U.S. ARMY

MDMS UPDATE

~ METER DATA MANAGEMENT SYSTEM ~

US Army Corps of Engineers®

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FROM THE PROGRAM MANAGER

Welcome to our December 2023 - January 2024 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 MDMS Outreach Team continues to work with both individuals and groups at all levels of the Army to introduce, acclimate and assist them with the abundance of tools that MDMS provides. This newsletter focuses on how certain modules can be leveraged at different levels of the organization. We encourage you to reach out to the Army Meter Service Desk and request a session with the MDMS Outreach Team to better understand how you can leverage the functionality of MDMS for yourself, your organization or your team. MDMS continues to expand with new modules being introduced frequently to further it's value in assisting and benefiting it's users, such as the upcoming audit tool. Stay tuned for more on that one!

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

VALUE OF MDMS FOR USERS

In today's rapidly evolving world, energy management has become a critical priority for organizations worldwide. The United States Army, with its vast global footprint, faces unique challenges in effectively managing energy consumption across its installations. To address these challenges and drive cost savings while promoting sustainability, the Army has implemented a cutting-edge solution: the Meter Data Management System (MDMS).

The MDMS serves as a centralized platform for collecting, analyzing, and managing energy use data from over 29,000 meters deployed across Army installations worldwide. This comprehensive system enables the Army to monitor energy consumption, identify trends, and implement targeted strategies to optimize energy efficiency and reduce costs.

One of the primary benefits of the MDMS is its ability to provide granular visibility into energy usage patterns across Army installations. By aggregating data from diverse sources, including electricity, natural gas, water, and steam, the MDMS offers invaluable insights into how and where energy is being consumed. Armed with this information, Army leaders can make informed decisions to prioritize energy-saving initiatives and allocate resources effectively. For example, the built-in advanced analytics of the system has identified $23M in immediate savings across the Army that are available in low-cost/no-cost solutions.

While the original philosophy behind metering in commercial and Government applications was to enable the Energy Managers (EMs) at the local level to better manage energy consumption, it should be noted that the centralized system provides other valuable insights applicable to users at the Higher Headquarters (HHQ) and Headquarters (HQ) levels. At the HHQ level, the value is unfettered access to data for comparing installations via charts and graphs on system usage, offline meters, category code performance, and so forth, for the metered buildings. At the HQ level, the tools provide information to aid in understanding the problem areas, allowing staff to direct resources to remediate the issues.

The MDMS Outreach Team continues to work with HHQ, HQ, EMs, and Resource Efficiency Managers (REMs) in group and one-on-one sessions to help introduce and acclimate them to MDMS and the wealth of functionality the system provides. While each group has many tools at their disposal, we think it would be beneficial to provide a summary of the end product that is supported by these 40+ modules in MDMS. The following functionality is provided for each of the user types. *(Continued on pg. 2)*

VALUE OF MDMS FOR USERS (CONT. FROM PG. 1)

HHQ

- Top-down view of energy use at LHC and Installation levels
- Global status of meters
- % of energy measured vs. used
- How are we doing on energy savings goals?
- Any anomalies in usage?
- Are we on track to meet the budget?

HQ

- Evaluating the usage from a command perspective
- Where are the problems?
- Prioritizing the highest users to allocate analysis time
- Prioritizing the biggest savings to allot resources to fix the situation

Auditor and Commissioning Agent

- Getting the detailed information to complete an audit or a commissioning report
- Performing the audit and analyzing the data for solution sets
- Using the analytic tools to perform the commissioning
- Validating the results

EM/REM

- Benchmarks (many varieties)
  - Baseloads
  - EUI
  - Weather zone
  - Category code
  - Installation vs. Army
- Meter issues
- Demand analysis
- Prioritizing energy usage
- Ranking energy potential savings
- Identifying override savings and the dollar value
- Identifying potential projects and the dollar value
- Allocating usage to various systems
- Providing the data for an auditing template

So, what tools are used by each group, and how are they used?

HHQ

The HHQ closely monitors how Land Holding Commands (LHCs) and installations manage their assets, necessitating a comprehensive view of overall usage, usage per square foot, usage trends over time, number of meters reporting, and the percentage of energy metered. These metrics are conveniently displayed through the MDMS.

Total energy usage is visualized through pie charts within the Total Energy By Org FYTD tool, offering breakdowns by LHC and installation. Additionally, usage can be analyzed on a granular level, with reports allowing for segmentation by month, day, hour, or interval for detailed facility or installation assessments.

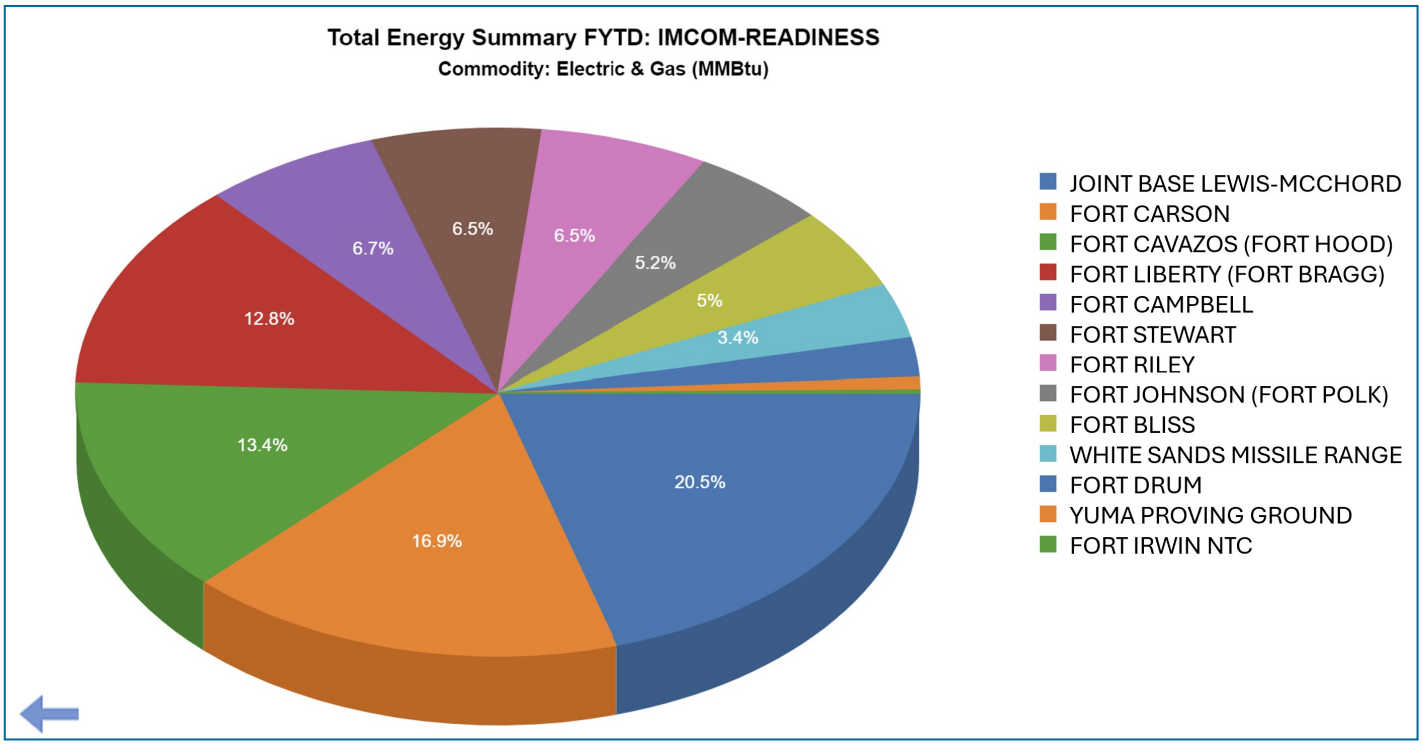
The Energy Use Intensity (EUI) report facilitates ranking installations based on kBtu/sf, enabling HHQ and LHCs to compare performance against a standardized benchmark. Furthermore, the Base Load Comparison report provides additional benchmarks for comparative analysis.

Monitoring usage over time reveals fluctuations throughout the year, providing insights into seasonal variations and overall energy output at different intervals, be it monthly or daily. Moreover, the system tracks meter reporting at both LHC and installation levels, ensuring data integrity and completeness.

Lastly, tracking the percentage of energy metered versus total energy consumption at LHC *(Continued on pg. 3)*

VALUE OF MDMS FOR USERS (CONT. FROM PG. 2)

or installation levels allows HHQ to monitor progress toward meeting energy capture goals, thereby facilitating informed decision-making and goal-attainment strategies. The following chart easily shows three installations use half of IMCOM-Readiness energy. So efforts can be focused there and affect a larger share of the resources.



Total Energy Summary FYTD for IMCOM-READINESS Showing Three Installations Use Half of Energy

HQ

At the HQ level (LHC, Other HQ, and Regional or State Offices), There has been a keen interest in assessing consumption trends over recent years and evaluating installation performance. Monitoring installation usage over time and conducting comparisons based on kBtu/sf serve as essential benchmarks mandated by Executive Orders.

This practice not only enables the HQ to gauge disparities among installations but also aids in identifying and addressing overlooked issues. The capacity to assess individual buildings against each other empowers the HQ to prioritize projects within their jurisdiction and across installations. Consequently, this streamlined process facilitates the identification of underperforming buildings warranting energy audits or recommissioning efforts.

By leveraging this approach, the HQ can effectively allocate support resources across the command to execute projects with the highest return on investment (ROI), thereby maximizing efficiency and optimizing energy management strategies.

The HQ utilizes certain tools akin to those used by the HHQ, albeit with some nuances. Within the HQ framework, various tools, such as the Energy Use Intensity (EUI) charts and the Energy Project Identification Tool (EPIT), are employed to prioritize facilities. EPIT facilitates the allocation of energy consumption across different systems, aiding HQ managers in gauging potential savings across four energy systems and identifying schedule overrides.

This comprehensive analysis encompasses all energy aspects within the baseload, typically representing a saving potential conservatively below or less than 15% to 35% of the actual. While providing a reliable baseline, the EPIT tool serves as a solid indicator for baseload energy savings, with the EM acknowledging that actual savings may slightly exceed the estimates.

(Continued on pg. 4)

VALUE OF MDMS FOR USERS (CONT. FROM PG. 3)

Air Conditioning Worksheet

Building	Square Footage	Cat Code	Overrides of Schedule	Revised Air Conditioning % Load	Air Conditioning Loading	Projected savings for ECM - 10%	Projected savings for ECM - 20%	Projected savings for ECM - 30%	Construction Costs supportable for 20 years contract for 10% savings	Construction Costs supportable for 20 years contract for 20% savings	Construction Costs supportable for 20 years contract for 30% savings
1 - TARC1	463,502	61050	$395,678.07	5.6%	$61,007.11	$6,100.71	$12,201.42	$18,302.13	$61,007.11	$122,014.22	$183,021.32
1940 - 21885 TMP MAINTENANCE BUILD	52,026	21885	$357,710.23	8.7%	$114,146.62	$11,414.66	$22,829.32	$34,243.99	$114,146.62	$228,293.24	$342,439.86
710 - AC/HEATING PLANT SCHOOL COM	9,472	89127	$280,485.42	6.6%	$54,234.27	$5,423.43	$10,846.85	$16,270.28	$54,234.27	$108,468.54	$162,702.81
301 - LYSTER ARMY HEALTH CLINIC	251,084	55010	$151,132.94	5.0%	$20,231.69	$2,023.17	$4,046.34	$6,069.51	$20,231.69	$40,463.37	$60,695.06
6006 - 61050 - ADMIN GEN PURP	265,045	61050	$142,512.19	5.3%	$20,386.71	$2,038.67	$4,077.34	$6,116.01	$20,386.71	$40,773.41	$61,160.12
285 - BAYNE-JONES ARMY COMMUNITY	367,793	51010	$128,053.73	8.4%	$38,223.32	$3,822.33	$7,644.66	$11,467.00	$38,223.32	$76,446.65	$114,669.97
117 - Kalaeloa B117 Veh Maint Shop	198,105	21407	$118,419.29	9.2%	$42,591.68	$4,259.17	$8,518.34	$12,777.50	$42,591.68	$85,183.35	$127,775.03
6002 - ADMIN GEN PURP	274,839	61050	$110,536.31	6.4%	$20,323.91	$2,032.39	$4,064.78	$6,097.17	$20,323.91	$40,647.83	$60,971.74
170 - ENLISTED BARRACK	79,488	72111	$110,025.81	6.2%	$19,361.26	$1,936.13	$3,872.25	$5,808.38	$19,361.26	$38,722.52	$58,083.79
05B01 - JFRC	138,485	17142	$109,034.77	6.5%	$20,527.61	$2,052.76	$4,105.52	$6,158.28	$20,527.61	$41,055.22	$61,582.83
705 - 74021 - Commissary	27,730	74021	$108,001.82	7.1%	$23,508.32	$2,350.83	$4,701.66	$7,052.50	$23,508.32	$47,016.64	$70,524.96
20200 - Commissary	46,468	74021	$104,531.37	5.3%	$14,973.30	$1,497.33	$2,994.66	$4,491.99	$14,973.30	$29,946.60	$44,919.90
MULTI - PHYS FIT CTR	35,800	74028	$92,667.48	6.6%	$17,885.98	$1,788.60	$3,577.20	$5,365.79	$17,885.98	$35,771.96	$53,657.95

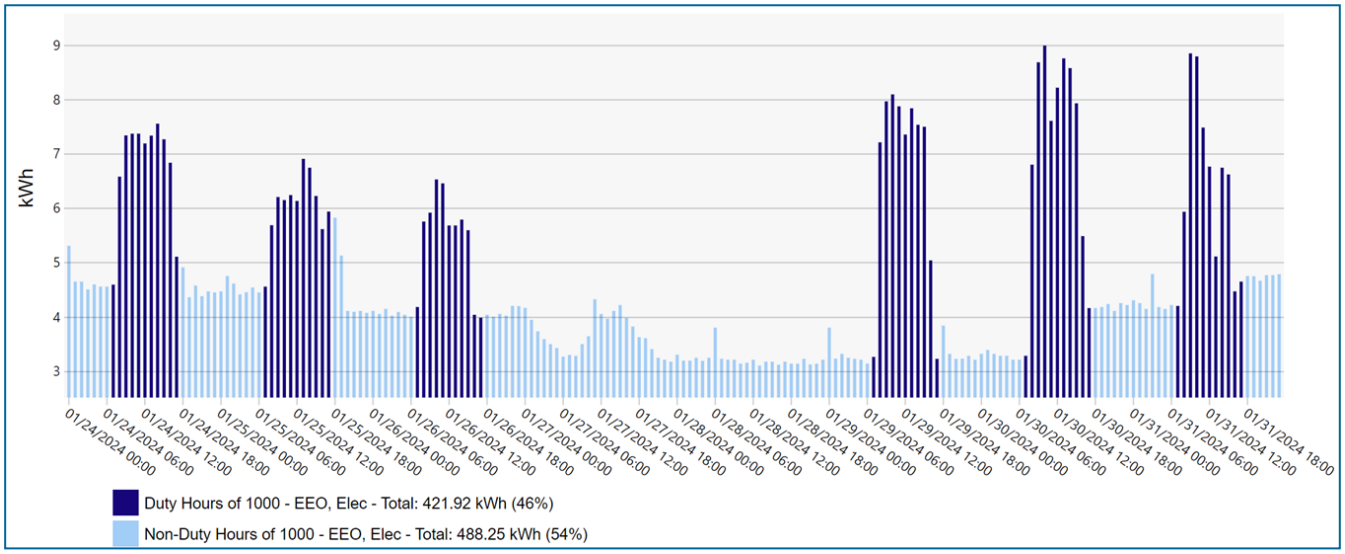
Energy Project Identification Tool's Air Conditioning Worksheet Showing Costs of Overrides of Schedules

The screenshot above shows the EPIT's Air Conditioning Worksheet for Army HQDA sorted highest to lowest on Overrides of Schedule. Also shown is the savings based on the % savings calculated and the construction costs identified that can be supported by that project. This tool proves invaluable in effectively prioritizing buildings for contractors or Energy Service Companies (ESCOs) to evaluate. Moreover, the EPIT tool streamlines project consolidation and evaluation processes, allowing the HQ EM to categorize projects by energy systems, thereby enhancing efficiency and coordination.

Auditor and Commissioning Agent

These professional groups require precise information to execute their duties effectively and efficiently. Their data needs are initially met through the EPIT tool, which offers a detailed breakdown of energy system usage, enabling them to focus their efforts strategically. With this breakdown, auditors and commissioning agents can accurately assess required usage and potential savings.

Furthermore, the EPIT tool identifies numerous overrides within Army systems, highlighting opportunities for significant savings, estimated between $30 to $50 million if schedules can be optimized. Many of these overrides can be rectified with minimal or no costs, while others may necessitate control additions, all of which are identified and analyzed through supplementary tools. The Duty vs. Non-Duty Analyzer is a visual tool that supplements the EPIT and shows how much energy is used during non-duty hours. That figure shown below indicates 54% of the energy is used during non-duty hours when the normal requirement range is 10-20%. *(Continued on pg. 5)*



Duty vs. Non-Duty Analyzer Showing 54% Energy Used During Non-Duty Hours

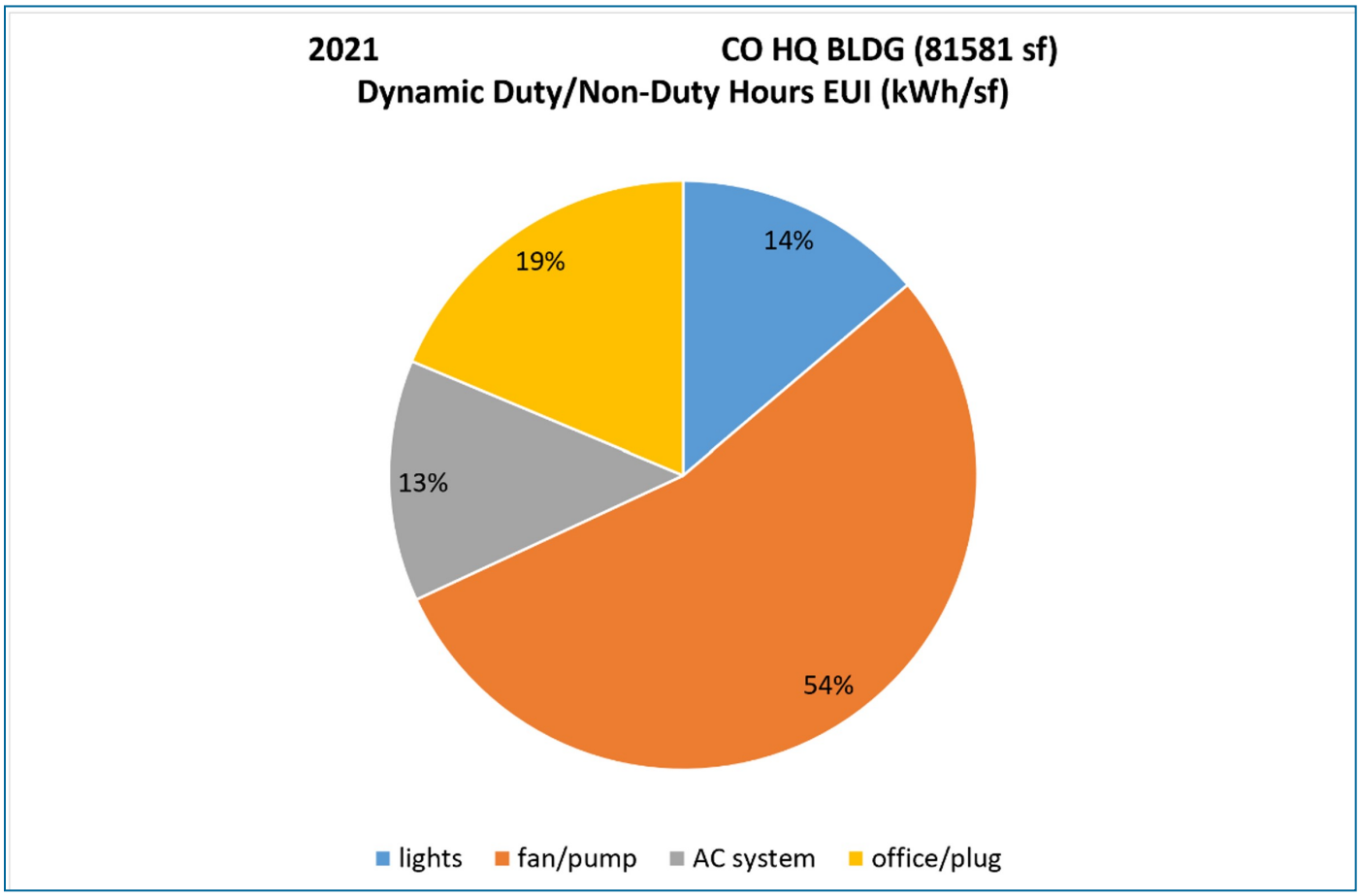
VALUE OF MDMS FOR USERS (CONT. FROM PG. 4)

The Baseload Tool provides insights into the percentage of energy consumed by baseload operations, indicating potential savings opportunities if baseload usage is higher than usual. Additionally, it helps identify specific equipment, such as fans or pumps, running constantly (24 hours/day, 7days/week) unnecessarily, allowing for prompt corrective action.

The Scatter Plot Modeling Tool offers a comprehensive analysis of energy usage during non-duty hours, revealing additional energy consumption by fans/pumps and AC systems. By breaking down energy usage into baseload and variable loading, auditors and commissioning agents can target potential savings more effectively.

Moreover, the scatter plot assists in auditing by dissecting energy consumption across various systems, including plug, lighting, fan/pumps, and AC systems in a pie chart. It helps determine lighting usage and potential efficiency improvements, such as replacing traditional lighting with LEDs, often without requiring an initial site visit.

The figure below shows the Pie Chart generated by the Scatter Plot Modeling Tool that breaks down the energy use by system for the selected building.

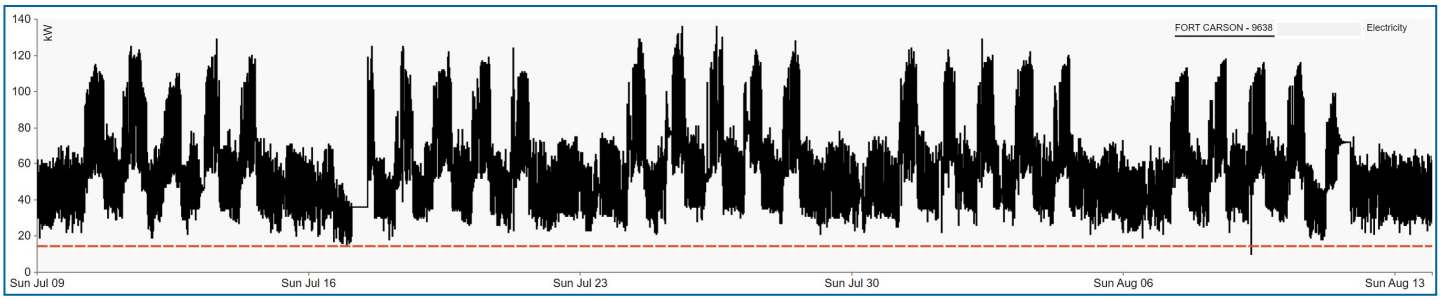


Scatter Plot Modeling Tool's Pie Chart Showing Usage Breakdown Amongst Systems

Additionally, the scatter plot can assess the efficiency of AC systems over time, identifying any deviations or changes in performance that may be attributed to system overrides or other factors such as the chiller efficiency. This comprehensive analysis empowers auditors to make informed recommendations and optimize energy usage effectively.

Another invaluable tool is the Interval kW graph, which allows contractors to determine the direct kW usage during baseload periods. This aids in identifying the horsepower of fans or pumps in operation, informing decisions regarding equipment optimization or replacement. The graph (shown below) indicates a baseload of 14.4kW in most cases with a majority of the baseload near 20kW. This shows a 4.2HP piece of equipment, usually a fan or pump, that is constantly on. *(Continued on pg. 6)*

VALUE OF MDMS FOR USERS (CONT. FROM PG. 5)



Interval kW Graph Showing a 4.2HP Piece of Equipment (Fan/Pump) Constantly On

EMs/REMs

EMs and REMs invest significant time in benchmarking their building standards against others, a practice crucial for optimization. The MDMS utilized by the Army offers unparalleled sophistication compared to other governmental or commercial systems. Its comprehensive features empower EMs to assess their buildings on multiple fronts meticulously.

MDMS offers three benchmark categories—baseload (watts/sf), baseload as a percent of the total consumption, and EUI—a notable enhancement over the single benchmark used elsewhere (EUI). Furthermore, the system allows for comparisons by category code, with 328 codes in the Army compared to 18 in the Energy Information Administration (EIA) database, providing extensive slicing and dicing capabilities for analysis.

Category Code	Category Code #	Building Count	Bottom 25th Percentile Watts/SF	Top 25th Percentile Watts/SF	Median Watts/SF	Bottom 25th Percentile EUI (kBtu/SF)	Top 25th Percentile EUI (kBtu/SF)	Median EUI (kBtu/SF)	Bottom 25th Percentile Baseload as % of Consumption	Top 25th Percentile Baseload as % of Consumption	Median Baseload as % of Consumption
ADMINISTRATION BUILD (61050)	61050	659	0.162	0.654	0.32	18.069	45.718	29.226	13.815	57.773	38.58
PERMANENT PARTY (PP) (72111)	72111	573	0.234	0.582	0.387	19.848	36.663	26.526	20.672	68.273	51.588
NATIONAL GUARD READI (17180)	17180	384	0.153	0.451	0.263	12.089	26.898	18.403	28.11	54.608	42.887
COMPANY HEADQUARTERS (14185)	14185	375	0.17	0.498	0.29	16.477	36.124	23.137	18.195	55.133	41.836
VEHICLE MAINTENANCE (21410)	21410	290	0.174	0.493	0.317	17.001	33.784	24.345	15.208	53.074	39.193
GENERAL INSTRUCTION (17120)	17120	200	0.096	0.641	0.268	18.5	47.833	30.82	13.735	49.43	32.015
BATTALION HEADQUARTE (14183)	14183	193	0.257	0.714	0.493	24.963	43.785	31.846	17.462	60.395	42.456

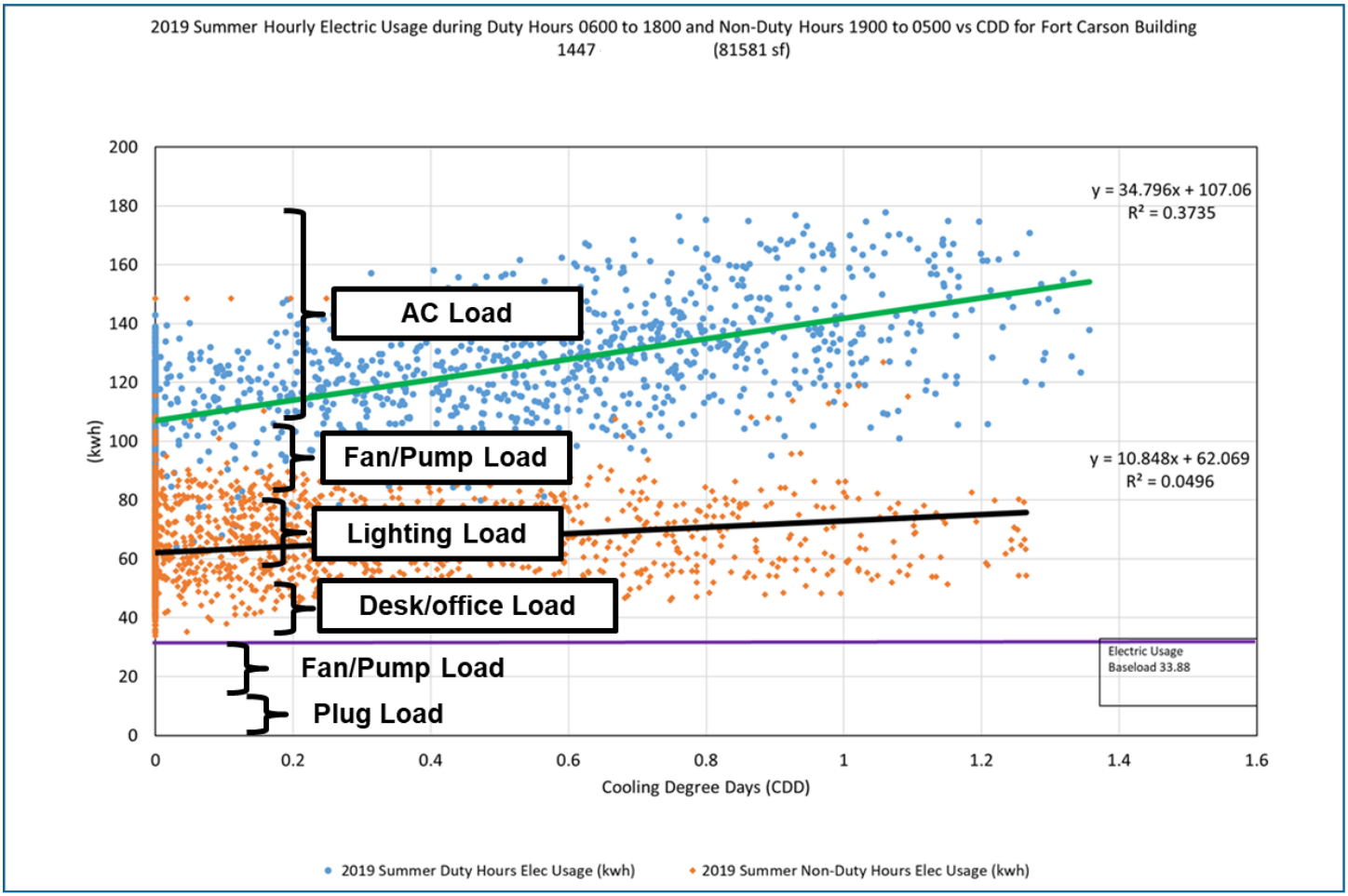
Category Code Performance Metrics with Three Benchmarks for Army HQDA Electric

One of the critical functionalities of MDMS is its ability to assess meter connectivity and data quality, ensuring efficient use of analytical resources. The system flags any meter reporting or data quality issues, enabling prompt corrective action. In cases where indicators are ambiguous, EMs/REMs can visually inspect interval data to assess conformity with required symmetric curves.

MDMS effortlessly meets the requirement for resiliency evaluation, facilitating peak load calculation and determining generator requirements for various operational phases. It aids in determining base kW and average kW, which is crucial for generator sizing and type selection. The Interval kW graph shown above indicates we need a 136kW generator to support this building, but the generator will need a turndown ratio to allow it to sustain operations at 14.4kW.

A standout feature of MDMS is its capability to segregate energy usage into different systems, tracking four energy systems and offering two complementary tools for analysis. The EPIT tool provides conservative estimates of potential savings by breaking down usage based on baseload ratios. At the same time, the scatter plot allows for fine-tuning variables in EPIT modeling, leading to more accurate projections. *(Continued on pg. 7)*

VALUE OF MDMS FOR USERS (CONT. FROM PG. 6)



Scatter Plot Modeling Tool Summer Showing Usage Breakdown Amongst Systems

Additionally, an upcoming audit tool will streamline data collection and populate audit templates, significantly reducing the time required for facility audits. This tool will compile data on plug, lighting, AC systems, and fan/pump systems, along with energy savings from non-duty hours, providing EMs/REMs with comprehensive insights and recommending solutions. Expected to save up to 80% of the EMs audit hours on metered facilities, this tool represents a substantial efficiency boost for EMs/REMs.