27.536	27.536	100.000	3A
IMCOM	FORT BLISS	1034 - CO HQ BLDG 10	15,152	CO HQ BL	4.10	0.271	101,567.726	35.374	22.872	22.872	100.000	3B
IMCOM	SCHOFIELD BA	767 - CO HQ BLDG	14,910	CO HQ BL	4.00	0.268	31,178.941	38.488	7.135	20.835	34.247	1A
IMCOM	FORT BRAGG	C7635 - CO HQ BLDG	96,045	CO HQ BL	25.70	0.268	400,621.275	56.209	14.233	14.233	100.000	3A
IMCOM	FORT BLISS	21115 - CO HQ BLDG 2	41,425	CO HQ BL	11.05	0.267	296,518.543	32.646	24.424	24.424	100.000	3B
IMCOM	FORT BRAGG	A5145 - COMPANY HEA	15,665	CO HQ BL	4.17	0.266	92,967.067	39.301	20.250	20.250	100.000	3A
IMCOM	FORT LEWIS	3384 - COMPANY HQ B	41,480	CO HQ BL	10.99	0.265	89,487.183	50.428	7.361	15.713	46.849	4C
IMCOM	FORT BLISS	20575 - CO HQ BLDG 2	55,796	CO HQ BL	9.72	0.174	277,691.873	30.674	16.982	16.982	100.000	3B
IMCOM	FORT BRAGG	C8650 - CO HQ BLDG	48,510	CO HQ BL	8.43	0.174	282,363.344	26.174	19.861	19.861	100.000	3A
IMCOM	FORT CARSON	2458 - CO HQ BLDG	23,954	CO HQ BL	4.11	0.172	83,781.509	43.017	11.934	11.934	100.000	5B
IMCOM	FORT HOOD	18027 - COMPANY HEA	5,945	CO HQ BL	1.01	0.170	24,939.219	35.578	14.314	14.314	100.000	2A
IMCOM	FORT BLISS	20175 - CO HQ BLDG 2	60,414	CO HQ BL	8.24	0.136	198,890.741	36.292	11.233	11.233	100.000	3B
IMCOM	FORT RILEY	810 - NOT AVAILABLE	15,152	CO HQ BL	2.05	0.136	260,494.810	6.916	58.662	58.662	100.000	4A
IMCOM	FORT HOOD	91237 - CO HQ BLDG	5,968	CO HQ BL	0.80	0.135	44,664.185	15.845	25.536	25.536	100.000	2A
IMCOM	FORT BRAGG	H6715 - CO HQ BLDG	19,142	CO HQ BL	2.50	0.131	145,428.216	15.071	25.923	25.923	100.000	3A
IMCOM	FORT POLK	2041 - 509TH COMPAN	25,168	CO HQ BL	2.14	0.085	111,024.323	16.921	15.052	15.052	100.000	3A
IMCOM	FORT BRAGG	X5017 - 3/4 BN COF BL	24,510	CO HQ BL	2.00	0.082	145,744.528	12.021	20.290	20.290	100.000	3A
IMCOM	FORT BENNING	74 - COMPANY HEADQ	29,784	CO HQ BL	2.24	0.075	342,257.463	5.734	39.210	39.210	100.000	3A
IMCOM	FORT POLK	1270 - 3 -10th CO HQ'S	23,593	CO HQ BL	1.76	0.075	97,568.442	15.880	14.111	14.111	100.000	3A
IMCOM	FORT HOOD	43018 - COMPANY HEA	5,939	CO HQ BL	0.40	0.067	20,769.409	16.884	11.933	11.933	100.000	2A
IMCOM	FORT BLISS	5774 - CO HQ BLDG 57	15,170	CO HQ BL	0.57	0.038	70,047.839	7.182	15.756	15.756	100.000	3B

The below examples dive into further analyzing one of these buildings in the red range utilizing the MDMS Benchmarking tool. This building's pattern looks okay but is sporadic and not consistent. Note also that the baseload is set too low—2.24 kW or watts/sf—which is what triggers the baseload number being out-of-range on the low side. (Continued on pg. 5)

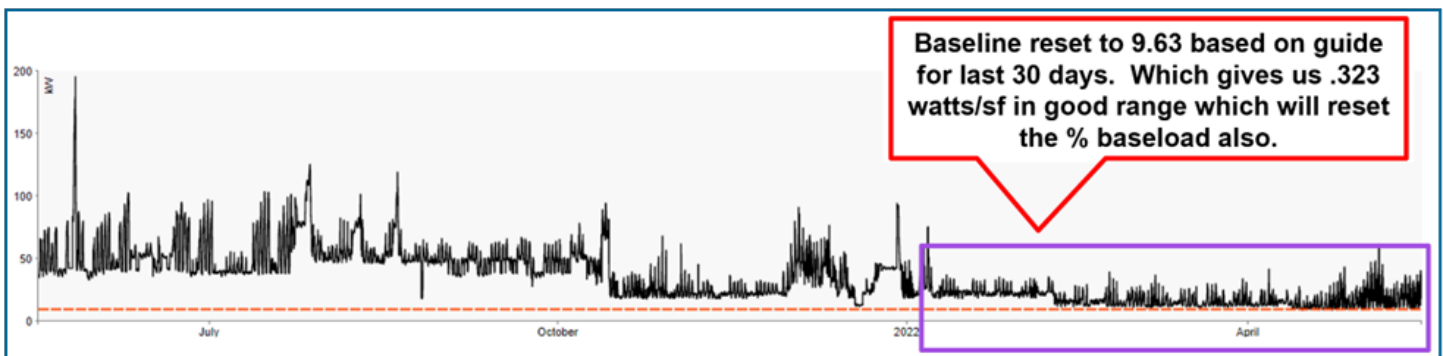


MDMS UPDATE

ADVANCED METRICS—STOP LIGHT CHART (CONT. FROM PG. 4)



In the graph shown below, we have reset the baseline to 9.63 based on the benchmarking tool's guide for the last 30 days, which calculates to 0.323 watts/sf. This is in good range which will reset the % of baseload calculations as well.



We then repeat these same analysis steps on the top, mid, and bottom ranges for both the % Baseload of Consumption and the Extrapolated EUI factors.

The next step is to perform an integrated analysis of the three factors. Looking at the top range, as we stated in our first example, if there are three red highlighted cells across all three metrics, then it is a high probability that you have a bad meter. If there are two red cells, it is most likely an improperly set baseload. Run the MDMS Benchmarking tool for the building and see if the baseline kisses the bottom edge of your curve and that the curve is symmetrical. If these are set correctly, then you probably have a bad meter.

Yellow highlighted cells for 2 or 3 metrics indicates the building needs to be looked at for excessive energy use or the slight possibility of a meter issue. The beige highlighted cells that are slightly above the median may have some savings, but these are probably the last buildings to evaluate as the savings potential is low.

Analyzing the bottom range, green cells in 2-3 of the metrics indicate good energy management. If you have 2-3 metrics in the light blue cells it confirms this building has exceptional energy use—top 25%. If you have 2-3 metrics in the red cells at the bottom of the scale then it indicates a bad meter, with the likelihood of a wrong meter multiplier or a meter connectivity issue—as in the meter is not consistently reporting to MDMS enough to produce a good baseline.

In summary, you can use the stop light chart breakdown to help you do analysis. We have a chart for each of the top 30 category codes based on number of buildings. You can use these charts to get a general feel for where your buildings stand within the Army's category codes. The rule of thumb is anything above 2 times the median value indicates a bad meter and needs attention, whereas anything 1-1.35 times above the median is probably okay. On the lower end, below 0.5 times the median value also indicates a bad meter, whereas 0.75-0.5 times below the median is great and 0.75-1 times below the median is good.

We encourage you to login to MDMS and utilize the new “Advanced Metrics – Stop Light Chart” module. Remember that we cover this tool as well as the principles and analysis covered in this article in our Advanced Metrics for Systems course. However, if you would like to delve into this tool in a one-on-one session, please submit a request with a help desk ticket with the Army Meter Service Desk (AMSD) via the Feedback/Help Request option under the Support menu in MDMS or you may e-mail them at: cehnc-army-meter-help@usace.army.mil.