NRG Energy

Comments on Request No.: WEQ AP Item 6(d) - Business Practices and Information Models to Support PAP 10 – Standardized Energy Usage Information

September 30, 2010

NRG Energy (NRG) commends the efforts of the PAP 10 Subcommittee in producing a Business Practice and Information Model to Support Priority Action Plan 10 – Standardized Energy Usage Information under a very tight timeline. NRG is generally supportive of the work product but does have a few concerns with the proposed Business Practice Standard. These concerns and questions are described below.

General

- NRG objects to the use of the term “Retail Customer” in the WEQ standard. The term is defined within the proposed Business Practice Standard as “Any Entity that takes gas and/or electric service for its own consumption”. NRG suggests that a better term for this definition in the context of the subject Recommendation may be “End User” or End-Use Customer”. In some States, commercial and industrial customers are able to take service at wholesale and hence are not retail customers. Perhaps more importantly, NRG does not interpret the NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1 upon which the proposed Business Practice Standard is based, to limit the exchange of energy use information to Retail Customers.

- Given that the Executive Summary and the Business Processes and Practices Overview appear to state that the proposed Business Practice Standard is not applicable to wholesale markets (a position to which NRG disagrees) why is there a need for WEQ-019?

Definitions

- WEQ-019.2 Energy Usage Abbreviations, Acronyms and Definition of Terms
  
  - In general, it’s unclear to why certain terms/acronyms are defined while others are not. It’s our understanding that terms used within the proposed Business Practice Standard are generally defined in WEQ-000. If this is the case, a reference to that standard should be made in WEQ-019.2. Something like, “In general, capitalized terms used within this standard are defined in WEQ-000. Definitions specific to this standard are defined below” would be helpful.

- Suggest the following terms be defined within the Recommendation:

  - System Operators – This term is used extensively within the proposed standard but is undefined. An acronym for System Operator (SO) is found in
WEQ-000. NRG suggests that the NERC definition of System Operator (An individual at a control center (Balancing Authority, Transmission Operator, Generator Operator, Reliability Coordinator) whose responsibility is to monitor and control that electric system in real-time) either be included in the proposed standard or incorporated by reference.

- Energy Service Provider - An Entity that may supply electricity, or natural gas and/or a variety of other energy cost savings services and devices, to End-Use Customers

- Market Participant – the definition introduces several terms that are left undefined: Registration Agent, settlement agent, meter reading entity. In addition, the definition conflicts with the term as defined in WEQ-000. NRG would also like to point out that the NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1, upon which this Recommendation is to be based, does not appear to address the consumption of natural gas by an entity.

**Energy Usage Information Model**

- WEQ-019.4.1 Energy Usage Information Model Details

  - In this section, all of the model classes are defined in addition to some of the model attributes. Why aren’t all of the model attributes defined?

  - Some of the model classes/attributes are left undefined or incomplete in the Recommendation. For example see requirements WEQ-019.4.1.4, WEQ-019.4.1.9, and WEQ-019.4.1.12. Are these left to be developed in phase II by a group such as ASHRAE?

Finally, a red-line of the Recommendation is attached for consideration. It incorporates the suggestions described above and minor edits.

Thank you for the opportunity to comment

Alan Johnson  
Director Regulatory Compliance  
Commercial Ops & Commodities  
NRG Energy, Inc.  
211 Carnegie Center Drive  
Princeton, NJ 08540  
T: (609)524-4876  
E: alan.johnson@nrgeenergy.com

Attachment
RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE

For Quadrant: Retail Electric and Wholesale Electric Quadrants
Requesters: Smart Grid PAP 10 Subcommittee
Request No.: WEQ AP Item 6(d), REQ AP Item 9(d)
Request Title: Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

1. RECOMMENDED ACTION:

<table>
<thead>
<tr>
<th>Action</th>
<th>Effect of EC Vote to Accept Recommended Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accept as requested</td>
<td>X Change to Existing Practice</td>
</tr>
<tr>
<td>Accept as modified below</td>
<td>X Status Quo</td>
</tr>
<tr>
<td>Decline</td>
<td></td>
</tr>
</tbody>
</table>

2. TYPE OF DEVELOPMENT/MAINTENANCE

Per Request:

- X Initiation
- X Modification
- X Interpretation
- X Withdrawal
- X Principle
- X Definition
- X Business Practice Standard
- X Document
- X Data Element
- X Code Value
- X X12 Implementation Guide
- X Business Process Documentation

Per Recommendation:

- X Initiation
- X Modification
- X Interpretation
- X Withdrawal
- X Principle
- X Definition
- X Business Practice Standard
- X Document
- X Data Element
- X Code Value
- X X12 Implementation Guide
- X Business Process Documentation

3. RECOMMENDATION

SUMMARY:

The Joint Retail Electric (REQ) and Wholesale Electric (WEQ) Quadrants’ PAP 10 Smart Grid Subcommittee submit this Recommendation for 2010 Retail Annual Plan Item No. 9d and WEQ Annual Plan Item No. 6d – Business Practices and Information Models to support Priority Action Plan 10, “Standardized Energy Usage Information,” based on the Tiger Team Report issued on June 7, 2010 by the NIST SGIP PAP10 Committee.

In initiating this standards development, NAESB agreed to by year-end 2010 develop an energy use information model standard defining a common data format that may be used when information is communicated between utilities, third parties and energy End-Use customers, via customer devices and/or third party energy service providers. The energy usage information model standard will enable the exchange of detailed energy information in a consistent format for use by customers, utilities, Energy Service Providers, consumer devices, and energy applications. Doing so will let Customers track their power use and help them manage energy consumption and cost. Without a standardized format for representing energy use data, a variety of approaches could emerge, leading to incompatibilities among energy management products and services. It is planned that the American Society of Heating, Refrigerating and AC Engineers (ASHRAE) will extend the NAESB standard to create a facilities data model providing additional energy use data elements for facility energy management including buildings.

WEQ PAP 10 Business Practices and Information Model Recommendation – V09 Revised August 31, 2010

DELETED: 22

DELETED: u

DELETED: s

DELETED: p

NRG RED-LINE
RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE

For Quadrant: Retail Electric and Wholesale Electric Quadrants
Requesters: Smart Grid PAP 10 Subcommittee
Request No.: WEQ AP Item 6(d), REQ AP Item 9(d)
Request Title: Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

RECOMMENDED STANDARDS:

WEQ-019 CUSTOMER ENERGY USAGE INFORMATION COMMUNICATION

EXECUTIVE SUMMARY

This standard establishes the Business Practice Standard for End-Use Customer energy usage information communication. Specifically, these Business Practice Standards establish a data model for Energy Usage Information. The standard does not limit the form or function of the data model and is inclusive, but not limited to, information that may be communicated in a consistent format among a variety of Entities, including but not limited to Distribution Companies, Energy Service Providers, meter-reading entities, and End-Use Customers. Such communication may occur via multiple systems and devices. Establishment of this energy usage information model will standardize a common data format which may be used when information is communicated between utilities, third parties and energy End-Use customers which may aid End-Use Customers in tracking and managing their energy use.

These Business Practice Standards do not require that wholesale electricity markets administered by ISOs/RTOs adopt this model since they generally are not the system of record for individual End-Use Customer energy usage information and load data or individual End-Use Customer forecasted usage and load data. These Business Practice Standards are not intended to replace applicable Governing Documents, and in the event of a conflict, the latter documents shall have precedence over these standards. Without limiting the foregoing, these Business Practice Standards are only applicable to the extent the information covered by this model is collected, managed or communicated pursuant to the applicable Governing Documents End-Use Customer energy usage information communication encompasses a variety of interactions between Distribution Companies, End-Use Customers and Energy Service Providers. In a business environment where best practices are voluntary, these Business Practice Standards may be applied within the context of regulatory or other market requirements and agreements.

INTRODUCTION

The North American Energy Standards Board (NAESB) is a voluntary, non-profit organization comprised of members from all aspects of the natural gas and electric industries. Within NAESB, the Retail Electric Quadrant (REQ) and the Retail Gas Quadrant (RGQ) focus on issues impacting the retail sale of energy to End-Use Customers. REQ / RGQ Business Practice Standards are intended to provide guidance to retail energy market participants not limited to: Distribution Companies, energy Suppliers, and energy service providers involved in providing competitive energy service to End-Use Customers. The focus of these Business Practice Standards is the representation of End-Use Customer energy usage information. The scope of the energy usage information model is not intended to characterize the data information model for communication of billing information.

These Business Practice Standards are voluntary and do not address policy issues that are the subject of state legislation or regulatory decisions. These Business Practice Standards have been

WEQ PAP 10 Business Practices and Information Model Recommendation – V09 Revised August 31, 2010

Page 2 of 34
RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE
For Quadrant: Retail Electric and Wholesale Electric Quadrants
Requesters: Smart Grid PAP 10 Subcommittee
Request No.: WEQ AP Item 6(d), REQ AP Item 9(d)
Request Title: Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

adopted with the realization that as the industry evolves, additional and amended Business Practice Standards may be necessary.

BUSINESS PROCESSES AND PRACTICES
Overview

The business processes and practices described below are not presently applicable to wholesale markets because wholesale markets do not generally communicate directly with End-Use Customers and are not the system of record for individual End-Use Customer energy usage information or individual End-Use Customer load forecast. The energy usage information model and these model business processes and practices are not required of ISOs/RTOs. As the energy usage information model and these business processes and practices evolve, ISOs/RTOs may determine that use of the energy usage information model in this Business Practice Standard can be applied to other information. However, such use is not intended to replace or supplant applicable Governing Documents. Without limiting the foregoing, these Business Practice Standards are only applicable to the extent the information covered by this model is collected, managed or communicated pursuant to the applicable Governing Documents.

WEQ-019.1 Principles

WEQ-019.1.1 Overall Principles

These Business Practice Standards provide an energy usage information model, which defines a collection of structured energy usage information classes and attributes that may be used to enable customer management of their energy usage and costs.

The energy usage information model is specified in UML, as a syntax neutral notation, so that it may be used within exchange protocols using a variety of specific representation syntax and exchange mechanisms, specified separately.

The recommended use of the energy usage information model is in implementation specifications exposing Customer energy usage information. Specifications that conform to the model shall contain equivalent required and included classes and attributes, thus resulting in straightforward (preferably lossless) transformations between conformant specifications.

Neither the energy usage information model nor these Business Practice Standards establish or govern ownership or any other rights in any information or data, as such ownership and other rights are subject to and governed by the Governing Documents and/or applicable laws and regulations.

Neither the energy usage information model nor these Business Practice Standards create any requirement to collect, manage or communicate any information.
RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE

For Quadrant: Retail Electric and Wholesale Electric Quadrants
Requesters: Smart Grid PAP 10 Subcommittee
Request No.: WEQ AP Item 6(d), REQ AP Item 9(d)
Request Title: Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

WEQ-019.1.1.6 While this standard defines an information model to be used when energy usage information is communicated, the Governing Documents determine the ownership of the data, the access to the data, what systems and hardware are required to comply with providing this data, and how it is paid for. There are no assumed or implied regulations in this Business Practice Standard.

WEQ-019.1.1.7 Appendix A describes the principles used in developing the energy usage information model and includes an explanatory verification paragraph describing how the energy usage information model satisfies each requirement. The Appendix A requirements WEO-019.4.2.1 through WEO-019.4.2.11.17 were provided by the SGIP PAP10 Working Group to the NAESB PAP 10 Subcommittee.

WEQ-019.1.1.8 The requirements in Appendix A represent a series of intended capabilities for the expressiveness of this Business Practice Standard but are specifically not intended to be requirements for the use of or on users of this Business Practice Standard.

WEQ-019.2 Energy Usage Abbreviations, Acronyms and Definition of Terms

WEQ-019.2.1 Business Definitions

(suggest adding a short narrative here to explain that defined terms common to all NAESB Business Practice Standards can be found in WEQ-000 and that the definitions below are used within this standard only)

WEQ-019.2.1.1 Applicable Regulatory Authority

The state regulatory agency or other governing body that provides oversight, policy guidance, and direction to any parties involved in the process of providing energy to End-Use Customers through regulations and orders.

WEQ-019.2.1.2 (End-Use) Customer

Any Entity that takes gas and/or electric service for its own consumption.

WEQ-019.2.1.3 Distribution Company

A regulated Entity which provides distribution services and may provide energy and/or transmission/transportation services in a given area.

WEQ-019.2.1.4 Energy Service Provider

An Entity that may supply electricity, or natural gas and/or a variety of other energy cost savings services and devices, to End-Use Customers.

WEQ PAP 10 Business Practices and Information Model Recommendation – V09 Revised August 31, 2010

Page 4 of 34
## RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE

**For Quadrant:** Retail Electric and Wholesale Electric Quadrants  
**Requesters:** Smart Grid PAP 10 Subcommittee  
**Request No.:** WEQ AP Item 6(d), REQ AP Item 9(d)  
**Request Title:** Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

### WEQ-019.2.1.5. Entity

A person or organization with sufficient legal standing to enter into a contract or arrangement with another such person or organization (as such legal standing may be determined by those parties) for the purpose of conducting and/or coordinating energy transactions.

### WEQ-019.2.1.6. Governing Documents

Documents that govern the interactions among parties, including but not limited to: regulatory documents (e.g. tariffs, rules, regulations), contractual agreements, and Distribution Company Operational Manuals.

### WEQ-019.2.1.7. Market Participants

A party engaged in the process of providing competitive retail energy to End-Use Customers including but not limited to the Distribution Company, the Supplier, the Registration Agent, the settlement agent, and the meter reading Entity.

\*Since it’s capitalized “Registration Agent” should be defined. Would also suggest defining “settlement agent” and “meter reading Entity”.*

### WEQ-019.2.1.8. Supplier

Persons engaged in the competitive sale of energy to End-Use Customers.

### WEQ-019.2.1.9. System Operator

An individual at a control center (Balancing Authority, Transmission Operator, Generator Operator, Reliability Coordinator) whose responsibility is to monitor and control that electric system in real-time.

### WEQ-019.2.2. Technical Definitions

This section contains technical terms and abbreviations used in this recommendation.

### WEQ-019.2.2.1. Energy Management System (EMS)

An application used for controlling multiple energy-controllable devices (e.g., pool pump, Programmable Communicating Thermostat, light switches, PEV charging, etc.). This application may reside within a HAN Device (e.g. Programmable Communicating Thermostat, In-Home Display, computer, cable set-top box, other computing device, etc.).
RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE
For Quadrant: Retail Electric and Wholesale Electric Quadrants
Requesters: Smart Grid PAP 10 Subcommittee
Request No.: WEQ AP Item 6(d), REQ AP Item 9(d)
Request Title: Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

This application may also control other devices or systems in the home providing integrated automated services for the Consumer.

WEQ-019.2.2.2 Energy Services Interface (ESI)
A secure interface to a premises communications network (i.e. HAN) which facilitates relevant energy applications (e.g. remote load control, demand response, monitoring and control of DER, in-premises display of energy usage, reading of energy and non-energy meters, PEV charging and roaming coordination, and integration with energy management systems, etc.), provides auditing / logging functions that record transactions to and from HAN Devices, and, often, coordination functions that enable secure transactions between the HAN Devices Commissioned and Registered on its network and enrolled in a Service Provider program.

WEQ-019.2.2.3 Fine Grained
Characterized by abundant use of detail or thoroughness of treatment.

WEQ-019.2.2.4 Operations
One of the seven domains (Bulk Generation, Transmission, Distribution, Markets, Service Providers, Customers, and Operations) identified in the NIST Framework and Roadmap, defined there as “The managers of the movement of electricity”. This could apply to operators of equipment within any of the other domains.

WEQ-019.2.3 Abbreviations and Acronyms

<table>
<thead>
<tr>
<th>Abbreviation / Acronym</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>UML</td>
<td>Unified Modeling Language</td>
</tr>
<tr>
<td>EMS</td>
<td>Energy Management System</td>
</tr>
<tr>
<td>ESI</td>
<td>Energy Services Interface</td>
</tr>
<tr>
<td>PEV</td>
<td>Plug-in Electric Vehicle</td>
</tr>
<tr>
<td>EISA</td>
<td>Energy Independence and Security Act</td>
</tr>
<tr>
<td>DOE</td>
<td>Department of Energy</td>
</tr>
<tr>
<td>HAN</td>
<td>Home Area Network</td>
</tr>
</tbody>
</table>

[UML, EMS, ESI are contained in WEQ-000. Why do we need to list them within the standard? If the decision is made to retain them, then why not include DER, SG and others?]

WEQ-019.3 Energy Usage Information Business Practice Standards

WEQ-019.3.1 Introduction

WEQ PAP 10 Business Practices and Information Model Recommendation – V09 Revised August 31, 2010

Page 6 of 34
**RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE**

For Quadrant: Retail Electric and Wholesale Electric Quadrants  
Requesters: Smart Grid PAP 10 Subcommittee  
Request No.: WEQ AP Item 6(d), REQ AP Item 9(d)  
Request Title: Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

The focus of these Business Practice Standards is the representation of energy usage information. As defined in [PAP10 Requirements] the energy usage information includes historic, present, and future projected usage and load together with the time period(s) for that information.

These Business Practice Standards draw on actors and use cases defined by the following groups:

- Energy Information Standards Alliance (the EIS Alliance) [EIS]
- NAESB Survey and Consolidation of PAP10 Use Cases [NAESB PAP10]
- UCAIug OpenADE [ADE]
- ZigBee/HomePlug Smart Energy Profile 2.0 Market Requirements [SEP MRD]

The relevant use cases are summarized as follows:

| WEQ-019.3.1.1 | The Energy Service Provider and/or Distribution Company communicates historic and present energy usage information and load information to the End-Use Customer or facility.¹ |
| WEQ-019.3.1.2 | The End-Use Customer or facility communicates future projected usage and load information to the Energy Service Provider, Distribution Company, or grid Operations.² |
| WEQ-019.3.1.3 | The Energy Service Provider and/or Utility communicates their projection of usage and load to the End-Use Customer or facility.³ |
| WEQ-019.3.1.4 | Devices within a facility communicate their present and future projected usage and load to controllers or facility EMS for aggregation and to be a component of facility aggregated future projected usage and load.⁴ |
| WEQ-019.3.1.5 | Devices, business processes, EMS, ESI, and other functional units within the facility communicate usage and load information among themselves.⁵ |
| WEQ-019.3.1.6 | These Business Practice Standards are limited to the seed specification which shall be usable by others to build standards and/or specification for exchange of energy usage information and load information appropriate to their needs without overly constraining those uses or including information that is not required in all implementations of specifications for exchanging load and usage. |

**WEQ-019.3.2**  
Energy Usage Information Model Format and Use

¹ See e.g. EIS Alliance Use Cases v2 including UC-9, UC-11, UC-12, UC-14, UC-15, ZBHP_SE_MRD 3.1 "HAN Device Information Retrieval Request", and OpenADE use case "Publication".  
² See e.g. EIS Alliance Use Cases v2 including UC-3, UC-11, UC-14, UC-15, and OpenADE use case "Publication"  
³ Needs refs. This is an addition to EIS and OpenADE.  
⁴ See e.g. EIS Alliance Use Cases v2 including UC-1, UC-2, UC-3, UC-8, UC-9.  
⁵ See e.g. EIS Alliance Use Cases v2 including UC-1, UC-2, UC-3  

WEQ PAP 10 Business Practices and Information Model Recommendation – V09 Revised August 31, 2010
The energy usage information model is developed using a UML modeling tool. The model classes, attributes, types and descriptions are included in WEQ-019.4. The model is made available as XML, which is the standard XML import/export format for UML. The model is exported as HTML, and made available as a downloadable archive viewable with a web browser.

WEQ-019.3.3 Energy Usage Information Model Technical Considerations

WEQ-019.3.3.1 The energy usage information model will be used as the basis for smart grid interfaces exchanging customer usage information between Energy Service Providers, consumers, and others.

WEQ-019.3.3.2 The energy usage information model permits schemas to be generated from it, using XML Schema Definition Language (XSD), and other format specification languages. Profiles may be constructed from the energy usage information model for this purpose.

WEQ-019.3.3.3 Implementations may include all or a subset of the elements defined in the model, possibly using a profile of the model.

WEQ-019.3.3.4 The informative example XSD shall conform to Naming and Design Rules best practices as described by IEC 62361-100, Naming and Design Rules for CIM Profiles to XML Schema Mapping.

WEQ-019.3.3.5 The model facilitates the use of multiple information exchange standards. The specifics are left to implementation specifications to define.

WEQ-019.3.3.6 Though there may be elements useful for the transfer of security-related information elements in the model, the specific details related to how to protect sensitive information, and how to authorize specific roles or identities to have access are not defined in this recommendation.

WEQ-019.3.4 Conformance

WEQ-019.3.4.1 A conformant specification that refines or extends this standard shall produce information for exchange that can be transformed algorithmically (that is based on the standard alone) into a form that can be validated through the method described in WEQ-019.3.4.2.

This requirement means that various formats for representation and exchange and various subsets and potentially supersets of information content are envisioned based on this standard. The use of the schema is not to impose its direct use in message validation. Rather, its use is intended to facilitate verification of conformance to the information model with respect to message content and semantics without imposing constraints on specific message payload schemas and data element representations. Some representations are anticipated to be entirely binary in nature. Others will trade off strings for integer representations of information contents. Regardless of the means, the information should be convertible to be testable as described herein.
WEQ-019.3.4.2 A specification that claims conformance to this standard shall describe and define an automatable transformation between that specification's model to and from this UML Model, including indicating attributes used and not used.

WEQ-019.3.4.3 Conformant specifications shall map corresponding model components to and from at least the following required core model attributes as exchanged between data provider and data consumer in their defined messages:

- One or more measurement or summary containers: IntervalReading, Reading, PowerQualitySummary, UsageSummary
- At least two of the following attributes, for each IntervalReading: timeStamp, endTimeStamp, duration
- The attribute "value" (the value of the measurement, from IntervalReading or Reading)
- ReadingType – ID, defaultQuality, direction, kind, multiplier, name, unit
- Association to ReadingType for each measurement (IntervalReading or Reading) (exists in model through MeterReading)
- Measurement source / location – ServiceDeliveryPoint.ID or MeterAsset.ID and association to measurements or summary

WEQ-019.4 Energy Usage Information Model

The energy usage information model herein is organized consistent with several related and well established models including the IEC TC57 Common Information Model [IEC 61968 Part 9], ZigBee Smart Energy Profile 2.0 [SEP2.0], that defined by the Energy Information Standards Alliance (EIS Alliance), and Open Automated Data Exchange (OpenADE). New classes and attributes identified in the model in this standard will be proposed to IEC TC57 for extension of a future release of the CIM. The energy usage information model, where possible, uses classes, information elements and attribute names drawn from the CIM and the cited references.

The starting point for the energy usage information model is the ServiceDeliveryPoint. ServiceDeliveryPoints identify key references for the information set optionally including identification of the customer, the location, and the physical asset. ServiceDeliveryPoints are associated in turn with zero or more MeterReadings. A MeterReading composes information about a particular measurement such as kWh or kwh. A MeterReading has a ReadingType which describes the nature of the measurement including its units of measure, and zero or more IntervalReadings or Readings and associated quality information. ServiceDeliveryPoint may also be associated with summary information on power and energy, and optionally, power quality. For applications requiring third party access to this information, additional classes are identified to facilitate associating customer and customer agreement information with the measurements available at a ServiceDeliveryPoint.

To find the use or load in a particular interval, identify the appropriate ServiceDeliveryPoint, select the MeterReading of interest (measurement) and then select the IntervalReading or Reading associated with the given interval.

WEQ PAP 10 Business Practices and Information Model Recommendation – V09 Revised August 31, 2010 Page 9 of 34
The energy usage information model includes many optional components. The complete set of information expressible using the model satisfies a wide range of applicability requirements identified by industry. Users of this standard may optionally take advantage of these extended definitions based on need without requiring them. Applications built on the energy usage information model may elect which optional components to present. However, clients of this information can be expected to recognize all components provided in the application.

Section WEQ-109.3.4.3 identifies the set of core model elements that shall be supported by specifications claiming conformance to this standard. The following class diagram illustrates a view of this core of the energy usage information model:

Figure 1: Energy Usage Information Model – Minimal View

The full energy usage information model, illustrated in Figure 2, forms the basis of the required standard.
RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE

For Quadrant: Retail Electric and Wholesale Electric Quadrants
Requesters: Smart Grid PAP 10 Subcommittee
Request No.: WEQ AP Item 6(d), REQ AP Item 9(d)
Request Title: Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

Figure 2: Full Energy Usage Information Model

WEQ PAP 10 Business Practices and Information Model Recommendation – V09 Revised August 31, 2010

Page 11 of 34
RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE
For Quadrant: Retail Electric and Wholesale Electric Quadrants
Requesters: Smart Grid PAP 10 Subcommittee
Request No.: WEQ AP Item 6(d), REQ AP Item 9(d)
Request Title: Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

WEQ-019.4.1 Energy Usage Information Model Details

The following sections contain the classes and attributes defined in the model, along with their descriptions. Elements tagged with <<enumeration>> define the valid values for an enumerated data type.

WEQ-019.4.1.1 Customer
Organisation receiving services from ServiceSupplier.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>string</td>
<td>Object identifier</td>
</tr>
<tr>
<td>name</td>
<td>string</td>
<td>Name of an attribute</td>
</tr>
</tbody>
</table>

WEQ-019.4.1.2 CustomerAgreement
Agreement between the Customer and the ServiceSupplier to pay for service at a specific ServiceLocation. It specifies the type of service provided at the ServiceLocation and the rate, which determines how the customer bill is calculated.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>string</td>
<td>Object identifier</td>
</tr>
</tbody>
</table>

WEQ-019.4.1.3 DateTimeInterval
Interval of date and time.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>duration</td>
<td>int</td>
<td>The duration of this interval, in seconds</td>
</tr>
<tr>
<td>end</td>
<td>dateTime</td>
<td>Date and time that this interval ended.</td>
</tr>
<tr>
<td>start</td>
<td>dateTime</td>
<td>Date and time that this interval started.</td>
</tr>
</tbody>
</table>

WEQ-019.4.1.4 EnergyUsageInformation
A collection of customer energy usage information

WEQ-019.4.1.5 IntervalReading
Data captured over a specific interval of time. If not specified, the duration is the intervalLength of the associated ReadingType, where the full definition of the units of measure is located.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cost</td>
<td>float</td>
<td>The cost associated with this reading for this interval.</td>
</tr>
<tr>
<td>duration</td>
<td>int</td>
<td>The duration of the interval, in seconds.</td>
</tr>
<tr>
<td>endTimeStamp</td>
<td>dateTime</td>
<td>End interval timestamp.</td>
</tr>
<tr>
<td>timeStamp</td>
<td>dateTime</td>
<td>The start date and time of an interval reading</td>
</tr>
<tr>
<td>value</td>
<td>float</td>
<td>The value of the reading for this interval in</td>
</tr>
</tbody>
</table>

Comment [ARJS]: There seems to be some inconsistency in this section. All of the model classes are defined, but only some of the model attributes. If some of the attributes are defined in this section, why not define all of them that are contained in the model?
RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE
For Quadrant: Retail Electric and Wholesale Electric Quadrants
Requesters: Smart Grid PAP 10 Subcommittee
Request No.: WEQ AP Item 6(d), REQ AP Item 9(d)
Request Title: Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>string</td>
<td>Object identifier</td>
</tr>
<tr>
<td>name</td>
<td>string</td>
<td>Meter name</td>
</tr>
</tbody>
</table>

WEQ-019.4.1.6 MeterAsset
Physical asset that performs the metering role of the ServiceDeliveryPoint. Used for measuring consumption and detection of events.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>string</td>
<td>Object identifier</td>
</tr>
<tr>
<td>valuesInterval</td>
<td>DateTimeInterval</td>
<td>Interval in date time (start &amp; end)</td>
</tr>
</tbody>
</table>

WEQ-019.4.1.7 MeterReading
Set of values obtained from the meter.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>frequencyVariations</td>
<td>int</td>
<td>Number of frequency variations</td>
</tr>
<tr>
<td>interruptions</td>
<td>int</td>
<td>Number of interruptions</td>
</tr>
<tr>
<td>sags</td>
<td>int</td>
<td>Number of sags</td>
</tr>
<tr>
<td>summaryInterval</td>
<td>DateTimeInterval</td>
<td>Interval of summary period</td>
</tr>
<tr>
<td>swells</td>
<td>int</td>
<td>Number of swells</td>
</tr>
<tr>
<td>transients</td>
<td>int</td>
<td>Number of transients</td>
</tr>
<tr>
<td>voltageImbalances</td>
<td>int</td>
<td>Number of voltage imbalances</td>
</tr>
</tbody>
</table>

WEQ-019.4.1.8 PowerQualitySummary
A summary of power quality events.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>estimated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>forecast</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mixed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>raw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>validated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>normalizedForWeather</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

WEQ-019.4.1.9 QualityOfReading <enumeration>
List of codes indicating the quality of the reading.
### RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE

For Quadrant: Retail Electric and Wholesale Electric Quadrants  
Requesters: Smart Grid PAP 10 Subcommittee  
Request No.: WEQ AP Item 6(d), REQ AP Item 9(d)  
Request Title: Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

---

#### WEQ-019.4.1.10 Reading

Specific value measured by a meter or other asset. Each Reading is associated with a specific ReadingType and was taken at the specified time.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cost</td>
<td>float</td>
<td>Cost in a currency</td>
</tr>
<tr>
<td>timeStamp</td>
<td>dateTime</td>
<td>The date and time of a reading</td>
</tr>
<tr>
<td>value</td>
<td>float</td>
<td>The value of the reading in the unit of measure defined by the associated ReadingType</td>
</tr>
</tbody>
</table>

#### WEQ-019.4.1.11 ReadingDirection «enumeration»

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>delivered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>received</td>
<td></td>
<td></td>
</tr>
<tr>
<td>net</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### WEQ-019.4.1.12 ReadingKind «enumeration»

Kind of reading.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>current</td>
<td></td>
<td></td>
</tr>
<tr>
<td>currentAngle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>date</td>
<td></td>
<td></td>
</tr>
<tr>
<td>demand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>energy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>phaseAngle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>power</td>
<td></td>
<td></td>
</tr>
<tr>
<td>powerFactor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>voltageAngle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>volume</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE
For Quadrant: Retail Electric and Wholesale Electric Quadrants
Requesters: Smart Grid PAP 10 Subcommittee
Request No.: WEQ AP Item 6(d), REQ AP Item 9(d)
Request Title: Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

carbonDioxide
NOx
carbon
SO2
methane
HCH
perfluorocarbons
sulfurHexafluoride
phaserPower
quantityPowerQ60
quantityPowerQ45
distortionPower
voltageRMS
voltageAverage
currentRMS
currentAverage
voltageTHD
currentTHD

WEQ-019.4.1.13 ReadingQuality
Quality of a specific reading value or interval reading value. If not present, then is assumed to be the defaultQuality indicated by the ReadingType.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>quality</td>
<td>QualityOfReading</td>
<td>Quality, to be specified if different than defaultQuality</td>
</tr>
</tbody>
</table>

WEQ-019.4.1.14 ReadingType
Type of data conveyed by a specific Reading.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>string</td>
<td>Object identifier</td>
</tr>
<tr>
<td>aliasName</td>
<td>string</td>
<td>The aliasName is free text human readable name of the object alternative to IdentifiedObjectName. It may be non unique and might not correlate to a naming hierarchy.</td>
</tr>
</tbody>
</table>
RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE

For Quadrant: Retail Electric and Wholesale Electric Quadrants
Requesters: Smart Grid PAP 10 Subcommittee
Request No.: WEQ AP Item 6(d), REQ AP Item 9(d)
Request Title: Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

channelNumber | integer | Logical positioning of this measurement data.
defaultQuality | QualityOfReading | Characteristics of a data value conveyed by a specific Reading, which allow an application to understand how a specific Reading is to be interpreted.
description | string | The description is a free human readable text describing or naming the object. It may be non unique and may not correlate to a naming hierarchy.
direction | ReadingDirection | Specifies the direction of flow of the measurement.
intervalLength | int | (if incremental reading value) Length of increment interval, in seconds. Interval duration specified at the IntervalReading overrides this default.
kind | ReadingKind | Kind of reading
multiplier | UnitMultiplier | Multiplier for 'unit'.
name | string | Name of an attribute.
unit | UnitSymbol | Unit in symbol

WEQ-019.4.1.15 ServiceDeliveryPoint
Logical point on the network where the ownership of the service changes hands. It is one of potentially many service points within a ServiceLocation, delivering service in accordance with a CustomerAgreement. Used at the place where a meter may be installed.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>string</td>
<td>Object identifier</td>
</tr>
<tr>
<td>description</td>
<td>string</td>
<td>The description is a free human readable text describing or naming the object. It may be non unique and might not correlate to a naming hierarchy.</td>
</tr>
<tr>
<td>lat</td>
<td>float</td>
<td>Latitude of the location</td>
</tr>
<tr>
<td>long</td>
<td>float</td>
<td>Longitude of the location</td>
</tr>
<tr>
<td>name</td>
<td>string</td>
<td>Name of an attribute.</td>
</tr>
</tbody>
</table>

WEQ-019.4.1.16 SummaryMeasurement
An aggregated summary measurement reading.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>multiplier</td>
<td>UnitMultiplier</td>
<td>The multiplier part of the unit of measure, e.g. &quot;kilo&quot; (k)</td>
</tr>
<tr>
<td>timeStamp</td>
<td>dateTime</td>
<td>The date and time (if needed) of the summary measurement.</td>
</tr>
</tbody>
</table>

WEQ PAP 10 Business Practices and Information Model Recommendation – V09 Revised August 31, 2010

Page 16 of 34
**RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE**

For Quadrant: Retail Electric and Wholesale Electric Quadrants  
Requesters: Smart Grid PAP 10 Subcommittee  
Request No.: WEQ AP Item 6(d), REQ AP Item 9(d)  
Request Title: Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

<table>
<thead>
<tr>
<th>unit</th>
<th>UnitSymbol</th>
<th>The units of the reading, e.g. &quot;Wh&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>float</td>
<td>The value of the summary measurement.</td>
</tr>
</tbody>
</table>

**WEQ-019.4.17**

**TariffProfile**

A schedule of charges; structure associated with Tariff that allows the definition of complex tariff structures such as step and time of use when used in conjunction with TimeTariffInterval and Charge. Inherited 'statusValue' is defined in the context of the utility's business rules, for example: active, inactive, etc.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>string</td>
<td>Object identifier</td>
</tr>
<tr>
<td>name</td>
<td>string</td>
<td>Name of an attribute.</td>
</tr>
</tbody>
</table>

**WEQ-019.4.18**

**UnitMultiplier <enumeration>**

The unit multipliers defined for the CIM

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>c</td>
<td></td>
<td>Centi 10**-2</td>
</tr>
<tr>
<td>d</td>
<td></td>
<td>Deci 10**-1</td>
</tr>
<tr>
<td>G</td>
<td></td>
<td>Giga 10**9</td>
</tr>
<tr>
<td>k</td>
<td></td>
<td>Kilo 10**3</td>
</tr>
<tr>
<td>m</td>
<td></td>
<td>Milli 10**3</td>
</tr>
<tr>
<td>M</td>
<td></td>
<td>Mega 10**6</td>
</tr>
<tr>
<td>micro</td>
<td></td>
<td>Micro 10**-6</td>
</tr>
<tr>
<td>n</td>
<td></td>
<td>Nano 10**-9</td>
</tr>
<tr>
<td>none</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p</td>
<td></td>
<td>Pico 10**-12</td>
</tr>
<tr>
<td>T</td>
<td></td>
<td>Tera 10**12</td>
</tr>
</tbody>
</table>

**WEQ-019.4.19**

**UnitSymbol <enumeration>**

The units defined for usage in the CIM

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td>Current in ampere</td>
</tr>
<tr>
<td>deg</td>
<td></td>
<td>Plane angle in degrees</td>
</tr>
<tr>
<td>F</td>
<td></td>
<td>Capacitance in farad</td>
</tr>
<tr>
<td>g</td>
<td></td>
<td>Mass in gram</td>
</tr>
<tr>
<td>h</td>
<td></td>
<td>Time in hours</td>
</tr>
<tr>
<td>H</td>
<td></td>
<td>Inductance in henry</td>
</tr>
</tbody>
</table>

WEQ PAP 10 Business Practices and Information Model Recommendation – V09 Revised August 31, 2010

Page 17 of 34
**RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE**

**For Quadrant:** Retail Electric and Wholesale Electric Quadrants  
**Requesters:** Smart Grid PAP 10 Subcommittee  
**Request No.:** WEQ AP Item 6(d), REQ AP Item 9(d)  
**Request Title:** Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hz</td>
<td>Frequency in hertz</td>
</tr>
<tr>
<td>Hz-I</td>
<td>per Hertz</td>
</tr>
<tr>
<td>J</td>
<td>Energy in joule</td>
</tr>
<tr>
<td>Js</td>
<td>Joule per second</td>
</tr>
<tr>
<td>kg/J</td>
<td>Mass per energy</td>
</tr>
<tr>
<td>m</td>
<td>Length in meter</td>
</tr>
<tr>
<td>m²</td>
<td>Area in square meters</td>
</tr>
<tr>
<td>m³</td>
<td>Volume in cubic meters</td>
</tr>
<tr>
<td>min</td>
<td>Time in minutes</td>
</tr>
<tr>
<td>N</td>
<td>Force in newton</td>
</tr>
<tr>
<td>none</td>
<td>Dimension less quantity, e.g. count, per unit, etc.</td>
</tr>
<tr>
<td>C</td>
<td>Relative temperature in degrees Celsius</td>
</tr>
<tr>
<td>ohm</td>
<td>Resistance in ohm</td>
</tr>
<tr>
<td>Pa</td>
<td>Pressure in pascal (n/m²)</td>
</tr>
<tr>
<td>rad</td>
<td>Plane angle in radians</td>
</tr>
<tr>
<td>S</td>
<td>Conductance in siemens</td>
</tr>
<tr>
<td>s</td>
<td>Time in seconds</td>
</tr>
<tr>
<td>s⁻¹</td>
<td>per second</td>
</tr>
<tr>
<td>V</td>
<td>Voltage in volt</td>
</tr>
<tr>
<td>V/VAr</td>
<td>Volt per volt ampere reactive</td>
</tr>
<tr>
<td>VA</td>
<td>Apparent power in volt ampere</td>
</tr>
<tr>
<td>VAh</td>
<td>Apparent energy in volt ampere hours</td>
</tr>
<tr>
<td>VAr</td>
<td>Reactive power in volt ampere reactive</td>
</tr>
<tr>
<td>VArh</td>
<td>Reactive energy in volt ampere reactive hours</td>
</tr>
<tr>
<td>W</td>
<td>Active power in watt</td>
</tr>
<tr>
<td>W/Hz</td>
<td>Watt per hertz</td>
</tr>
<tr>
<td>W/s</td>
<td>Watt per second</td>
</tr>
<tr>
<td>Wh</td>
<td>Real energy in Watt hours</td>
</tr>
<tr>
<td>pct</td>
<td>Percent</td>
</tr>
</tbody>
</table>

**Usage Summary**

Summary of usage for a billing period

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
</table>

WEQ PAP 10 Business Practices and Information Model Recommendation – V09 Revised August 31, 2010  
Page 18 of 34
### RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE

**For Quadrant:** Retail Electric and Wholesale Electric Quadrants  
**Requesters:** Smart Grid PAP 10 Subcommittee  
**Request No.:** WEQ AP Item 6(d), REQ AP Item 9(d)  
**Request Title:** Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

<table>
<thead>
<tr>
<th>Field</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>billingPeriod</td>
<td>DateTimeInterval</td>
<td>The billing period to which the included measurements apply</td>
</tr>
<tr>
<td>billLastPeriod</td>
<td>float</td>
<td>The amount of the bill for the previous period</td>
</tr>
<tr>
<td>billToDate</td>
<td>float</td>
<td>The bill amount related to the billing period as of the date received</td>
</tr>
<tr>
<td>costAdditionalLastPeriod</td>
<td>float</td>
<td>Additional charges from the last billing period</td>
</tr>
<tr>
<td>currency</td>
<td>string</td>
<td>The ISO 4217 code indicating the currency applicable to the bill amounts in the summary. See list at: <a href="http://www.unicef.org/cefact/recommendations/rec09/rec09_eceetd203.pdf">http://www.unicef.org/cefact/recommendations/rec09/rec09_eceetd203.pdf</a></td>
</tr>
<tr>
<td>currentBillingPeriodOverAllConsumption</td>
<td>SummaryMeasurement</td>
<td>The total consumption for the billing period</td>
</tr>
<tr>
<td>currentDayLastYearNetConsumption</td>
<td>SummaryMeasurement</td>
<td>The amount of energy consumed one year ago</td>
</tr>
<tr>
<td>currentDayNetConsumption</td>
<td>SummaryMeasurement</td>
<td>Net consumption for the current day</td>
</tr>
<tr>
<td>currentDayOverallConsumption</td>
<td>SummaryMeasurement</td>
<td>Overall energy consumption for the current day</td>
</tr>
<tr>
<td>peakDemand</td>
<td>SummaryMeasurement</td>
<td>Peak demand recorded for the current period</td>
</tr>
<tr>
<td>previousDayLastYearOverallConsumption</td>
<td>SummaryMeasurement</td>
<td>The amount of energy consumed on the previous day one year ago</td>
</tr>
<tr>
<td>previousDayNetConsumption</td>
<td>SummaryMeasurement</td>
<td>Net consumption for the previous day</td>
</tr>
<tr>
<td>previousDayOverallConsumption</td>
<td>SummaryMeasurement</td>
<td>The total consumption for the previous day</td>
</tr>
<tr>
<td>qualityOfReading</td>
<td>QualityOfReading</td>
<td>Indication of the quality of the summary readings</td>
</tr>
<tr>
<td>ratchetDemand</td>
<td>SummaryMeasurement</td>
<td>The current ratchet demand value for the ratchet demand period</td>
</tr>
<tr>
<td>ratchetDemandPeriod</td>
<td>DateTimeInterval</td>
<td>The period over which the ratchet demand applies</td>
</tr>
</tbody>
</table>

**WEQ-019.4.1.21 ServiceKind «enumeration»**

Kind of service.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
</table>

WEQ PAP 10 Business Practices and Information Model Recommendation – V09 Revised August 31, 2010

Page 19 of 34
RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE
For Quadrant: Retail Electric and Wholesale Electric Quadrants
Requesters: Smart Grid PAP 10 Subcommittee
Request No.: WEQ AP Item 6(d), REQ AP Item 9(d)
Request Title: Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

electricity
gas
water
time
heat Includes hot water and steam
refuse
sewerage
rates
tvLicence
internet
other

Cold Includes chilled water and ice

WEQ-019.4.1.22 CustomerAuthorisation
Holds an authorisation for access to specific user-private data granted to a 3rd Party service provider. [OpenADE Extension - Specialization of "Agreement"]

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>string</td>
<td>Unique identifier for this authorisation</td>
</tr>
<tr>
<td>validityInterval</td>
<td>DateTimeInterval</td>
<td>Date and time interval this agreement is valid (from going into effect to termination).</td>
</tr>
</tbody>
</table>

WEQ-019.4.1.23 ServiceCategory
Category of service provided to the customer.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>kind</td>
<td>ServiceKind</td>
<td>Kind of service.</td>
</tr>
</tbody>
</table>

WEQ-019.4.1.24 SupplierKind «enumeration»
Kind of supplier.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>district</td>
<td></td>
<td></td>
</tr>
<tr>
<td>intermediary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>local</td>
<td></td>
<td></td>
</tr>
<tr>
<td>microgrid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>retailer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>utility</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## ServiceSupplier

Organisation that provides services to Customers.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>string</td>
<td>Unique identifier of this service supplier.</td>
</tr>
<tr>
<td>kind</td>
<td>SupplierKind</td>
<td>Kind of supplier.</td>
</tr>
<tr>
<td>name</td>
<td>string</td>
<td>The human-readable name for the service supplier.</td>
</tr>
</tbody>
</table>
APPENDIX A

Principle Verifications Against The Energy Information Usage Model

WEQ-019.4.2

Requirements validation method

A complete requirements process involves a sequential breakdown of a problem starting with the collection of high level functional user requirements. The high level requirements are broken down into ever more specific derived requirements. Eventually you get to design requirements. At the bottom of the requirements tree are simple, testable, atomic requirements. When the atomic requirements are met, the tracing to the higher level requirements allows them to be met by definition.

The PAP10 charter – the text of the abstract, description, and objectives from the NIST Framework Release 1.0 – contains high level user requirements (http://www.nist.gov/public_affairs/releases/upload/smartgrid_interoperability_final.pdf). The requirements presented in WEQ-019.3 can be considered the first level requirements breakdown of derived requirements.

This standard does not go to the final level of detailed design requirements. Instead, a parallel assessment was performed of the “derived requirements” against the evolving model, which itself was initially derived from detailed requirements identified in activities external to this standard.

Here is a sample requirement and how it is verified:

**WEQ 12.4.2.1.2** Usage and load information shall be readily available

While the availability of information is the realm of the Distribution Company and its customer (since the Distribution Company generally owns the billing meter), this model facilitates availability by providing a single simple information model for client applications.

Each of the following sections lists one of the requirements for the information model that satisfies PAP 10 and is followed with an explanatory verification paragraph describing how the energy usage information model satisfies the requirement.

**WEQ-019.4.2.1** General

**WEQ-019.4.2.1.1** Facilities shall include residences, buildings, and industrial installations

No specific limit as to the nature of the facility appears in the energy usage information model. Identifiers are for user, location, and device only.

**WEQ-019.4.2.1.2** Usage and load information shall be readily available

While the availability of information is the realm of the Distribution Company and its customer (since the Distribution Company generally owns the billing meter), this model facilitates availability by providing a single simple information model for client applications.

WEQ PAP 10 Business Practices and Information Model Recommendation – V09 Revised August 31, 2010

Page 22 of 34
PAP 10 is an information model concept which is transport agnostic.
The information, classes, and attributes that are contained in the energy usage
information model and concepts described in this standard are data encoding and
communication protocol agnostic.

Timeliness of Delivery

Customers shall be able to use the information defined in these standards for real-time
feedback on present and projected performance
There are no constraints on time stamps, latency or performance imposed by the
model, so it is possible to represent past, present, or future usage.

Premises based systems (e.g. EMS/ESI) shall be able to use the information defined in
these standards for real-time feedback on present and projected performance
There are no constraints on time stamps, latency or performance imposed by the
model, so it is possible to represent past, present, or future usage.

Information exchanged shall be delivered in sufficient time to affect usage ["and this is
the definition of real-time and near real-time "]
There are no constraints on time stamps, latency or performance imposed by the
model, so it is possible to represent past, present, or future usage.

Operations, Distribution, and Service Providers shall be able to use the information
defined in these standards with the facility in near-real-time
There are no constraints on time stamps, latency or performance imposed by the
model, so it is possible to represent past, present, or future usage.

Customers and premises-based systems shall be able to use the information defined in
these standards to provide real-time feedback on present and projected performance
There are no constraints on time stamps, latency or performance imposed by the
model, so it is possible to represent past, present, or future usage.

Benefits to Facilities

Standard load and usage information shall enable improved energy efficiency by
defining a consistent way to communicate usage information.
By minimizing the number of different physical representations of usage
information, and aligning the logical elements included in the definition of this
information, it will allow for the development of applications that require this
information to provide energy efficiency services and functionality.

Standard load and usage information shall enable helping [all] Customers and
operations manage their energy usage [and load]
**RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE**

<table>
<thead>
<tr>
<th>For Quadrant:</th>
<th>Retail Electric and Wholesale Electric Quadrants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requesters:</td>
<td>Smart Grid PAP 10 Subcommittee</td>
</tr>
<tr>
<td>Request No.:</td>
<td>WEQ AP Item 6(d), REQ AP Item 9(d)</td>
</tr>
<tr>
<td>Request Title:</td>
<td>Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information</td>
</tr>
</tbody>
</table>

The data model standardizes load and usage information so customer usage data provider services may be developed to interface with systems that help customers and operations with energy management.

**WEQ-019.4.2.3.3**

*Standard load and usage information shall enable improved [facility] energy usage by availability of fine grained and timely information*

The data model standard provides for measurement intervals enabling the availability of fine grained and timely load and usage information.

**WEQ-019.4.2.3.4**

*Availability of fine grained and timely information will enable better decisions about energy usage and conservation*

The data model enables a standard approach for fine grained and timely load and usage information so customer usage data provider services can interface to systems that help customers and/or operations with energy conservation.

**WEQ-019.4.2.3.5**

*Facilities will benefit from consistent usage information exchange inside the facility, including meeting the energy efficiency goals of EISA 2007 and DOE initiatives*

The data model provides consistent energy usage data representation so information exchanges are uniformly understood. This ensures facility energy efficiency systems using this data are acting on correct and consistent information.

**WEQ-019.4.2.3.6**

*Standard model shall support aggregated projections that can be passed on to operations [the System Operator’s] or [building management] [?] make forecasting and management better and increase the value of a facility to smart grid*

Aggregated projections are supported via future timestamps in interval and other data. The model supports aggregation based on topology, device, and owner.

**WEQ-019.4.2.3.7**

*Sharing usage and load information inside a facility makes that facility more valuable to smart grid*

The data model provides usage, load, and pricing information from which a facility manager or system may take optimization actions.

**WEQ-019.4.2.3.8**

*The information exchanged shall allow integration of usage information throughout facility decision processes*

The data model standardizes usage information so customer usage data provider services may be developed to integrate with systems handling facility decision processes.
RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE

For Quadrant: Retail Electric and Wholesale Electric Quadrants
Requesters: Smart Grid PAP 10 Subcommittee
Request No.: WEQ AP Item 6(d), REQ AP Item 9(d)
Request Title: Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

WEQ-019.4.2.4 Benefits to Grid and Service Provider Operations

WEQ-019.4.2.4.1 Standard load and usage information will improve forecasting and grid management by delivering aggregated projections to operations.

By specifying future intervals, which could be larger than measured intervals, it is possible to represent aggregated projections.

WEQ-019.4.2.4.2 Standard load and usage information will improve forecasting and grid management by delivering aggregated projections to service providers.

By specifying future intervals, which could be larger than measured intervals, it is possible to represent aggregated projections.

WEQ-019.4.2.4.3 Standard load and usage information will enable more responsive facilities.

Interoperable models of load and usage information allow coordination of response capability, allowing those capabilities to be utilized more efficiently.

WEQ-019.4.2.4.4 Standard load and usage information will enable early deployment of devices that deliver and understand usage information.

By standardizing the information to be made available, devices and applications will be able to obtain access to that information.

WEQ-019.4.2.5 Internet-Like Future

WEQ-019.4.2.5.1 Standard usage and load information enables innovation in novel ways to help customers manage energy usage.

By standardizing on simple data sets that many providers and consumers can utilize, this information can be combined with additional information to find the specific way that will help customers the most.

WEQ-019.4.2.5.2 Standard usage and load information enables innovation by third party service and software providers.

By standardizing on simple data sets that many providers and consumers can utilize, this information can be combined with additional information to find the specific way that will help customers the most.

WEQ-019.4.2.6 Improved Collaboration

WEQ-019.4.2.6.1 The Information model shall not restrict two way flows of information.

Customers, utilities and third parties will have access to the model in real time with the appropriate usage information and customer permissions/allowances.
**RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE**

**For Quadrant:** Retail Electric and Wholesale Electric Quadrants  
**Requesters:** Smart Grid PAP 10 Subcommittee  
**Request No.:** WEQ AP Item 6(d), REQ AP Item 9(d)  
**Request Title:** Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

**WEQ-019.4.2.6.2**  
By standardizing usage and load information exchange, devices that deliver and understand usage and load can be deployed more quickly, contributing to achieving the energy efficiency goals of EISA 2007 and DOE. Uniformity among signals as required by the model standards will lead to greater acceptance and adoption.

**WEQ-019.4.2.7**  
**Information Sources and Accessibility**

**WEQ-019.4.2.7.1**  
Usage and load information shall be provided by utilities and aggregating service providers and may be provided by others. With consent from the customer, utilities and aggregators will provide access to usage and load information in the provided format for model integration.

**WEQ-019.4.2.7.2**  
Usage and load information shall be provided by devices and EMS/ESI implementations. With consent from the customer, devices and EMS/ESI implementations will provide usage and load information in the provided format for model integration.

**WEQ-019.4.2.7.3**  
Usage and load information can be accessed from the meter. With consent from the customer and the utility, usage and load information will be provided by the meter to accredited sources for purposes of running the model.

**WEQ-019.4.2.7.4**  
Usage and load information can be accessed from smart grid. With consent from the customer and the utility, usage and load information will be made available by any Smart Grid services provider via the public Internet.

**WEQ-019.4.2.8**  
**Interactions and Information Exchanges Supported**

**WEQ-019.4.2.8.1**  
Interactions supported shall include those between Distribution [and Operations] and the industrial, commercial, and residential premises. The model does not exclude/include specific actors or potential exchange points, it merely describes data and format of information.

**WEQ-019.4.2.8.2**  
Standard information models and understanding of usage and load are essential to cross domain interactions between Distribution [and Operations] and Industrial, Commercial, Residential, and PEVs. The standard information format does not exclude potential actors or exchange points including potential cross domain interaction including those between Distribution companies and other actors.

**WEQ-019.4.2.8.3**  
Interactions supported shall include those between Distribution [and Operations] and the industrial, commercial, residential premises, and plug-in electric vehicles.
The model does not exclude/include specific actors or potential exchange points, it merely describes data and format of information.

**WEQ-019.4.2.8.4**

*Standard information models and understanding of usage and load are essential to cross domain interactions between Service Providers: and Industrial, Commercial, Residential, and PETs.*

The standard information format does not exclude potential actors or exchange points including potential cross domain interaction including those between Service Providers and other actors.

**WEQ-019.4.2.8.5**

*Interactions supported shall include those between Service Providers and the industrial, commercial, residential premises, and plug-in electric vehicles.*

The model does not exclude/include specific actors or potential exchange points, it merely describes data and format of information therefore by not excluding these actors.

**WEQ-019.4.2.8.6**

*This effort shall support information standards for load curtailment, load shaping, and energy market operations, hence load and usage must be supported (see PAP09, PAP03, and PAP04).* Load and usage information are part of the model.

**WEQ-019.4.2.8.1**

*Information exchanges shall include to, from, and within facilities.*

The model does not preclude any potential exchange points therefore the requirement is met.

**WEQ-019.4.2.9**

*Information Characteristics*

**WEQ-019.4.2.9.1**

*Information model shall support exchange of both Fine Grained and summary information.*

Summary information is available at the top level through PowerQualitySummary and UsageSummary components. Fine-grained information is available through the list of MeterReading measurement structures which in turn have both summary, Reading, and interval level detail, IntervalReading components. Additionally, the energy usage information data structures can be associated by device, location, and owner facilitating variable aggregations.

**WEQ-019.4.2.9.2**

*Fine grained means that there is disaggregated information. Disaggregated information can include for example load, subsystem, premise, and variable time interval.*

Fine grained (disaggregated) information is described throughout the information model. From CustomerAccount, EventType, MeterAsset, ReadingKind, etc. there seems to be enough detailed data elements to support "Fine grained" information.
**RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE**

<table>
<thead>
<tr>
<th>For Quadrant:</th>
<th>Retail Electric and Wholesale Electric Quadrants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requesters:</td>
<td>Smart Grid PAP 10 Subcommittee</td>
</tr>
<tr>
<td>Request No.:</td>
<td>WEQ AP Item 6(d),REQ AP Item 9(d)</td>
</tr>
<tr>
<td>Request Title:</td>
<td>Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information</td>
</tr>
</tbody>
</table>

**WEQ-019.4.2.9.3**  
Support for exchanging standard historical, present, and projected load information is required.

Historical information seems to be supported by the UsageSummary attributes for billing items only. Present (meter reading) information has fine-grained as well as billing attributes defined. Projected usage is supported in the QualityOfReading <<enumeration>> attribute, which delineates the “estimated” and “forecast” attribute names. Historical, present, and projected load information is implicitly available at the interval and reading level based on the time stamps utilized – past/present/future.

**WEQ-019.4.2.9.4**  
Energy Usage Information shall include usage, usage profile, and some component of cost (consistent with PAP03, PAP04)

Energy usage information, including costs is contained in the data model. Interval data is supportive of usage profiles (PAP03) and PAP04.

**WEQ-019.4.2.9.5**  
The PAP 10 Energy Usage Information model shall allow for exchange of greater or lesser detail.

Summary information is available at the top level through PowerQualitySummary and UsageSummary components. Fine-grained information is available through the list of MeterReading measurement structures which in turn have both summary, Reading, and interval level detail, IntervalReading components. Additionally, the energy usage information data structures can be associated by device, location, and owner facilitating variable aggregations.

**WEQ-019.4.2.10**  
**Timing and Goals**

**WEQ-019.4.2.10.1**  
*Initial steps include making usage information more readily available by defining and standardizing usage information [delivered] through existing SG infrastructure.*

The energy usage information data structures enable a diverse range of technologies to deliver usage information in a timely and protocol agnostic manner. Examples of this might be a premise ESI or through services provided by a utility, facility, aggregator, energy services provider, or others.

**WEQ-019.4.2.10.2**  
*Information on device and facility usage is a primary goal in the initial focus.*

As the energy usage information data structures cover summary and device level information, device and facility (aggregated) information can be delivered.

**WEQ-019.4.2.10.3**  
*Standard load and usage information will enable early deployment of devices that deliver and understand usage information.*

As the energy usage information data models are standardized, producers may deliver usage based devices with confidence in interoperability.
WEQ-019.4.2.11 Requirements on Quality of Consensus Standard

The information model shall support:

WEQ-019.4.2.11.1 Consistent data representation for REST & Web Services.
This requirement will support REST and Web Services. However, other transports may be supported such as, but not limited to, IEEE 1703/ANSI C12.22 architecture per AEIC Guidelines V2.0. See Section REQ.18.3.3 which implies support for alternative syntaxes.

WEQ-019.4.2.11.2 Specification of transactional exchange, syntax, and required population of the information model are beyond the scope of these requirements.
No transactional syntaxes or message services are defined in this standard.

WEQ-019.4.2.11.3 An extensible information model – e.g. ability to add custom extensions as needed
This model may be extended by adding new elements (classes, attributes, and associations). Implementations must utilize conventions to ignore any elements not understood by components, to allow them to continue to operate when future extensions are added.

WEQ-019.4.2.11.4 Have an evolvable information model – e.g. the standards process supports future revisions
WEQ-019.4.2.3.3 identifies how the model is evolvable. The reference in section 9 defines how the standard version can be revised.

WEQ-019.4.2.11.5 Forward compatible as we evolving
To maintain forward and backward compatibility, best practices on extensibility, which also includes evolvability through standards versions, should be followed.

WEQ-019.4.2.11.6 Supportive of versioning
Versioning in the UML Model is addressed by a tagged value.

WEQ-019.4.2.11.7 Usable without “knowing all the details”
Information in the model is arranged hierarchically. Greater detail can be understood the deeper into this hierarchy the reader goes. Summary information is exposed near the top of the hierarchy. These arrangements make it straightforward to accessing applications to ignore the level of detail they do not plan to use or comprehend, while getting value out of higher level information.

More flexibility for independent innovation shall be achieved through:

WEQ PAP 10 Business Practices and Information Model Recommendation – V09 Revised August 31, 2010

Page 29 of 34
RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE

For Quadrant: Retail Electric and Wholesale Electric Quadrants
Requesters: Smart Grid PAP 10 Subcommittee
Request No.: WEQ AP Item 6(d), REQ AP Item 9(d)
Request Title: Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

WEQ-019.4.2.11.8 Focus on information exchanged

The specification of an information-only model allows the standard to focus on the information exchanged.

WEQ-019.4.2.11.9 Agreed upon interfaces are maintained over time

A profile of this EUI model supports the exposure of an interface. One is provided as an example in this standard. Section 0, verification references how the information model is to be maintained. See section WEQ 12.3.3 which describes how the energy usage information model will be used as the basis for Smart Grid interfaces.

WEQ-019.4.2.11.10 Minimal details = maximum interoperability

The model provides a hierarchy of summary and detailed information. A balance is achieved by the definition of minimal set of details necessary to satisfy the cumulative set of use cases of the energy usage information and allocated to this model.

WEQ-019.4.2.11.11 Intellectual Property Rights shall be clear & clean

Sections 0, 0, 0, 0, 0 describe the FPR rights to use of the energy usage information model defined by this standard.

Results of PAP 10 shall produce:

WEQ-019.4.2.11.12 Information model and XML schema

There is no normative schema in this standard. There is an "example" non-normative schema to demonstrate how to take the EUI model and create a profile that can generate an XML schema or other description.

WEQ-019.4.2.11.13 At information exchange level

The information model is designed to be exchanged between participants. The information model and XML Schema provide the specificity to define an information exchange, but stops short of mandating one (see 0).

The information model shall be:

WEQ-019.4.2.11.14 Readable without charge

NAESB has agreed to make the energy usage information model included in WEQ-019.4 and WEQ-019.4.1 available to the public without charge.

WEQ-019.4.2.11.15 Reusable without restriction or charge

WEQ PAP 10 Business Practices and Information Model Recommendation – V09 Revised August 31, 2010

Page 30 of 34

NRG REDLINE
RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE

For Quadrant: Retail Electric and Wholesale Electric Quadrants
Requesters: Smart Grid PAP 10 Subcommittee
Request No.: WEQ AP Item 6(d), REQ AP Item 9(d)
Request Title: Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

The use of the energy usage information model included in WEQ-019.4 and WEQ-019.4.1 for the production of derivative work products is not prohibited.

WEQ-019.4.2.11.16 Adaptable without restriction or charge

All NAESB standards may be modified through the NAESB process. (Please see: http://www.naesb.org/misc/naesb_process_for_standards_dev.doc)

WEQ-019.4.2.11.17 Usable for open source

The use of the energy usage information model included in WEQ-019.4 and WEQ-019.4.1 may be distributed in any manner, however, must be made available without charge.

WEQ-019.4.2.12 Additional Considerations (not provided by SGIP PAP10 Working Group)

WEQ-019.4.2.12.1 In communicating energy usage information, the energy usage information model should be used and the information outlined within the model should be available.

The model provides a common, consensus-based, vendor-neutral model to represent usage information, to be used in exchange scenarios where it is applicable and desired by usage information providers and Customers. Section WEQ-019.3.3 elaborates the technical considerations for constructing implementing standards which do specify syntax.

WEQ-019.4.2.12.2 The energy usage information model data set has three unique identifiers, which serve the purpose of allowing various aggregations of data sets.

The model has the class ServiceDeliveryPoint which has an ID. Additionally, it has an association with Customer and MeterAsset which support aggregation by location, owner, and device.

Owner (customer): This is represented by the Customer class, provided the use of the term ‘owner’ or similar verbiage is not indicative or dispositive of any ownership or other rights under applicable law in the model or any data.

Location: This is represented by ServiceDeliveryPoint.

Device: This is represented by MeterAsset.

WEQ-019.4.2.12.3 The TariffProfile component should be included in the energy information usage model.

TariffProfile is included in the energy usage information model as a reference. This reference supports the potential acquisition of details on the agreements between supplier and consumer of energy when this optional reference is included and populated.

WEQ-019.4.2.12.4 UsageSummary should include an optional cost attribute to interval and reading class.
UsageSummary has a cost roll up and optional cost attributes in interval and reading classes are included in the model.

WEQ-019.4.12.5 A known base currency should be included in the top level class associated with the MeterAsset for the energy usage information model, which would be applicable to all instances

A base currency attribute is part of the UsageSummary class based on ISO 4217.

WEQ-019.4.12.6 The energy usage information model should be compliant with ISO8601.

The current model does not define the primitive to be used to represent the dateTime, however the default xs:dateTime is ISO8601 compliant.

WEQ-019.4.12.7 Optionally, both start and end of interval can be defined in order to support non-uniform interval information, which is accomplished in the energy information usage model through endTimestamp to IntervalReading.

The endTimeStamp element is included as an optional component of IntervalReading.

WEQ-019.4.12.8 Demand based elements are maintained in the TariffProfile including common demand and demand ratchets.

The model does not currently contain the full definition of TariffProfile, but this is the CIM element where thresholds associated with the rate are specified.

WEQ-019.4.12.9 The energy information usage model status structure includes a named pair of QualityOfReading and values of raw, forecast, validated, estimated, mixed, and other for qualifying the associated data set, as an explicit representation of these name value pairs can be processed in implementations by sending and receiving actors. The UsageSummary class also includes such summary information.

Model is specified as described.

WEQ-019.4.12.10 MeterEvent should be associated with MeterAsset, not MeterReading.

MeterEvent is not part of the Energy Usage Information Model. This will be forwarded to IEC 61968 Committee for resolution.

WEQ-019.4.12.11 PowerQualitySummary as events of enumerated type are provided in the energy information usage model to represent a simple exposure of summary information.

The model exposes these events in summary form as described.

WEQ-019.4.12.12 With respect to devices monitoring or capable of monitoring point source emissions, the energy usage information model should represent and take into account pollutant emissions (e.g. SO₂, NOX, etc.).
RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE

For Quadrant: Retail Electric and Wholesale Electric Quadrants
Requesters: Smart Grid PAP 10 Subcommittee
Request No.: WEQ AP Item 6(d), REQ AP Item 9(d)
Request Title: Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

Detailed information about these emissions is possible through definition of a ReadingType specifying the appropriate kindReading values as enumerated in ReadingKind.

WEQ-019.42.12.13 energy usage information model should include a top level cost summary – billStart, billEnd, billToDate, lastPeriod, and costAdditional, so that the bill to date and bill as of the last billing period could be conveyed through a formula:

\[ \text{billLastPeriod} = \text{costAdditionalLastPeriod} + \sum_{\text{MeterReading}\[i]} \text{Reading.cost} \quad \text{(constrained by datetime)} \]

The model represents these elements in the UsageSummary class.
RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE

For Quadrant: Retail Electric and Wholesale Electric Quadrants
Requesters: Smart Grid PAP 10 Subcommittee
Request No.: WEQ AP Item 6(d), REQ AP Item 9(d)
Request Title: Business Practices and Information Models to Support Priority Action Plan 10 – Standardized Energy Usage Information

4. SUPPORTING DOCUMENTATION

a. Description of Request:

b. Description of Recommendation:

c. Business Purpose:

d. Commentary/Rationale of Subcommittee(s)/Task Force(s):

NAESB Process for Standards Development -
http://www.naesb.org/misc/naesb_process_for_standards_dev.doc

WEQ PAP 10 Business Practices and Information Model Recommendation – V09 Revised August 31, 2010

Page 34 of 34