MDMS *UPDATE*

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FROM THE PROGRAM MANAGER

By Michael Ott, MDMS Project Manager, USACE—Huntsville Center

Welcome to our February - March 2018 issue of the *MDMS Update,* designed to keep you informed on the growth and latest developments of the Meter Data Management System and the Army Metering Program.

Our first story focuses on the collective team effort that brought Fort Hood back online after their Physical-to-Virtual migration approximately a year ago. The team's activities brought almost 400 meters back online for Ft. Hood.

Gaps in meter data are common occurrences in all advanced automated metering systems (AMS). With MDMS v2, manual (mental) extrapolation to 100% usage will no longer be necessary. A quick glance at the actual meter data capture percentage will reveal how much of the report is based upon actual versus estimated usage. Check out the article on pages 2 and 3.

Recently, an IMCOM Energy Manager asked whether we planned to add more Category Code Target Profiles to the EUI report. This inquiry and the subsequent discussions led to our Median Use Profile article on pages 4 and 5.

The MDMS project team provided MDMS training on 19 January 2018 for Energy Staff at the United States Army Garrison - Rheinland-Pfalz and IMCOM - Europe.

As always, our mission is to improve the MDMS experience for end users. Your input is valuable, and we welcome your feedback at: usarmy.coe-huntsville.cehnc.mbx.armymeterhelp@mail.mil

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Inside this issue:

WELCOME BACK FORT HOOD

After the Ft. Hood JCI Metasys, UMCS underwent a Physical-to-Virtual (P2V) migration approximately a year ago, the UMCS was unable to communicate with MDMS. A P2V migrates everything on the UMCS physical servers – including the data, applications, and the operating system (OS) – to a virtualized machine (VM) environment. Prior to the P2V, the MDMS Gateway server queried meter data from a database replication VM server and not the live UMCS. After discussing all options with JCI and the Ft. Hood NEC, it was decided that a second Network Interface Card/Controller (NIC) could be configured on the live UMCS database server with the appropriate IP address thereby eliminating the need for the database replication VM server.

Before the solution could be implemented, changes had to be made to the System Interconnection Agreement (SIA) to reflect this new connection between the MDMS Gateway server and the JCI Metasys UMCS. Once the MDMS System Security Engineer got the required signatures on the revised SIA, the Ft. Hood NEC was able to configure the NIC on the UMCS database server VM, and facility meter data again flowed to the MDMS after a long hiatus. Thanks to the continuous coordination activities, almost 400 meters were restored to MDMS for Ft. Hood. Once again, a great collaborative effort for the Army Metering Program!

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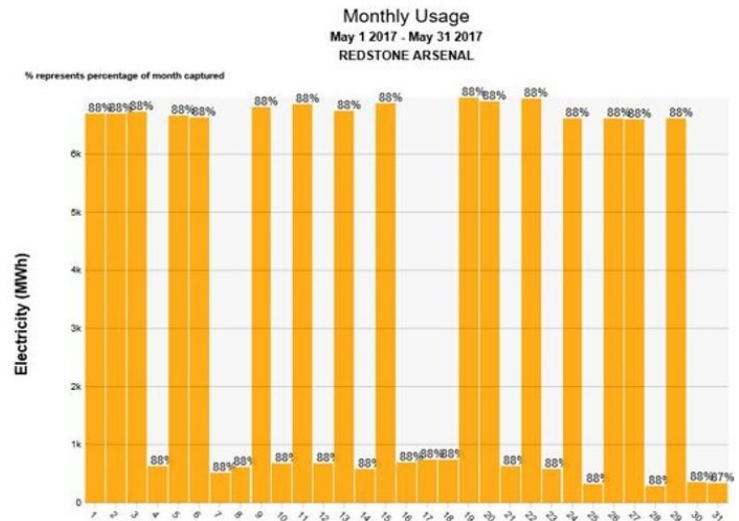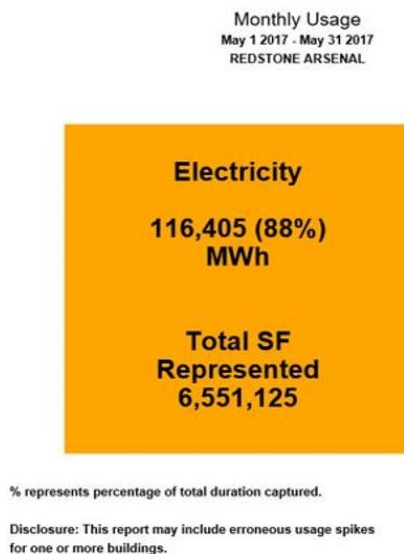# HOW MDMS V2 WILL MANAGE MISSING AND FAULTY METER DATA

Gaps and errors in meter data are common problems in all advanced metering systems. The current version of MDMS discloses how much of the meter data is missing from a report so that Energy Managers can make their own judgments as to a report's reliability, and how much extrapolation is required to estimate total usage had there been no data gaps. Extrapolation to 100% usage will no longer be necessary with MDMS v2. Future reports will show 100% usage as determined by both actual and estimated values, where needed, to fill-in the meter data gaps. In some cases, a usage report may be 100% estimated depending upon the report duration.

Below is a comparison of a monthly usage report as now reported by MDMS v1 and how MDMS v2 will render the report using the same meter data. The difference is more than the color of the bars.
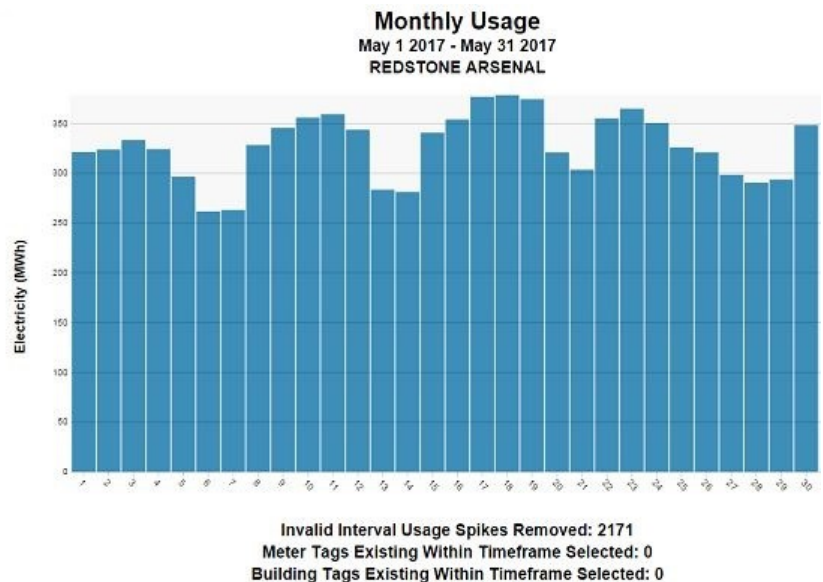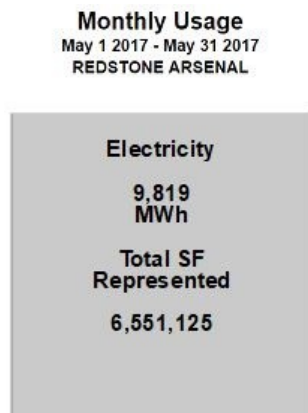
Previous publications of this newsletter have addressed erroneous usage spikes and stuck meters (protracted reporting of zero usage). MDMS v2 will detect those occurrences and record how often each meter reports a faulty meter reading, because frequency of network outages is currently being tracked. MDMS v2 will replace missing and faulty meter data with estimated values for report generation purposes while retaining the actual received meter data for selected viewing. The methodology for this data validation, estimating and editing (VEE) functionality is explained later in this article, limited in detail to what is practical for this newsletter. *(Cont. on pg. 3)*

This screen shot shows an example of the current MDMS v1 Aggregated Usage for a month. Notice that there are obvious erroneous interval usage spikes that cause the total usage to be overstated.

Monthly Usage
May 1 2017 - May 31 2017
REDSTONE ARSENAL

Electricity

116,405 (88%)
MWh

Total SF
Represented
6,551,125

% represents percentage of total duration captured.

Disclosure: This report may include erroneous usage spikes for one or more buildings.

Monthly Usage
May 1 2017 - May 31 2017
REDSTONE ARSENAL

% represents percentage of month captured

This screen shot shows an example of the MDMS v2 Aggregated Usage report for the same location and month. The faulty usage spikes and data gaps have been replaced with calculated usage.

Monthly Usage
May 1 2017 - May 31 2017
REDSTONE ARSENAL

Electricity

9,819
MWh

Total SF
Represented

6,551,125

Monthly Usage
May 1 2017 - May 31 2017
REDSTONE ARSENAL

Invalid Interval Usage Spikes Removed: 2171
Meter Tags Existing Within Timeframe Selected: 0
Building Tags Existing Within Timeframe Selected: 0

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HOW MDMS V2 WILL MANAGE MISSING AND FAULTY METER DATA (CONT. FROM PG. 2)

The trigger for erroneous spike detection is set at ten times the normal highest usage measured at the smallest reporting time interval, typically 15-minute. So, ten times normal would be a highly unlikely actual event. MDMS v2 will estimate an interval usage amount to replace a missing interval usage (due to network outages) and to overwrite a detected erroneous usage spike or another invalid value such as a negative usage. The exception to the latter would be net metering involving renewable energy—a topic for a future newsletter.

Upon encountering a missing or invalid usage calculation, MDMS v2 will reference the closest preceding valid interval usage amount and the previous hour's valid usage amount calculation for the same corresponding time interval. "Valid" means the interval usage calculation was based upon actual meter data and the resulting usage value passed all data reliability vetting criteria. The two referenced valid interval usage values are then averaged to become the replacement for the missing or faulty usage

calculation. Note that MDMS v2 will continue to save all of the actual received meter data including the null values for the missing data.

What will not be estimated and overwritten are time intervals that show zero usage. Zero usage is self-evident in building usage reports, could be true, and therefore will not be automatically calculated with estimated usage. A future functional enhancement to MDMS v2 may offer users the option to replace zero usage with estimated usage after confirming that a network outage or meter failure was the culprit. In summary, a compromise must be made between data accuracy and enabling the productive use of the Energy Manager's time when analyzing meter data. As the Army's meter network reliability improves, the need for and the amount of VEE substituted data will diminish, but will likely never be eliminated.

The following interval usage spikes were automatically detected and replaced with new calculated usage. In the event the usage spike(s) have been validated as accurate, please submit a ticket to the Army Metering Service Desk (AMSD) at 256-971-2141 (Mon-Fri 0700-1700 CT) or usarmy.coe-huntsville.cehnc.mbx.armymeterhelp@mail.mil. Please identify the meter name and timestamp of the validated interval usage.

Search : Search   Clear

Site	Building #	Building Name	Meter	Timestamp ▲	Reporting Interval	Interval Usage Spike	Units
REDSTONE ARSENAL		US Army Garrison - Redstone HQ.	REDS_BLDG_4488_METER_4	5/1/2017 12:00:00 AM	15.00	3156.00	kWh
REDSTONE ARSENAL		US Army Garrison - Redstone HQ.	REDS_BLDG_4488_METER_4	5/1/2017 12:15:00 AM	15.00	3166.00	kWh
REDSTONE ARSENAL		US Army Garrison - Redstone HQ.	REDS_BLDG_4488_METER_4	5/1/2017 12:30:00 AM	15.00	3104.00	kWh
REDSTONE ARSENAL		US Army Garrison - Redstone HQ.	REDS_BLDG_4488_METER_4	5/1/2017 12:45:00 AM	15.00	3140.00	kWh
REDSTONE ARSENAL		US Army Garrison - Redstone HQ.	REDS_BLDG_4488_METER_4	5/1/2017 1:00:00 AM	15.00	3024.00	kWh
REDSTONE ARSENAL		US Army Garrison - Redstone HQ.	REDS_BLDG_4488_METER_4	5/1/2017 1:15:00 AM	15.00	2938.00	kWh
REDSTONE ARSENAL		US Army Garrison - Redstone HQ.	REDS_BLDG_4488_METER_4	5/1/2017 1:30:00 AM	15.00	2964.00	kWh

Export to Excel

Done

The screenshot above shows the list of automatically detected and replaced interval usage spikes with v2. Note that the Energy Manager may have those added back if they are validated as accurate.
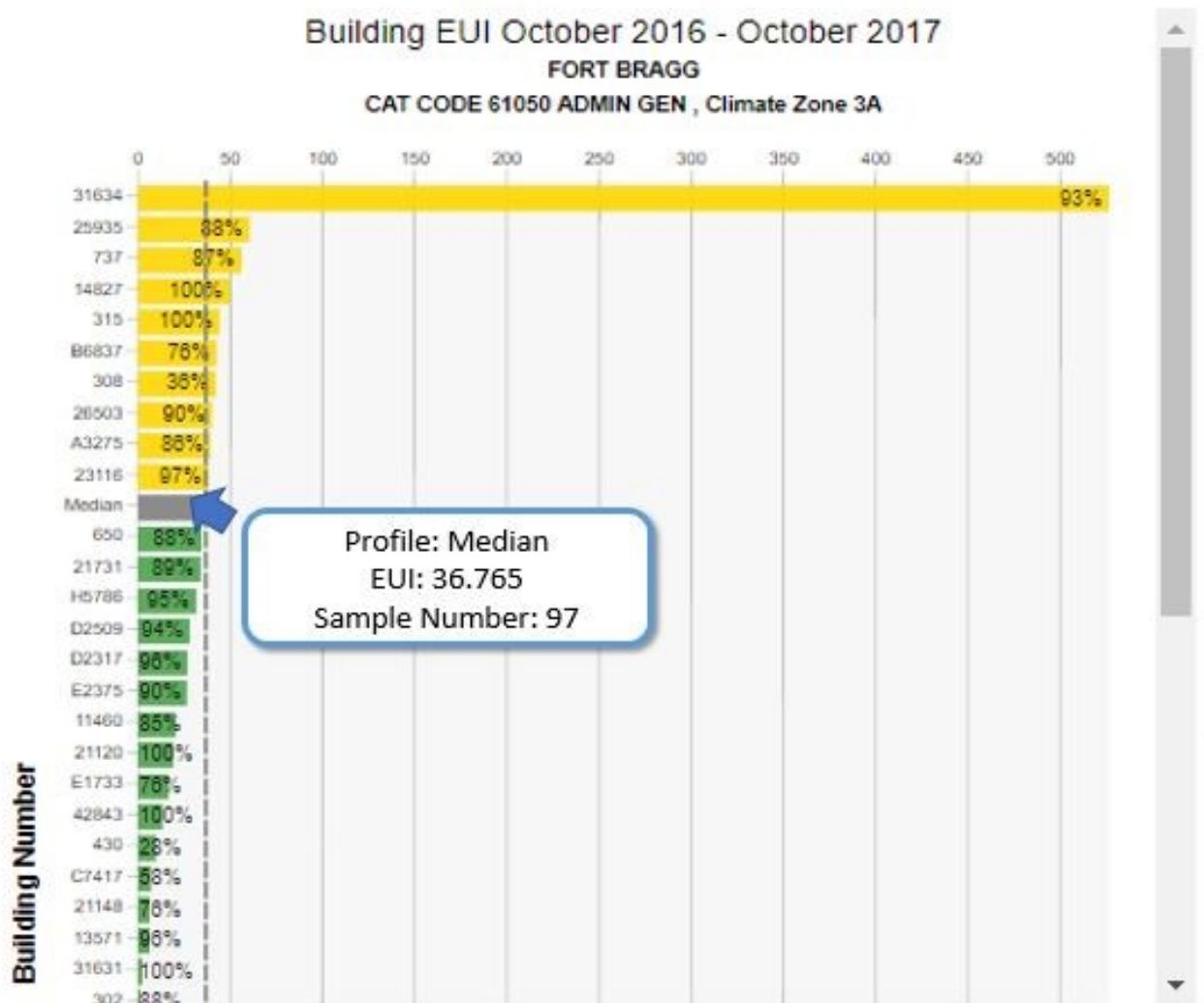
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MEDIAN USE PROFILE

The MDMS Energy Use Intensity (EUI) report is intended to help Energy Managers prioritize facilities for investigation and action by ranking comparable buildings from highest to lowest EUI. Recently, an IMCOM Energy Manager asked whether we planned to add more Category Code Target Profiles to the EUI report. He finds the existing ones very useful and closely comparable to modeled energy use profiles published by DoE. He was also skeptical about the validity and usefulness of the Median EUI due to non-reporting meters, unreliable meter data/data anomalies, and false reporting meters that distort the calculation and plotting of the Median Use profile. The answer to his first question about more category code target profiles is yes. When? After the stand-up of MDMS v2 within the production environment schedule for this spring. Priorities will need to be established for development of additional target profiles along with other requested improvements. Note that this article pertains to MDMS v1, which is legacy that needs to be, and will be, much improved in MDMS v2. The v2 logic for this report will be reviewed by USACE-Huntsville Center prior to its release.
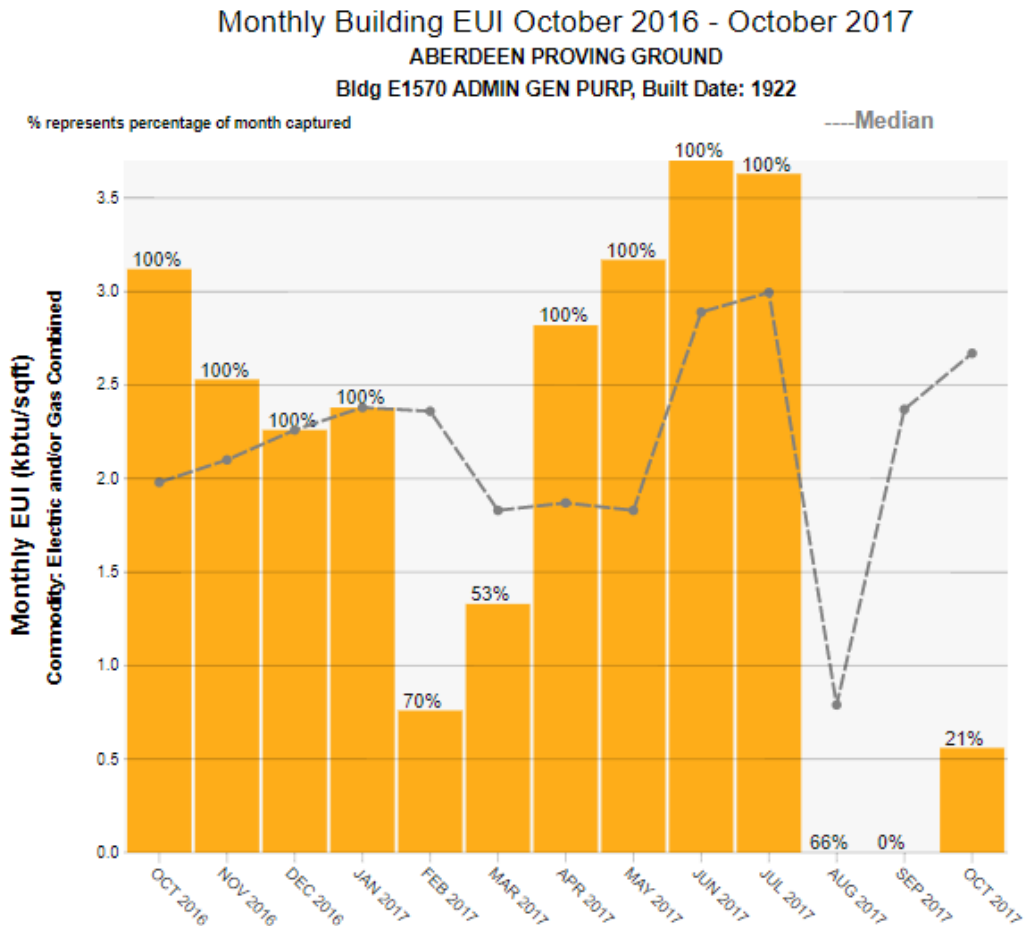
We would like to take this opportunity to also address concerns about the Median Use profile. As most readers already know, median is not the mean (calculated average or central value of a set of numbers). Median is the value at the center of a series of values ranging from the least to the highest. Outlier values at the beginning and end of a series have no effect upon the median. MDMS goes one step further: It excludes buildings from the EUI data series that do not have at least 90% of their usage captured. MDMS also extrapolates EUI calculations upward to 100% for buildings having less than 100%, but at least 90% usage capture. Median EUI is therefore a reliable point of reference/ comparison *provided* the sample size is reasonably large. Hovering the mouse over the median bar reveals the average (not median) monthly sample size as shown below.

Building EUI October 2016 - October 2017
FORT BRAGG
CAT CODE 61050 ADMIN GEN , Climate Zone 3A

Profile: Median
EUI: 36.765
Sample Number: 97

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MEDIAN USE PROFILE (CONT. FROM PG. 4)

Note that the sample size for the median EUI can be larger than the number of facilities shown in the EUI report for the installation. The median EUI is based upon all Army buildings located within the same climate zone that share the same category code. Can the median profile ever be unreliable? Yes. If the sample size is small due to a majority of comparable facilities failing to meet the minimum 90% usage capture criterion, the resultant median may not reflect the true median of that population of facilities. A large dip (reduction) in the median EUI curve for a particular month is indicative that the sample size for that month is much smaller than what was available for other "normal looking" months. If none of the buildings satisfied the minimum 90% usage capture criterion for a month, the median EUI curve will show zero for that month. See the example to the right.

Monthly Building EUI October 2016 - October 2017
ABERDEEN PROVING GROUND
Bldg E1570 ADMIN GEN PURP, Built Date: 1922

MDMS WEBINAR FOR RHEINLAND-PFALZ/EUROPE

The Army Meter Service Desk received a request from the Energy Staff at the United States Army Garrison - Rheinland-Pfalz and the Energy Staff at IMCOM - Europe for user training on the Meter Data Management System (MDMS). The MDMS project team provided the training on 19 January 2018 to introduce the Energy Managers, DPW, and Energy Engineers to the MDMS system, it's vision and mission, and then demonstrated many of the reporting options with their local installations and sites. The MDMS v2 future enhancements were also discussed and one of the Energy Managers asked for more information regarding the GIS integration for MDMS. The MDMS project team provided the following details regarding the upcoming GIS functionality:

- Initial release is focused on health & status of meter reporting
- Each building icon displays red, yellow or green based upon its last reporting date
- A mouse-click on the building icon shows additional metadata such as square feet, building number, last meter reading received, Category (CAT) Code (selected facility use), Real Property Asset Unique Identifier (RPA UID), and the date built
- Option to generate an EUI report comparing the building's performance to other buildings at site with same CAT Code

As mentioned in earlier newsletters, you can see many of the V2 enhancements via the "MDMS Overview Presentation 10112017" on the AMSD website. If your group or region has specific training needs, please log a request via the AMSD website https://army.deps.mil/NETCOM/EEDRS/SitePages/AMSD.aspx
or send an email to: usarmy.coehuntsville.cehnc.mbx.armymeterhelp@mail.mil.

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