

## A Validation of MDMS Leadership

**Hundreds of Millions  
of Meter Reads  
Processed Everyday**

It's no secret. You can't manage what you don't measure. This old business adage remains true today. It is a central tenet to the Smart Grid promise for greater energy efficiency, and today's smart meters measure with much greater accuracy than their predecessors.

The challenge is synchronizing this near-continuous stream of smart meter data with a dizzying array of systems and validating it with immutable consistency.

The complexity and quantity of data available is expanding almost exponentially. The new challenge is correctly and consistently adjudicating valid information on a timely basis and executing efficient intervention when actions are needed. For a mid-size utility deploying interval metering, validating every read from every meter can easily reach millions of reads each day, every day. Failing to understand and act promptly and properly to anomalies from even a small percentage of reads can quickly escalate with potentially far reaching implications. After all, this data is used to calculate a customer's monthly invoice and often it's available almost immediately online.

Standard requirements for Meter Data Management System (MDMS) include the ability to validate data by checking for completeness, identifying anomalies, considering seasons, holidays, customer class and rate. Then flag the data that falls outside of utility-set tolerances. True distinction becomes apparent when the MDMS uses these parameters to validate every meter read every day for the entire service territory.

More than a decade ago, the founders of Ecologic Analytics recognized the direction of the utility industry, and with the needs in mind for—what has now become—today's Smart Grid, Ecologic Analytics built its MDMS from the ground up with the capacity and ability to adjudicate data consistently every day. Validating every meter read every day for every customer is a process that occurs for hundreds of millions of reads each day across Ecologic Analytics' customer base. Strong validation at this scale is one of the reasons why the Ecologic MDMS is a critical enterprise solution providing high resolution, verified data for many of North America's leading smart meter deployments.

The business logic and rules within the Ecologic MDMS, tuned to provide the best possible data, allows utilities to meet their business requirements as well as local and Federal regulations each and every day.

### **From the First Point of Exchange – Validation is Fundamental in the Meter Reading Process**

As data arrives from smart meter and AMI network technology platforms, older one-way technologies or traditional field reads from within a utility's service territory, the Ecologic MDMS goes to work. First, by transforming the meter read data into a universal format for the MDMS and other back office systems. Then, by doing initial validations to determine that the data received is complete, followed by identifying duplicate data and by checking for any related diagnostic flags that may indicate the data is less than ideal. If data is missing or represents less than a full day of usage, it's marked for estimation. Data that satisfies all validation requirements in this initial stage are given the temporary designation of Good Read, and proceed for more in-depth validation.

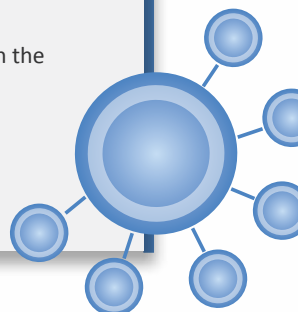
Following this initial stage of validation at the point of exchange between AMI technology and the MDMS, every read from every meter, whether it has achieved the initial good read status or not, goes through a rigorous and proven validation, estimation and editing (VEE) process.

### **Validating Reads and Estimating Missing Data for Millions of Endpoints Daily**

The VEE engines, WAVE™ and iWAVE™, within the Ecologic MDMS have been used in production for nearly a decade. The processes are proven. The engines inspect the meter reads—every single one—to ensure they are within tolerance according to utility requirements.

To accomplish this, WAVE and iWAVE use complex sets of business rules to validate and estimate the meter read data. It is a rigorous process that produces actionable information that allows a utility to ensure the data they are using is of the highest quality.

Yet, with so much data available and so many systems bringing it all together, exceptions are just part of the process, but with the Ecologic MDMS many of the exceptions are handled by the system. When editing is needed, it's manageable.



### The Five Steps of the Ecologic VEE Process

1. Validate register reads to ensure data is within tolerance.
2. Estimate register reads where data is missing using a combination of proven, proprietary business rules.
3. Validate interval reads to ensure data is within tolerance.
4. Estimate interval reads where data is missing using a combination of proven, proprietary business rules.
5. Run the proprietary Interval Adjusted Register™ process to “true-up” data received.

Common exceptions identified by the MDMS are meter reads that are higher or lower than a customer’s historical usage patterns. These high/low checks are performed on both a daily and a billing cycle basis to provide advanced notice of deviations and prevent the creation of an inaccurate bill.

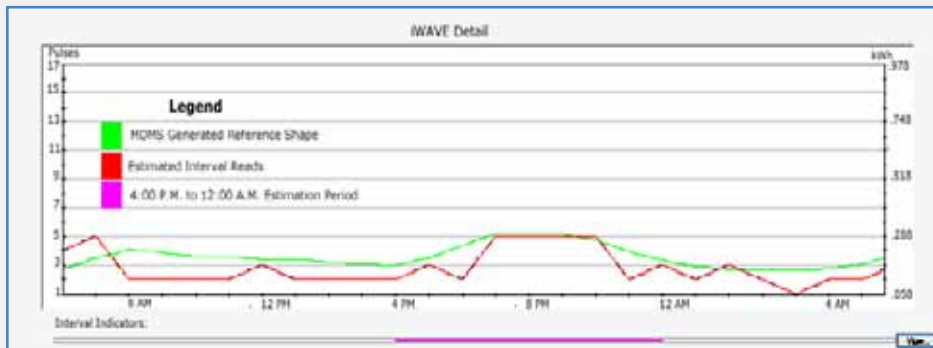
Other common exceptions are unexpected consumption with no active account, and zero consumption. This may indicate that a consumer has moved in or out without notifying the utility. In these cases, instead of scheduling a physical visit to the premise, the Ecologic MDMS’ command-and-control functions allow the utility to activate or deactivate the meter remotely, avoiding the expense of rolling a truck.

### Estimation Done Right - Every Day

All estimations done by the Ecologic MDMS are based on the last good read recorded by the smart meter. For daily register reads, WAVE does the work. It provides estimates

using one of a variety of business rules and historical usage data to calculate a highly accurate estimated read. WAVE does this by leveraging daily averages calculated and maintained by the Ecologic MDMS. The average daily usage feature of the Ecologic MDMS is a workhorse for WAVE because when a read meeting the utility’s criteria is unavailable, WAVE relies on the average daily usage statistics to form its estimate. These calculated daily averages are available to WAVE in a variety of geographic, similar customer, and chronological dimensions to best fit the utilities estimation philosophy and regulatory requirements.

Similar to WAVE for register reads, iWAVE looks for anomalies within interval reads received from the read collection systems. iWAVE also uses a complex set of business rules to validate the interval reads and provide highly accurate estimates when the data is missing or malformed.



This intelligence built into iWAVE provides a level of precision needed to satisfy utility VEE requirements for every interval every day, just as WAVE does for meter reads.

Several of iWAVE’s estimation algorithms leverage auto reference shapes developed by the Ecologic MDMS and based on actual customer usage. iWAVE is able to distribute its meter read estimates across all of the miss-

ing intervals within the period being analyzed, following a pattern similar in its peaks and valleys as the customer’s actual usage.

Another distinguishing feature of iWAVE is the patent pending process—iARegister™. This process adjusts estimated register reads based on good interval reads received. When the sum of intervals received by the smart meter system does not equal the difference between an estimated register read on day 2 and the preceding good register read on day 1, iAR™ recalculates the estimated register based on the sum of the intervals. Working in concert, WAVE and iWAVE ensure enterprise business processes are operating on a single master set of consistently cleansed meter read data.

But the work doesn’t stop there. Even after the initial estimates are provided, WAVE and iWAVE continuously improve estimates as new meter read data is received from the metering systems. This results in consistent, well-formed estimates for every interval, every day.

At every step in the Ecologic VEE process, the meter read data consumed by the Ecologic MDMS is tracked, stored and versioned. The dozens of estimation option possibilities are coded for clear, auditable business controls. That’s VEE done right, for hundreds of millions of reads each day. *That’s Ecologic Analytics.*

Interested in validating every read every day?  
Contact Ecologic Analytics to learn more about the VEE capabilities of the Ecologic MDMS.

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