Energy Data Management – An Overview

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Introduction

The purpose of this paper is to provide an overview of the functions of Energy Data Management (EDM).

While aspects of the discussion can be equally related to register based meter reading, the real focus is with regards to the requirements for managing profile or interval based meter reading.

Technically speaking, the process of metering data acquisition and data management is fairly simple. There are several suppliers of solutions in the meter reading and data management arenas, ranging from single vendor multi-meter to multi-vendor multi-meter solutions. It is in the operational environment where we find the practicalities regarding issues of responsibility and data or system ownership that become apparent.

Typically, projects related to the deployment of metering solutions, especially automated meter reading (AMR) and the retrieval of profile metering data, are driven by a single group in the business with a specific focus or output in mind. Traditionally this group has been either the one responsible for billing (business focus driven), or the group responsible for installing new metering and operating the AMR system (technical focus driven). Implied in this is then also the underlying business process/es that drive the metering data acquisition and data management requirements.

Energy Data Management (EDM)

Before discussing the details of EDM, it may be useful to give it a definition. For the purposes of this paper, the following definition is given.

"Energy data management is the process of acquisition, validation, storage and provision of data in support of all associated business processes."

From this definition, it can be stated that EDM is a combination of both technical and business process requirements. Energy data management itself is a process that covers the end-to-end requirements from data acquisition to business group outputs. EDM is a business process, supported by a technical infrastructure and associated software and hardware systems.

So, where does EDM start?

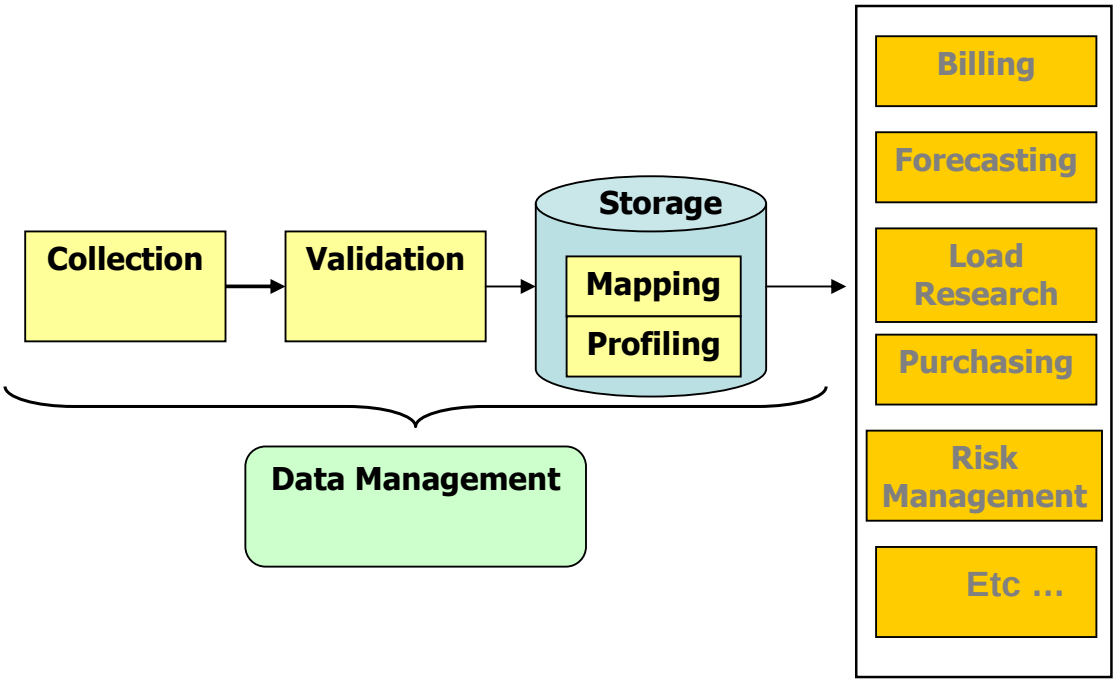
Ask five people from different areas of the business and you may get five different answers, as each has their own business requirements and focus in mind. Each will possibly see the start of their business process as the start of their EDM requirements. All of the answers however will have a common point, that being access to the base metering data.

Who then is responsible for providing the metering data to the different business groups and who is responsible for managing the source of the metering data from which the business groups would obtain the data?

This raises a question then in terms of EDM, does it belong to one group within an organization or is it a service and process on its own? More on this point later.

Components of EDM

While EDM is viewed as a process, it is logical that each of the various parts of the process is likely to be performed by the most appropriate group within an organization. Parts, or all, of the process may be outsourced and operated by an external service provider.



Data Acquisition (AMR)

Data acquisition is comprised of two areas, the first being the technical aspect of meter installation and management, along with the associated means of communication with the metering or measurement device. The second area is the operational process of data acquisition.

Decisions related to the first area have a large impact on the second. In an ideal situation, a planned EDM strategy would start with the appropriate selection of meters and data acquisition software. Here decisions regarding single or multi-vendor need to be taken into account. Even within a single vendor environment, it is preferable to ensure that all the

meters can be communicated with by a common data acquisition package. This is purely from a practical perspective to minimize operational complexity of the AMR process. There are drawbacks in that the range of meters available and meter functionality may be limited, however this needs to be weighed against the costs of metering data acquisition and data management.

Critical issues related to the operational side of data acquisition are the communication methods (automated or manual), the media used (Handheld, PSTN, GPRS, Cellular, Radio, etc) and the operational costs. Business requirements and practicalities will usually define the appropriate periods for data acquisition, such as hourly, daily, weekly or monthly.

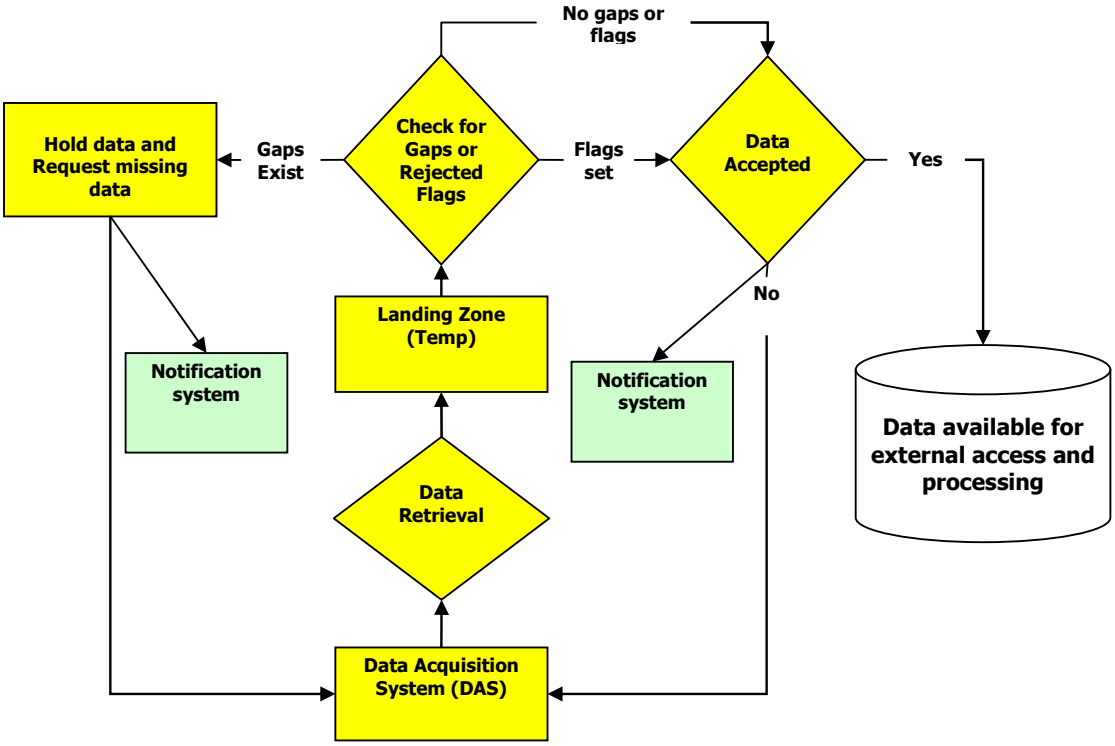
Data Validation, Editing and Estimation (VEE)

Data validation can also be seen as comprising two areas, namely the technical verification and business verification.

Technical verification is usually driven by flags and status information returned by the meters themselves and include indicators such as Power Outages, Phase failures, CRC Checksum errors, etc. and related directly to the correctness of the value returned by the meter. Under these circumstances, there are technical reasons why the validation has failed and can be both traced and corrected using defined engineering principles.

The business verification is more related to the quality issues of the data and goes towards the plausibility of the meter values themselves. These include checks against historical energy and demand values or against backup or check metering. Validation failures in this area should also be checked against possible network incidents, such as planned and unplanned power outages.

In both cases, defined principals of operation and processes for the rectification of the data should be established to ensure correct and consistent handling of data validation failures. Typically these would include when and how data estimation is to be performed, including specific methods of data estimation and under which circumstances each method is to be applied (ie: copying backup to main, linear interpolation, historical usage with ratio-metric expansion, etc.). It is possible that the range of options is limited by the software packages used.



Possible VEE process

Data Storage

The scale of the project, the volumes of data being managed and the business requirements generally determines the data storage requirements. For some utilities a single PC may be sufficient to support their needs and the software package used provides all the required functionality for data acquisition, data validation, editing and estimation. This approach however does lead to limitations in providing information to other users and using the data for additional value-added analysis and services.

In an installation where other persons within the utility require access to the data, a single PC would not be appropriate. Here a Client/Server application or independent database would be required.

Data storage includes all the requirements for both on-line accessible data, as well as off-line storage of data in backups.

Data Access

Requirements for data access are driven by the various business groups such as the Billing Department, Revenue Protection Management, Forecasting, Network Planning.

Data access methods, or the means users are able to gain access to the data, is very much determined by the choice of data storage options.

In the single PC solution, users either require access to the specific machine, or an operator is required to export the data, in one or other format, to a shared network drive or floppy disk. For small operations, low volumes and infrequent requests, this solution may be the best.

Where volumes are higher, requests more frequent and the number of users increase, it is necessary to look at providing access to the data via desktop clients. This may be a licensed client of the AMR software being used in a client/server operation, or access to the data stored on an open platform such as any standard relational database management system. The choice between an open platform database and a proprietary client would be very specific to the utility setup and requirements. Issues of protocols, LAN vs WAN and network performance would need to be taken into account.

Benefits of an open platform storage environment are wider access to data by various 3rd party packages (ie. Analysis and Reporting). Direct access to profile metering data stored in vendor based software products is not usually available.

Ownership

This is possibly one of the most critical issues regarding the long term sustainability of EDM. The question of ownership generally brings up two groups. The first being, 'It's mine' and the second being 'Don't make your problem my problem'. Unfortunately the second group generally ends up begging the first group for data.

Process

To ensure that one area of the business is not held hostage by another, with respect to access to data, it is essential that the overall process has a single owner. This owner carries the accountability for ensuring that the overall process is implemented and operates according to the defined business rules.

System

System ownership can vary, depending on which physical implementation is chosen (single PC to open database) and includes issues related to both the hardware and software. System ownership is generally only an issue in organizations where specific development work has been done or enhancements are required that may benefit or impact more than one business group. Since the data is now a shared resource, it is essential to ensure that one group is not negatively impacted by another group's requirements.

Data

Data ownership is more about the accountability and responsibility for managing the data, rather than an issue of actual ownership. It is unlikely that in the current industry environment there would be issues regarding segregation of data between business units within the same organization.

Audit Requirements

Experience has shown that an audit trail is required under the following conditions. Auditing provides an objective system-based view on the process and allows for the automation of several tasks, such as automated notification of data failures and proactive monitoring of data received and data still expected (ie. Data gaps and missing data reports)

- Data edits
  - All data edits should be kept, as well as copies of the original data. Only copies of original and current values are essential, however if other systems have used the data, it may be necessary to keep all interim version values as well.
- Data received
  - Where the systems are split and data is exported from one system to another, it is important to keep audit trails of the files received, with an indication of what data was contained in them. This avoids any chance of finger pointing, as well as assists in automated reporting and notification.
- Data loaded
  - Where data is loaded into a secondary system, audit trails of all data loads should be kept, including what data was loaded when and what the source was for that data.
- Data sent
  - Where secondary systems export data, it is necessary to keep audit trails of all data exported, including when and to what destination.

Conclusion

The acquisition of profile metering data is technically a fairly simple process, however the management thereof carries a number of technical and business related issues that need to be taken into account. It is not a One-Size-Fits-All issue, as size of utitliy, number of users and volume of data has significant impacts on business requirements. A question was raised earlier regarding EDM being a process and possibly a business function on its own. Once again, this is very dependent on the size of operation and volumes of data being managed. Broadly speaking, there is a very strong case in support of this.