

**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

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**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:**

- Accept as requested
- Accept as modified below
- Decline

**EFFECT OF EC VOTE TO ACCEPT RECOMMENDED ACTION:**

- Change to Existing Practice
- Status Quo

**2. TYPE OF DEVELOPMENT/MAINTENANCE**

**Per Request:**

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

**Per Recommendation:**

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

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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 services 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.

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

NRG RED-LINE



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**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

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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.

**Comment [ARJ1]:** If this is true, why are we developing WEQ-019? To have on the shelf for a future date?

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**WEQ-019.1 Principles**

**WEQ-019.1.1 Overall Principles**

**WEQ-019.1.1.1** 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.

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**WEQ-019.1.1.2** 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.

**WEQ-019.1.1.3** 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.

**WEQ-019.1.1.4** 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.

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**WEQ-019.1.1.5** Neither the energy usage information model nor these Business Practice Standards create any requirement to collect, manage or communicate any information.

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<p>WEQ-019.1.1.6</p>	<p>While this standard defines <u>an information</u> 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 <u>data</u>, and how it is paid for. There are no assumed or implied regulations in this <u>Business Practice Standard</u>.</p>	<p>Deleted: a data Deleted: information Deleted: s</p>
<p>WEQ-019.1.1.7</p>	<p>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 <u>WEQ-019.4.2.1 through WEQ-019.4.2.11.17</u> were provided by the SGIP PAP10 Working Group to the NAESB PAP 10 Subcommittee.</p>	<p>Deleted: up Deleted: REQ Deleted: . Deleted: 8</p>
<p>WEQ-019.1.1.8</p>	<p>The requirements in Appendix A represent a series of intended capabilities for the expressiveness of this <u>Business Practice Standard</u> but are specifically not intended to be requirements for the use of or on users of this <u>Business Practice Standard</u>.</p>	<p>Comment [ARJ2]: Does this mean that the remaining requirements were developed within the NAESB PAP 10 Subcommittee deliberations?</p>
<p>WEQ-019.2</p>	<p><b>Energy Usage Abbreviations, Acronyms and Definition of Terms</b></p>	
<p>WEQ-019.2.1</p>	<p><b>Business Definitions</b></p>	
<p>WEQ-019.2.1.1</p>	<p><i>{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}</i></p>	<p>Deleted: s Deleted: and Deleted: s Formatted: Font: Italic Formatted: Default Text, Indent: Left: 1.5", Tabs: Not at 1.53"</p>
<p>WEQ-019.2.1.1</p>	<p><b>Applicable Regulatory Authority</b></p> <p>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 <u>End-Use Customers</u> through regulations and orders.</p>	<p>Deleted: ¶ Deleted: Retail Deleted: Retail</p>
<p>WEQ-019.2.1.2</p>	<p><b>(End-Use) Customer</b></p> <p>Any Entity that takes gas and/or electric service for its own consumption.</p>	
<p>WEQ-019.2.1.3</p>	<p><b>Distribution Company</b></p> <p>A regulated Entity which provides distribution services and may provide energy and/or transmission/transportation services in a given area.</p>	<p>Formatted: Font: Bold Formatted: Indent: Left: 0" Deleted: ¶ Formatted: Font: Not Bold Formatted: Font: Bold</p>
<p>WEQ-019.2.1.4</p>	<p><b>Energy Service Provider</b></p> <p><u>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</u></p>	<p>Formatted: NAESBDefinition, Tabs: Not at 1.53"</p>

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**WEQ-019.2.1.5 Entity**

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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**

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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 Participant**

Comment [ARJ3]: Conflicts with definition provided in WEQ-000. If just applicable to this standard, should be so stated.

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.

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*{Since it's capitalized, "Registration Agent" should be defined. Would also suggest defining "settlement agent" and "meter reading Entity"}*

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**WEQ-019.2.1.8 Supplier**

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

Comment [ARJ4]: Not sure I agree with this definition. Do we want to exclude an integrated utility as a Supplier. What about a utility in competitive markets selling last resort service. Wouldn't the utility be considered a Supplier?

**WEQ-019-2.1.9 System Operator**

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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.

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**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.).

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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.

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**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**

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

*{UML, EMS, EMI 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, SO and others?}*

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**WEQ-019.3 Energy Usage Information Business Practice Standards**

**WEQ-019.3.1 Introduction**

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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/Home Plug 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.<sup>1</sup>

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**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.<sup>2</sup>

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**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.<sup>3</sup>

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**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.<sup>4</sup>

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**WEQ-019.3.1.5**

Devices, business processes, EMS, ESI, and other functional units within the facility communicate usage and load information among themselves.<sup>5</sup>

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**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**

<sup>1</sup> 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".

<sup>2</sup> See e.g. EIS Alliance Use Cases v2 including UC-3, UC-11, UC-14, UC-15, and OpenADE use case "Publication".

<sup>3</sup> Needs refs. This is an addition to EIS and OpenADE.

<sup>4</sup> See e.g. EIS Alliance Use Cases v2 including UC-1, UC-2, UC-3, UC-8, UC-9.

<sup>5</sup> See e.g. EIS Alliance Use Cases v2 including UC-1, UC-2, UC-3

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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.

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**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.

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**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.

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**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.19.3.4.2.

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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.

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**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 kW. 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.

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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.

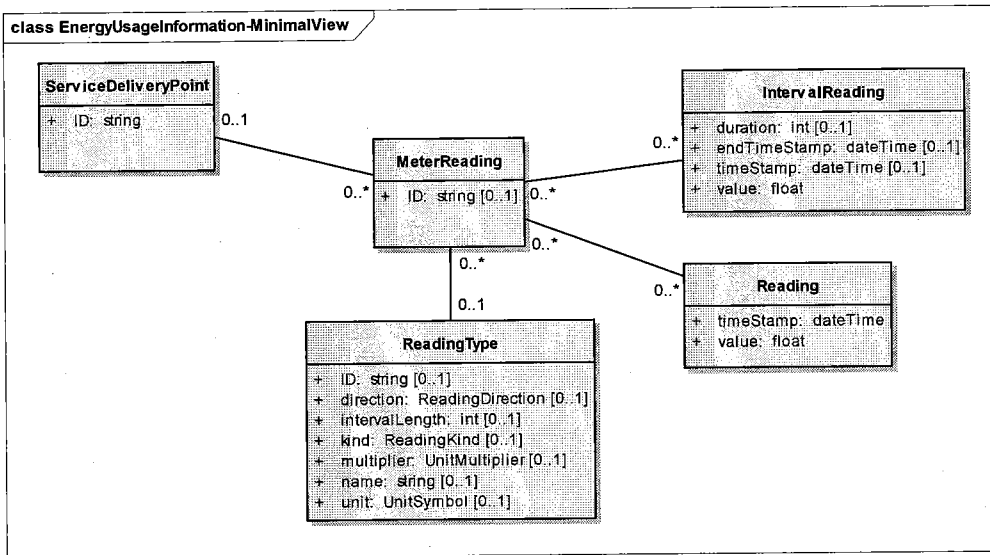
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Section WEQ-019.3.4.3 identifies the set of core model elements that shall be supported by specifications claiming conformance to this standard. The following class diagram illustrates a view of this core of the energy usage information model:

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**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.

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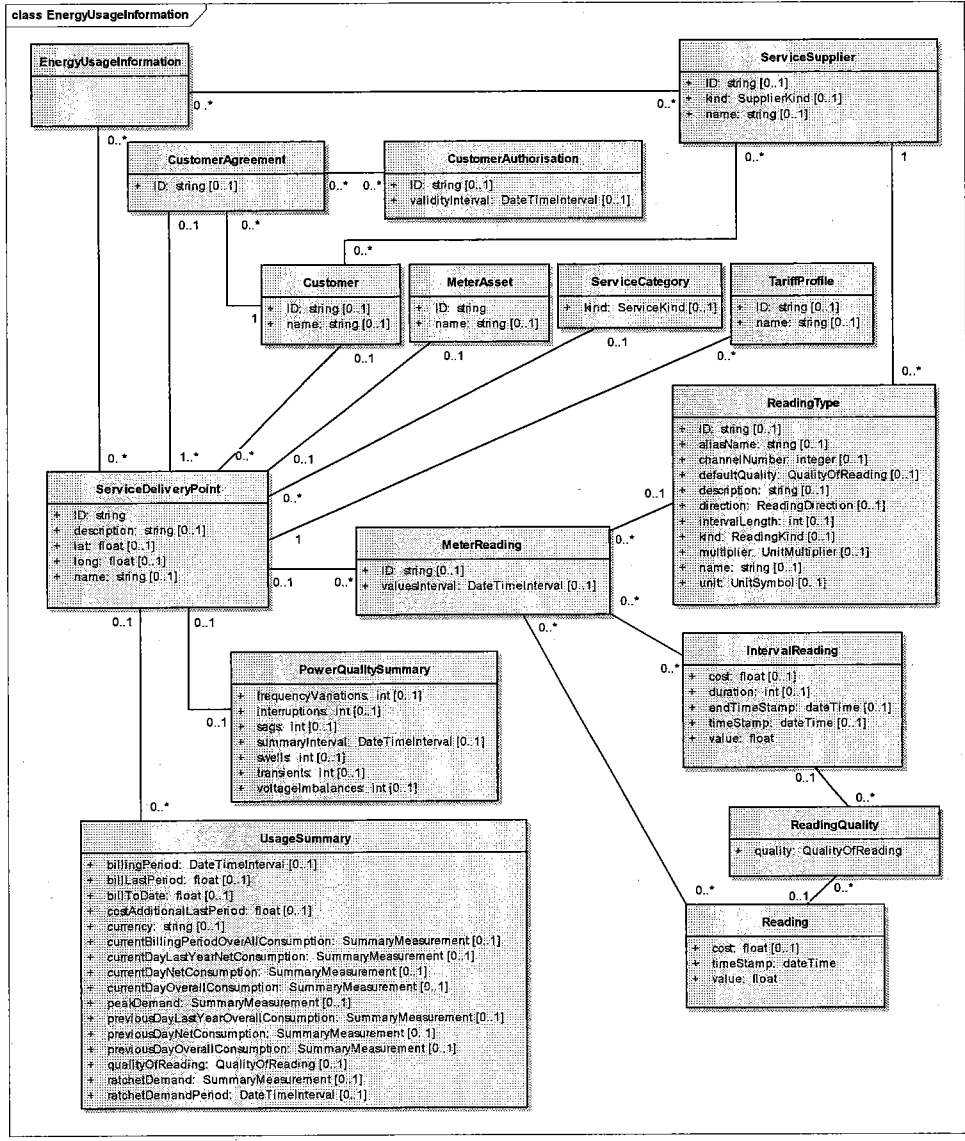


Figure 2: Full Energy Usage Information Model

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**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.

**Comment [ARJ5]:** 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?

**WEQ-019.4.1.1**

**Customer**

Organisation receiving services from ServiceSupplier.

Name	Type	Description
ID	string	Object identifier
name	string	Name of an attribute.

**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.

Name	Type	Description
ID	string	Object identifier

**WEQ-019.4.1.3**

**DateTimeInterval**

Interval of date and time.

Name	Type	Description
duration	int	The duration of this interval, in seconds
end	dateTime	Date and time that this interval ended.
start	dateTime	Date and time that this interval started.

**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.

Name	Type	Description
cost	float	The cost associated with this reading for this interval.
duration	int	The duration of the interval, in seconds.
endTimeStamp	dateTime	End interval timestamp
timeStamp	dateTime	The start date and time of an interval reading
value	float	The value of the reading for this interval in

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		the unit of measure defined by the associated ReadingType.
--	--	--

WEQ-019.4.1.6

**MeterAsset**

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

Name	Type	Description
ID	string	Object identifier
name	string	Meter name

WEQ-019.4.1.7

**MeterReading**

Set of values obtained from the meter.

Name	Type	Description
ID	string	Object identifier
valuesInterval	DateTimeInterval	Interval in date time (start & end)

WEQ-019.4.1.8

**PowerQualitySummary**

A summary of power quality events.

Name	Type	Description
frequencyVariations	int	Number of frequency variations
interruptions	int	Number of interruptions
sags	int	Number of sags
summaryInterval	DateTimeInterval	Interval of summary period
swells	int	Number of swells
transients	int	Number of transients
voltageImbalances	int	Number of voltage imbalances

WEQ-019.4.1.9

**QualityOfReading «enumeration»**

List of codes indicating the quality of the reading

Name	Type	Description
estimated		
forecast		
mixed		
raw		
validated		
normalizedForWeather		



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other		
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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.

Name	Type	Description
cost	float	Cost in a currency
timeStamp	dateTime	The date and time of a reading
value	float	The value of the reading in the unit of measure defined by the associated ReadingType.

WEQ-019.4.1.11

**ReadingDirection «enumeration»**

Name	Type	Description
delivered		
received		
net		

WEQ-019.4.1.12

**ReadingKind «enumeration»**

Kind of reading.

Name	Type	Description
current		
currentAngle		
date		
demand		
energy		
other		
phaseAngle		
power		
powerFactor		
pressure		
time		
voltage		
voltageAngle		
volume		





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carbonDioxide		
NOx		
carbon		
SO2		
methane		
HCH		
perfluorocarbons		
sulfurHexafluoride		
phasorPower		
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.

Name	Type	Description
quality	QualityOfReading	Quality, to be specified if different than defaultQuality

WEQ-019.4.1.14

**ReadingType**

Type of data conveyed by a specific Reading.

Name	Type	Description
ID	string	Object identifier
aliasName	string	The aliasName is free text human readable name of the object alternative to IdentifiedObject.name. It may be non unique and might not correlate to a naming hierarchy.



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<b>channelNumber</b>	<i>integer</i>	Logical positioning of this measurement data.
<b>defaultQuality</b>	<i>QualityOfReading</i>	Characteristics of a data value conveyed by a specific Reading, which allow an application to understand how a specific Reading is to be interpreted.
<b>description</b>	<i>string</i>	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.
<b>direction</b>	<i>ReadingDirection</i>	Specifies the direction of flow of the measurement.
<b>intervalLength</b>	<i>int</i>	(if incremental reading value) Length of increment interval, in seconds. Interval duration specified at the IntervalReading overrides this default.
<b>kind</b>	<i>ReadingKind</i>	Kind of reading.
<b>multiplier</b>	<i>UnitMultiplier</i>	Multiplier for 'unit'.
<b>name</b>	<i>string</i>	Name of an attribute.
<b>unit</b>	<i>UnitSymbol</i>	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.

Name	Type	Description
<b>ID</b>	<i>string</i>	Object identifier
<b>description</b>	<i>string</i>	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.
<b>lat</b>	<i>float</i>	Latitude of the location
<b>long</b>	<i>float</i>	Longitude of the location
<b>name</b>	<i>string</i>	Name of an attribute.

**WEQ-019.4.1.16**

**SummaryMeasurement**

An aggregated summary measurement reading.

Name	Type	Description
<b>multiplier</b>	<i>UnitMultiplier</i>	The multiplier part of the unit of measure, e.g. "kilo" (k)
<b>timeStamp</b>	<i>dateTime</i>	The date and time (if needed) of the summary measurement.



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<b>unit</b>	<i>UnitSymbol</i>	The units of the reading, e.g. "Wh"
<b>value</b>	<i>float</i>	The value of the summary measurement.

WEQ-019.4.1.17

**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 'status.value' is defined in the context of the utility's business rules, for example: active, inactive, etc.

Name	Type	Description
<b>ID</b>	<i>string</i>	Object identifier
<b>name</b>	<i>string</i>	Name of an attribute.

WEQ-019.4.1.18

**UnitMultiplier «enumeration»**

The unit multipliers defined for the CIM

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

WEQ-019.4.1.19

**UnitSymbol «enumeration»**

The units defined for usage in the CIM

Name	Type	Description
<b>A</b>		Current in ampere
<b>deg</b>		Plane angle in degrees
<b>F</b>		Capacitance in farad
<b>g</b>		Mass in gram
<b>h</b>		Time in hours
<b>H</b>		Inductance in henry



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

WEQ-019.4.1.20

**UsageSummary**

Summary of usage for a billing period

Name	Type	Description
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<b>billingPeriod</b>	<i>DateTimeInterval</i>	The billing period to which the included measurements apply
<b>billLastPeriod</b>	<i>float</i>	The amount of the bill for the previous period
<b>billToDate</b>	<i>float</i>	The bill amount related to the billing period as of the date received
<b>costAdditionalLastPeriod</b>	<i>float</i>	Additional charges from the last billing period
<b>currency</b>	<i>string</i>	The ISO 4217 code indicating the currency applicable to the bill amounts in the summary. See list at <a href="http://www.unece.org/cefact/recommendations/rec09/rec09_ecetrd203.pdf">http://www.unece.org/cefact/recommendations/rec09/rec09_ecetrd203.pdf</a>
<b>currentBillingPeriodOverAllConsumption</b>	<i>SummaryMeasurement</i>	The total consumption for the billing period
<b>currentDayLastYearNetConsumption</b>	<i>SummaryMeasurement</i>	The amount of energy consumed one year ago
<b>currentDayNetConsumption</b>	<i>SummaryMeasurement</i>	Net consumption for the current day
<b>currentDayOverAllConsumption</b>	<i>SummaryMeasurement</i>	Overall energy consumption for the current day
<b>peakDemand</b>	<i>SummaryMeasurement</i>	Peak demand recorded for the current period
<b>previousDayLastYearOverallConsumption</b>	<i>SummaryMeasurement</i>	The amount of energy consumed on the previous day one year ago
<b>previousDayNetConsumption</b>	<i>SummaryMeasurement</i>	Net consumption for the previous day
<b>previousDayOverAllConsumption</b>	<i>SummaryMeasurement</i>	The total consumption for the previous day
<b>qualityOfReading</b>	<i>QualityOfReading</i>	Indication of the quality of the summary readings
<b>ratchetDemand</b>	<i>SummaryMeasurement</i>	The current ratchet demand value for the ratchet demand period
<b>ratchetDemandPeriod</b>	<i>DateTimeInterval</i>	The period over which the ratchet demand applies

WEQ-019.4.1.21

**ServiceKind** «enumeration»

Kind of service.

Name	Type	Description
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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"]

Name	Type	Description
<b>ID</b>	<i>string</i>	Unique identifier for this authorisation
<b>validityInterval</b>	<i>DateTimeInterval</i>	Date and time interval this agreement is valid (from going into effect to termination).

WEQ-019.4.1.23

**ServiceCategory**

Category of service provided to the customer.

Name	Type	Description
<b>kind</b>	<i>ServiceKind</i>	Kind of service.

WEQ-019.4.1.24

**SupplierKind «enumeration»**

Kind of supplier.

Name	Type	Description
<b>district</b>		
<b>intermediary</b>		
<b>local</b>		
<b>microgrid</b>		
<b>other</b>		
<b>retailer</b>		
<b>utility</b>		



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WEQ-019.4.1.25

**ServiceSupplier**

Organisation that provides services to Customers.

Name	Type	Description
<b>ID</b>	<i>string</i>	Unique identifier of this service supplier.
<b>kind</b>	<i>SupplierKind</i>	Kind of supplier.
<b>name</b>	<i>string</i>	The human-readable name for the service supplier.



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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.

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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 19.4.2.1.2 Usage and load information shall be readily available

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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.

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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.

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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

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- WEQ-019.4.2.1.3**      *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.
- WEQ-019.4.2.2**      **Timeliness of Delivery**
- WEQ-019.4.2.2.1**      *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.
- WEQ-019.4.2.2.2**      *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.
- WEQ-019.4.2.2.3**      *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.
- WEQ-019.4.2.2.4**      *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.
- WEQ-019.4.2.2.4.1**      *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.
- WEQ-019.4.2.3**      **Benefits to Facilities**
- WEQ-019.4.2.3.1**      *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.
- WEQ-019.4.2.3.2**      *Standard load and usage information shall enable helping [all] Customers and operations manage their energy usage [and load]*



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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.



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- 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.



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- 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.*



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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 PEVs.*

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.



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**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 (PAP05) 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.



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**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-019.3.3 identifies how the model is evolvable. The reference in section 0, defines how the standard version can be revised.~~

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**WEQ-019.4.2.11.5 Forward compatible as we evolve**

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:*

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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 19.3.3 which describes how the energy usage information model will be used as the basis for Smart Grid interfaces.

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WEQ-019.4.2.11.10 Minimal details = maximum interoperation

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 describe the IPR rights to use of the energy usage information model defined by this standard.

Results of PAP 10 shall produce:

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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).

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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.

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WEQ-019.4.2.11.15 Reusable without restriction or charge

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- WEQ-019.4.2.11.16**     *Adaptable without restriction or charge*

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.

All NAESB standards may be modified through the NAESB process. (Please see: [http://www.naesb.org/misc/naesb\\_process\\_for\\_standards\\_dev.doc](http://www.naesb.org/misc/naesb_process_for_standards_dev.doc))

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- 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-018.4.1 may be distributed in any manner, however, must be made available without charge.

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- 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.

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- 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.*

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UsageSummary has a cost roll up and optional cost attributes in interval and reading classes are included in the model.

**WEQ-019.4.2.12.5** *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-019.4.2.12.6** *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-019.4.2.12.7** *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-019.4.2.12.8** *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-019.4.2.12.9** *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-019.4.2.12.10** *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-019.4.2.12.11** *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-019.4.2.12.12** *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. SO<sub>2</sub>, NOX, etc.).*



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

**WEQ-019.4.2.12.13**

*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:*

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

The model represents these elements in the UsageSummary class.



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**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](http://www.naesb.org/misc/naesb_process_for_standards_dev.doc)