



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 **1. RECOMMENDED ACTION:**

EFFECT OF EC VOTE TO ACCEPT RECOMMENDED ACTION:

- Accept as requested
- Accept as modified below
- Decline

- Change to Existing Practice
- Status Quo

3 **2. TYPE OF DEVELOPMENT/MAINTENANCE**

Per Request:

Per Recommendation:

- Initiation
- Modification
- Interpretation
- Withdrawal

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

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4

5 **3. RECOMMENDATION**

6 **SUMMARY:**

7 The Joint Retail Electric (REQ) and Wholesale Electric (WEQ) Quadrants’ PAP 10 Smart Grid Subcommittee
8 submit this Recommendation for 2010 Retail Annual Plan Item No. 9d and WEQ Annual Plan Item No. 6d –
9 Business Practices and Information Models to support Priority Action Plan 10, “Standardized Energy Usage
10 Information,” based on the Tiger Team Report issued on June 22, 2010 by the NIST SGIP PAP10 Committee.

11 In initiating this standards development, NAESB agreed to by year-end 2010 develop an energy use information
12 model standard defining information to be communicated between utilities, third parties and energy use customers,
13 via customer devices and/or 3rd Party energy services providers. The basic energy usage information model
14 standard will let energy services providers exchange detailed energy use and cost information in a consistent format
15 on behalf of customers. Doing so will let Customers track their power use and help them manage energy
16 consumption and cost. Without a standardized format for representing energy use data, a variety of approaches
17 could emerge, leading to incompatibilities among energy management products and services. It is planned that the
18 American Society of Heating, Refrigerating and AC Engineers (ASHRAE) will extend the NAESB standard to
19 create a facilities data model providing additional energy use data elements for facility energy management
20 including buildings.



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21 **RECOMMENDED STANDARDS:**

22

23 **REQ.18 CUSTOMER ENERGY USAGE INFORMATION COMMUNICATION**

24

25 **EXECUTIVE SUMMARY**

26 This section presents a summary of the Model Business Practices for Retail Customer Energy
27 Usage Information communication. Specifically, these Model Business Practices establish a
28 model for Energy Usage Information to be communicated in a consistent format among a variety
29 of Entities, potentially including Distribution Companies, Energy Service Providers, meter-
30 reading entities, and Retail Customers, via devices owned by Retail Customers and/or Energy
31 Services Providers. Establishment of this model will let Retail Customers track their energy use
32 and help them manage energy consumption and costs.

33 This document contains Model Business Practices establishing a model for communication of
34 Retail Customer Energy Usage Information. The Model Business Practices do not require that
35 wholesale electricity markets administered by System to adopt this model since System Operators
36 generally are not the system of record for individual Retail Customer Energy Usage Information
37 and load data or individual Retail Customer forecasted usage and load data. These Model
38 Business Practices are not intended to replace applicable Governing Documents, and in the event
39 of a conflict, the latter documents shall have precedence over these standards. Without limiting the
40 foregoing, these Model Business Practices are only applicable to the extent the information
41 covered by this model is collected, managed or communicated pursuant to the applicable
42 Governing Documents.

43 Retail Customer Energy Usage Information communication encompasses a variety of interactions
44 between Distribution Companies, Retail Customers and Energy Services Providers. In a business
45 environment where best practices are voluntary, Model Business Practices such as those in this
46 document may be applied within the context of regulatory or other market requirements and
47 agreements.

48 **INTRODUCTION**

49 The North American Energy Standards Board (NAESB) is a voluntary, non-profit organization
50 comprised of members from all aspects of the natural gas and electric industries. Within NAESB,
51 the Retail Electric Quadrant (REQ) and the Retail Gas Quadrant (RGQ) focus on issues impacting
52 the retail sale of energy to end-use Retail Customers. REQ / RGQ Model Business Practices are
53 intended to provide guidance to Distribution Companies, Suppliers, and other Market Participants
54 involved in providing competitive energy service to end-use Retail Customers. The focus of these
55 Model Business Practices is the representation of Retail Customer Energy Usage Information.
56 System Operators do not generally communicate with Retail Customers and are not the system of
57 record for individual Retail Customer Energy Usage Information or individual Retail Customer
58 load forecast.



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59 These Model Business Practices are voluntary and do not address policy issues that are the subject
60 of state legislation or regulatory decisions. These Model Business Practices have been adopted
61 with the realization that as the industry evolves, additional and amended Model Business Practices
62 may be necessary. Any industry participant seeking additional or amended Model Business
63 Practices (including principles, definitions, data elements, process descriptions, and technical
64 implementation instructions) should submit a request to the NAESB office, detailing the change,
65 so that the appropriate process may take place to amend the Model Business Practice.

66 BUSINESS PROCESSES AND PRACTICES

67 Overview

68 The business processes and practices described below are not presently applicable to Wholesale
69 Markets because Wholesale Markets do not generally communicate directly with Retail
70 Customers and are not the system of record for individual Retail Customer Energy Usage
71 Information or individual Retail Customer load forecast. The model and these business processes
72 and practices are not required of System Operators. As the model and these business processes
73 and practices evolve, System Operators may determine that use of the model or these business
74 processes can be applied to other information. However, such use is not intended to replace or
75 supplant applicable Governing Documents. Without limiting the foregoing, these Model Business
76 Practices are only applicable to the extent the information covered by this model is collected,
77 managed or communicated pursuant to the applicable tariff, market rules, operating procedures,
78 protocols or manuals.

79 REQ.18.1 Principles

80 REQ.18.1.1 Overall Principles

81 These Model Business Practices provide a Retail Customer Energy Usage Information
82 model, defining a collection of structured Energy Usage Information elements needed by
83 Retail Customers, to allow management of their energy efficiency and costs, including
84 environmental impacts.

85 REQ.18.1.1.2 The Energy Usage Information model is specified in UML, which is syntax neutral, so
86 that it may be used within exchange protocols using a variety of specific representation
87 syntax and exchange mechanisms, specified separately.

88 REQ.18.1.1.3 The recommended use of the Energy Usage Information model is in implementation
89 specifications exposing Customer Energy Usage Information. Specifications that
90 conform to the model shall contain semantically equivalent representations of all
91 required and included model elements, resulting in straightforward, lossless
92 transformations between conformant specifications.

93 REQ.18.1.2 General Principles

94 This section describes the requirements for the Energy Usage Information model defined
95 in these Model Business Practices. It is specifically not intended to represent



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96 requirements for use of the Model Business Practices. Rather, it describes the potential
97 overlapping needs of a robust model that can satisfy the many current and anticipated
98 future needs for exchange of Energy Usage Information.

99 The following list of objectives represents a series of intended outcomes from the
100 implementation of Model Business Practices defining Energy Usage Information. The
101 goals and objectives herein do not require the regulated wholesale or retail Entity, in
102 control of such information, to provide in the defined format or release such information,
103 except where required under their Governing Documents and only to the Parties that are
104 identified in the Governing Documents to receive such information. The Wholesale
105 Market does not communicate with the individual Retail Customer, nor does the
106 Wholesale Market forecast energy consumption for individual Retail Customers. The
107 Wholesale Market does not use individual Retail Customer Energy Usage Information in
108 their settlement unless specified in or supported by their Governing Documents.
109 Statements idealizing intended outcomes do not hold the regulated Entity responsible for
110 any actions taken or results of the actions of the receiving party.

111 For each requirement stated, there is an explanatory verification paragraph describing
112 how the model in Appendix A satisfies the requirement.

113 **REQ.18.1.2.1 General**

114 *REQ.18.1.2.1.1 Facilities shall include residences, buildings, and industrial installations*

115 *REQ.18.1.2.1.2 Usage and load information shall be readily available*

116 *REQ.18.1.2.1.3 PAP 10 is an information model concept which is transport agnostic.*

117 **REQ.18.1.2.2 Timeliness of Delivery**

118 *REQ.18.1.2.2.1 Customers shall be able to use the information defined in these standards for real-time
119 feedback on present and projected performance*

120 *REQ.18.1.2.2.2 Premises based systems (e.g. EMS/ESI) shall be able to use the information defined in
121 these standards for real-time feedback on present and projected performance*

122 *REQ.18.1.2.2.3 Information exchanged shall be delivered in sufficient time to affect usage ["and this is
123 the definition of real-time and near real-time "]*

124 *REQ.18.1.2.2.4 Operations, Distribution, and Service Providers shall be able to use the information
125 defined in these standards with the facility in near-real-time*

126 *REQ.18.1.2.2.5 Customers and premises-based systems shall be able to use the information defined in
127 these standards to provide real-time feedback on present and projected performance*

128 **REQ.18.1.2.3 Benefits to Facilities**

129 *REQ.18.1.2.3.1 Standard load and usage information shall enable improved energy efficiency by
130 defining a consistent way to communicate usage information.*



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- 131 *REQ.18.1.2.3.2* *Standard load and usage information shall enable helping [all] Customers and*
132 *operations manage their energy usage [and load]*
- 133 *REQ.18.1.2.3.3* *Standard load and usage information shall enable improved [facility] energy usage by*
134 *availability of fine grained and timely information*
- 135 *REQ.18.1.2.3.4* *Availability of fine grained and timely information will enable better decisions about*
136 *energy usage and conservation*
- 137 *REQ.18.1.2.3.5* *Facilities will benefit from consistent usage information exchange inside the facility,*
138 *including meeting the energy efficiency goals of EISA 2007 and DOE initiatives*
- 139 *REQ.18.1.2.3.6* *Standard model shall support aggregated projections that can be passed on to*
140 *operations make forecasting and management better and increase the value of a facility*
141 *to the Smart Grid*
- 142 *REQ.18.1.2.3.7* *Sharing usage and load information inside a facility makes that facility more valuable to*
143 *the Smart Grid*
- 144 *REQ.18.1.2.3.8* *The information exchanged shall allow integration of usage information throughout*
145 *facility decision processes*
- 146 **REQ.18.1.2.4** **Benefits to Grid and Service Provider Operations**
- 147 *REQ.18.1.2.4.1* *Standard load and usage information will improve forecasting and grid management by*
148 *delivering aggregated projections to operations.*
- 149 *REQ.18.1.2.4.2* *Standard load and usage information will improve forecasting and grid management by*
150 *delivering aggregated projections to service providers.*
- 151 *REQ.18.1.2.4.3* *Standard load and usage information will enable more responsive facilities.*
- 152 *REQ.18.1.2.4.4* *Standard load and usage information will enable early deployment of devices that*
153 *deliver and understand usage information.*
- 154 **REQ.18.1.2.5** **Internet-Like Future**
- 155 *REQ.18.1.2.5.1* *Standard usage and load information enables innovation in novel ways to help customers*
156 *manage energy usage.*
- 157 *REQ.18.1.2.5.2* *Standard usage and load information enables innovation by third party service and*
158 *software providers.*
- 159 **REQ.18.1.2.6** **Improved Collaboration**
- 160 *REQ.18.1.2.6.1* *The Information model shall not restrict two way flows of information.*
- 161 *REQ.18.1.2.6.2* *By standardizing usage and load information exchange, devices that deliver and*
162 *understand usage and load can be deployed more quickly, contributing to achieving the*
163 *energy efficiency goals of EISA 2007 and DOE.*



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- 164 **REQ.18.1.2.7** **Information Sources and Accessibility**
- 165 *REQ.18.1.2.7.1* *Usage and load information shall be provided by utilities and aggregating service*
166 *providers and may be provided by others.*
- 167 *REQ.18.1.2.7.2* *Usage and load information shall be provided by devices and EMS/ESI implementations.*
- 168 *REQ.18.1.2.7.3* *Usage and load information can be accessed from the meter.*
- 169 *REQ.18.1.2.7.4* *Usage and load information can be accessed from the Smart Grid.*
- 170 **REQ.18.1.2.8** **Interactions and Information Exchanges Supported**
- 171 *REQ.18.1.2.8.1* *Interactions supported shall include those between Distribution [and Operations] and*
172 *the industrial, commercial, and residential premises.*
- 173 *REQ.18.1.2.8.2* *Standard information models and understanding of usage and load are essential to cross*
174 *domain interactions between Distribution [and Operations]: and Industrial,*
175 *Commercial, Residential, and PEVs.*
- 176 *REQ.18.1.2.8.3* *Interactions supported shall include those between Distribution [and Operations] and*
177 *the industrial, commercial, residential premises, and plug-in electric vehicles.*
- 178 *REQ.18.1.2.8.4* *Standard information models and understanding of usage and load are essential to cross*
179 *domain interactions between Service Providers: and Industrial, Commercial,*
180 *Residential, and PEVs.*
- 181 *REQ.18.1.2.8.5* *Interactions supported shall include those between Service Providers and the industrial,*
182 *commercial, residential premises, and plug-in electric vehicles.*
- 183 *REQ.18.1.2.8.6* *This effort shall support information standards for load curtailment, load shaping, and*
184 *energy market operations, hence load and usage must be supported (see PAP09, PAP03,*
185 *and PAP04).*
- 186 *REQ.18.1.2.8.7* *Information exchanges shall include to, from, and within facilities.*
- 187 **REQ.18.1.2.9** **Information Characteristics**
- 188 *REQ.18.1.2.9.1* *Information model shall support exchange of both Fine Grained and summary*
189 *information.*
- 190 *REQ.18.1.2.9.2* *Fine grained means that there is disaggregated information. Disaggregated information*
191 *can include for example load, subsystem, premise, and variable time interval.*
- 192 *REQ.18.1.2.9.3* *Support for exchanging standard historical, present, and projected load information is*
193 *required.*
- 194 *REQ.18.1.2.9.4* *Energy Usage Information shall include usage, usage profile, and some component of*
195 *cost (consistent with PAP03, PAP04).*
- 196 *REQ.18.1.2.9.5* *The PAP 10 Energy Usage Information model shall allow for exchange of greater or*
197 *lesser detail.*



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- 198 **REQ.18.1.2.10** **Timing and Goals**
- 199 *REQ.18.1.2.10.1* *Initial steps include making usage information more readily available by defining and*
200 *standardizing usage information [delivered] through existing SG infrastructure.*
- 201 *REQ.18.1.2.10.2* *Information on device and facility usage is a primary goal in the initial focus.*
- 202 *REQ.18.1.2.10.3* *Standard load and usage information will enable early deployment of devices that*
203 *deliver and understand usage information.*
- 204 **REQ.18.1.2.11** **Requirements on Quality of Consensus Standard**
- 205 *The information model shall support:*
- 206 *REQ.18.1.2.11.1* *Consistent data representation for REST & Web Services*
- 207 *REQ.18.1.2.11.2* *Specification of transactional exchange, syntax, and required population of the*
208 *information model are beyond the scope of these requirements*
- 209 *REQ.18.1.2.11.3* *an extensible information model – e.g. ability to add custom extensions as needed*
- 210 *REQ.18.1.2.11.4* *have an evolvable information model – e.g. the standards process supports future*
211 *revisions*
- 212 *REQ.18.1.2.11.5* *Forward compatible as we evolve*
- 213 *REQ.18.1.2.11.6* *Supportive of versioning*
- 214 *REQ.18.1.2.11.7* *Usable without “knowing all the details”*
- 215 *More flexibility for independent innovation shall be achieved through:*
- 216 *REQ.18.1.2.11.8* *Focus on information exchanged*
- 217 *REQ.18.1.2.11.9* *Agreed upon interfaces are maintained over time*
- 218 *REQ.18.1.2.11.10* *Minimal details = maximum interoperation*
- 219 *REQ.18.1.2.11.11* *Intellectual Property Rights shall be clear & clean*
- 220 *Results of PAP 10 shall produce:*
- 221 *REQ.18.1.2.11.12* *Information model and XML schema*
- 222 *REQ.18.1.2.11.13* *At information exchange level*
- 223 *The information model shall be:*
- 224 *REQ.18.1.2.11.14* *Readable without charge*
- 225 *REQ.18.1.2.11.15* *Reusable without restriction or charge*
- 226 *REQ.18.1.2.11.16* *Adaptable without restriction or charge*
- 227 *REQ.18.1.2.11.17* *Usable for open source*



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|-----|-------------------------|--|
| 228 | REQ.18.1.2.12 | Additional Considerations |
| 229 | <i>REQ.18.1.2.12.1</i> | <i>In communicating energy usage information, the Energy Usage Information Model should be used and the information outlined within the model should be available.</i> |
| 230 | | |
| 231 | <i>REQ.18.1.2.12.2</i> | <i>The Energy Usage Information Model data set has three unique identifiers, which serve the purpose of allowing various aggregations of data sets.</i> |
| 232 | | |
| 233 | <i>REQ.18.1.2.12.3</i> | <i>The Tariff Profile component should be included in the Energy Information Usage Model.</i> |
| 234 | | |
| 235 | <i>REQ.18.1.2.12.4</i> | <i>UsageSummary should include an optional cost attribute to interval and reading class.</i> |
| 236 | <i>REQ.18.1.2.12.5</i> | <i>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.</i> |
| 237 | | |
| 238 | | |
| 239 | <i>REQ.18.1.2.12.6</i> | <i>The Energy Usage Information Model should be compliant with ISO8601.</i> |
| 240 | <i>REQ.18.1.2.12.7</i> | <i>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.</i> |
| 241 | | |
| 242 | | |
| 243 | <i>REQ.18.1.2.12.8</i> | <i>Demand based elements are maintained in the TariffProfile including common demand and demand ratchets.</i> |
| 244 | | |
| 245 | <i>REQ.18.1.2.12.9</i> | <i>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.</i> |
| 246 | | |
| 247 | | |
| 248 | | |
| 249 | | |
| 250 | <i>REQ.18.1.2.12.10</i> | <i>MeterEvent should be associated with meterAsset, not MeterReading.</i> |
| 251 | <i>REQ.18.1.2.12.11</i> | <i>PQSummary as events of enumerated type are provided in the Energy Information Usage Model to represent a simple exposure of summary information.</i> |
| 252 | | |
| 253 | <i>REQ.18.1.2.12.12</i> | <i>The Energy Usage Information Model should represent and take into account pollutant energy emissions such as O₂, SO₂, and NO_X.</i> |
| 254 | | |
| 255 | <i>REQ.18.1.2.12.13</i> | <i>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:</i> |
| 256 | | |
| 257 | | |
| 258 | <i>REQ.18.1.2.12.14</i> | <i>The model shall use the work being produced by OASIS on common schedule information pursuant to the SGIP PAP04 Requirements. As this work is not complete as of this draft, the abstract definition of time intervals is the most appropriate way to ensure consistency.</i> |
| 259 | | |
| 260 | | |
| 261 | | |
| 262 | <i>REQ.18.1.2.12.15</i> | <i>The model shall use the work being produced by OASIS on common price and product definition information pursuant to the SGIP PAP03 Requirements. As this work is not complete as of this draft, should information related to price be included in the Seed Specification it must be at an appropriate level of abstraction.</i> |
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| | | |
|-----|---------------------|---|
| 266 | REQ.18.2 | Energy Usage Abbreviations, Acronyms and Definition of Terms |
| 267 | REQ.18.2.1 | Business Definitions |
| 268 | REQ.18.2.1.1 | Applicable Regulatory Authority |
| 269 | | The state regulatory agency or other governing body that provides oversight, policy |
| 270 | | guidance, and direction to any parties involved in the process of providing energy to |
| 271 | | Retail Customers through regulations and orders. |
| 272 | REQ.18.2.1.2 | (Retail) Customer |
| 273 | | Any Entity that takes gas and/or electric service for its own consumption. |
| 274 | REQ.18.2.1.3 | Distribution Company |
| 275 | | A regulated Entity which provides distribution services and may provide energy and/or |
| 276 | | transmission/transportation services in a given area. |
| 277 | REQ.18.2.1.4 | Entity |
| 278 | | A person or organization with sufficient legal standing to enter into a contract or |
| 279 | | arrangement with another such person or organization (as such legal standing may be |
| 280 | | determined by those parties) for the purpose of conducting and/or coordinating energy |
| 281 | | transactions. |
| 282 | REQ.18.2.1.5 | Governing Documents |
| 283 | | Documents that govern the interactions among parties, including but not limited to: |
| 284 | | regulatory documents (e.g. tariffs, rules, regulations), contractual agreements, and |
| 285 | | Distribution Company Operational Manuals. |
| 286 | REQ.18.2.1.6 | Market Participant |
| 287 | | A party engaged in the process of providing competitive retail energy to end-use |
| 288 | | Customers including but not limited to the Distribution Company, the Supplier, the |
| 289 | | Registration Agent, the settlement agent, and the meter reading Entity. |
| 290 | REQ.18.2.1.7 | Model Business Practices |
| 291 | | TBD |
| 292 | REQ.18.2.1.8 | Supplier |
| 293 | | Persons engaged in the competitive sale of energy to end-users. |



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294 **REQ.18.2.2** **Technical Definitions**

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

296 **REQ.18.2.2.1** **Energy Management System (EMS)**

297 An application used for controlling multiple energy-controllable devices (e.g., pool
298 pump, Programmable Communicating Thermostat, light switches, PEV charging, etc.).
299 This application may reside within a HAN Device (e.g. Programmable Communicating
300 Thermostat, In-Home Display, computer, cable set-top box, other computing device,
301 etc.). This application may also control other devices or systems in the home providing
302 integrated automated services for the Consumer.

303 **REQ.18.2.2.2** **Energy Services Interface (ESI)**

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

312 **REQ.18.2.2.3** **Energy Services Provider**

313 An entity (e.g. Utility, retail electric provider, demand response aggregator, etc.) which
314 provides energy services to Customers.

315 **REQ.18.2.2.4** **Energy Usage Information**

316 TBD

317 **REQ.18.2.2.5** **Facility**

318 TBD

319 **REQ.18.2.2.6** **Fine Grained**

320 Characterized by abundant use of detail or thoroughness of treatment.

321 **REQ.18.2.2.7** **Operations**

322 One of the seven domains identified in the NIST Framework and Roadmap, defined there
323 as “The managers of the movement of electricity”. This could apply to operators of
324 equipment within any of the other domains.



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325 **REQ.18.2.2.8 Real-time**

326 Refers to the ability of a component to process input at the rate it is received.

327 **REQ.18.2.2.9 Regional Transmission Organization**

328 TBD

329 **REQ.18.2.2.10 Seed Specification**

330 TBD

331 **REQ.18.2.2.11 Smart Grid**

332 TBD

333 **REQ.18.2.2.12 System Operator**

334 TBD

335 **REQ.18.2.2.13 Wholesale Market**

336 TBD

337 **REQ.18.2.3 Abbreviations and Acronyms**

| Abbreviation / Acronym | Meaning |
|------------------------|---------------------------|
| EUI | Energy Usage Information |
| UML | Unified Modeling Language |
| EMS | Energy Management System |
| ESI | Energy Services Interface |
| PEV | Plug-in Electric Vehicle |

338

339 **REQ.18.3 Energy Usage Information Model Business Practices**

340 **REQ.18.3.1 Introduction**

341 The focus of these Model Business Practices is the representation of Energy Usage
342 Information. As defined in [PAP10 Requirements] the Energy Usage Information
343 includes historic, present, and future projected usage and load together with the time
344 period(s) for that information.



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345 These Model Business Practices draw on actors and use cases defined by
346 the following groups:

- 347 • Energy Information Standards Alliance (the EIS Alliance) [EIS]
- 348 • NAESB Survey and Consolidation of PAP10 Use Cases [NAESB PAP10]
- 349 • UCAIug OpenADE [ADE]
- 350 • ZigBee/Home Plug Smart Energy Profile 2.0 Market Requirements [SEP MRD]

351 The relevant use cases are summarized as follows:

352 **REQ.18.3.1.1** **The ESP and/or Distribution Company communicates historic and present Energy**
353 **Usage Information and load information to the Retail Customer or Facility.¹**

354 **REQ.18.3.1.2** **The Retail Customer or Facility communicates future projected usage and load**
355 **information to the ESP, Distribution Company, or Grid Operations.²**

356 **REQ.18.3.1.3** **The ESP and/or Utility communicates their projection of usage and load to the**
357 **Retail Customer or Facility.³**

358 **REQ.18.3.1.4** **Devices within a Facility communicate their present and future projected usage and**
359 **load to Controllers or Facility EMS for aggregation and to be a component of**
360 **Facility aggregated future projected usage and load.⁴**

361 **REQ.18.3.1.5** **Devices, business processes, EMS, ESI, and other functional units within the**
362 **Facility communicate usage and load information among themselves.⁵**

363 **REQ.18.3.1.6** **These Model Business Practices are limited to the Seed Specification which shall be**
364 **usable by others to build standards and/or specification for exchange of Energy**
365 **Usage Information and load information appropriate to their needs without overly**
366 **constraining those uses or including information that is not required in all**
367 **implementations of specifications for exchanging load and usage.**

368 **REQ.18.3.2** **Energy Usage Information Model Format and Use**

369 The Energy Usage Information Model is developed using a UML modeling tool. The Model
370 classes, attributes, types and descriptions are included in REQ 18.4. The Model is made
371 available as XMI, which is the standard XML import/export format for UML. The Model is
372 exported as HTML, and made available as a downloadable archive viewable with a web browser.

¹ See e.g. EIS Alliance Use Cases v2 including UC-9, UC-11, UC-12, UC-14, UC-15, and OpenADE use case “Publication”.

² See e.g. EIS Alliance Use Cases v2 including UC-3, UC-11, UC-14, UC-15

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



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- 373 **REQ.18.3.3** Energy Usage Information Model Technical Considerations
- 374 **REQ.18.3.3.1** The Energy Usage Information Model will be used as the basis for Smart Grid
375 interfaces exchanging customer usage information between energy services
376 providers.
- 377 **REQ.18.3.3.2** The Energy Usage Information Model will be configured to allow schemas to be
378 generated from it, using XML Schema Definition Language (XSD). This format
379 defines the valid structures and types for XML documents that may carry the
380 model information.
- 381 **REQ.18.3.3.3** Implementations may decide to include only a subset of the elements defined in the
382 model.
- 383 **REQ.18.3.3.4** The example XSD shall conform to Naming and Design Rules best practices as
384 described by IEC 62361-100, Naming and Design Rules for CIM Profiles to XML
385 Schema Mapping.
- 386 **REQ.18.3.3.5** The model and schema shall support multiple information exchange standards,
387 including WS-I Basic Profile Web Services, RESTful Web Services, or other
388 conventions. These specifics are left to implementers to define.
- 389 **REQ.18.3.3.6** Though there may be elements useful for transfer of security-related information
390 elements in the model, the specific details related to how to protect sensitive
391 information, and how to authorize specific roles or identities to have access are not
392 defined in this recommendation.
- 393 **REQ.18.3.4** Conformance
- 394 **REQ.18.3.4.1** A conformant specification that refines or extends this standard shall produce
395 information for exchange that can be transformed algorithmically (that is based on
396 the standard alone) into a form that can be validated through the method described
397 in REQ.18.3.4.2.
- 398 This requirement means that various formats for representation and exchange
399 and various subsets and potentially supersets of information content are
400 envisioned based on this standard. The use of the schema is not to impose its
401 direct use in message validation. Rather, its use is intended to facilitate
402 verification of conformance to the information model with respect to message
403 content and semantics without imposing constraints on specific message
404 payload schemas and data element representations. Some representations are
405 anticipated to be entirely binary in nature. Others will trade off strings for
406 integer representations of information contents. Regardless of the means, the
407 information should be convertible to be testable as described herein.



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408 **REQ.18.3.4.2** A specification that claims conformance to this standard shall describe and define
409 an automatable transformation from that specification’s model to and from this
410 UML Model, including indicating listing of attributes used and not used.

411 **REQ.18.3.4.3** Conformant specifications shall include the following required core model elements
412 exchanged between data provider and data consumer in their defined messages:

- 413 • One or more measurement or summary containers: *IntervalReading*, *Reading*,
414 *PowerQualitySummary*, *UsageSummary*
- 415 • Two of the following attributes, for each *IntervalReading*: *timeStamp*, *endTimeStamp*,
416 *duration*
- 417 • *value* (the value of the measurement, from *IntervalReading* or *Reading*)
- 418 • *ReadingType* – *ID*, *defaultQuality*, *direction*, *kind*, *multiplier*, *name*, *unit*
- 419 • *ReadingType ID* for each measurement (*IntervalReading* or *Reading*) (exists in model
420 through *MeterReading*)
- 421 • *Measurement source / location* – *ServiceDeliveryPoint.ID* or *MeterAsset.ID* and
422 *association to measurements or summary*

423 **REQ.18.4** **Energy Usage Information Model**

424 [Marty Burns 20100824] *This section presents two views on the model including the*
425 *complete model and the proposed conformance constrained “simpler” view inspired by*
426 *conversations with Bill Cox and others. This introductory section and the graphics*
427 *presented are based on the August 10th 2010draft model and contributions from various*
428 *participants. It is not intended to substitute for the detailed comment resolution process*
429 *we are engaged in. A number of these comments suggest enhancements to the model and*
430 *these will be addressed. Care has been taken at this point not to inadvertently presume*
431 *the resolution of the comments. We do however, seek to satisfy explicitly the desire for a*
432 *simpler presentation of the model to facilitate use by subsequent standards efforts. Note:*
433 *this paragraph will not be included in the next draft.*

434 The Energy Usage Information model herein is organized consistent with several related and
435 well established models including the IEC TC57 Common Information Model [IEC 61968 Part
436 9], ZigBee Smart Energy Profile 2.0 [SEP2.0], the EIS Alliance [EIS Alliance], and OpenADE
437 [OpenADE]. New classes and attributes identified in the Model in this standard are proposed as
438 extensions to be considered by IEC TC57 for inclusion in a future release of the CIM. The
439 Energy Usage Information model, where possible, uses classes, information elements and
440 attribute names drawn from the CIM and the cited references.

441 The starting point for the Energy Usage Information model is the *ServiceDeliveryPoint*.
442 *ServiceDeliveryPoints* identify key references for the information set optionally including
443 identification of the customer, the location, and the physical asset. *ServiceDeliveryPoints* are
444 associated in turn with zero or more *MeterReadings*. A *MeterReading* composes information



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445 about a particular measurement such as kWh or kW. A MeterReading has a ReadingType which
446 describes the nature of the measurement including its units of measure, and zero or more
447 IntervalReadings or Readings and associated quality information. ServiceDeliveryPoint may also
448 be associated with summary information on power and energy, and optionally, power quality.
449 For applications requiring third party access to this information, additional classes are identified
450 to facilitate associating customer and customer agreement information with the measurements
451 available at a ServiceDeliveryPoint.

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

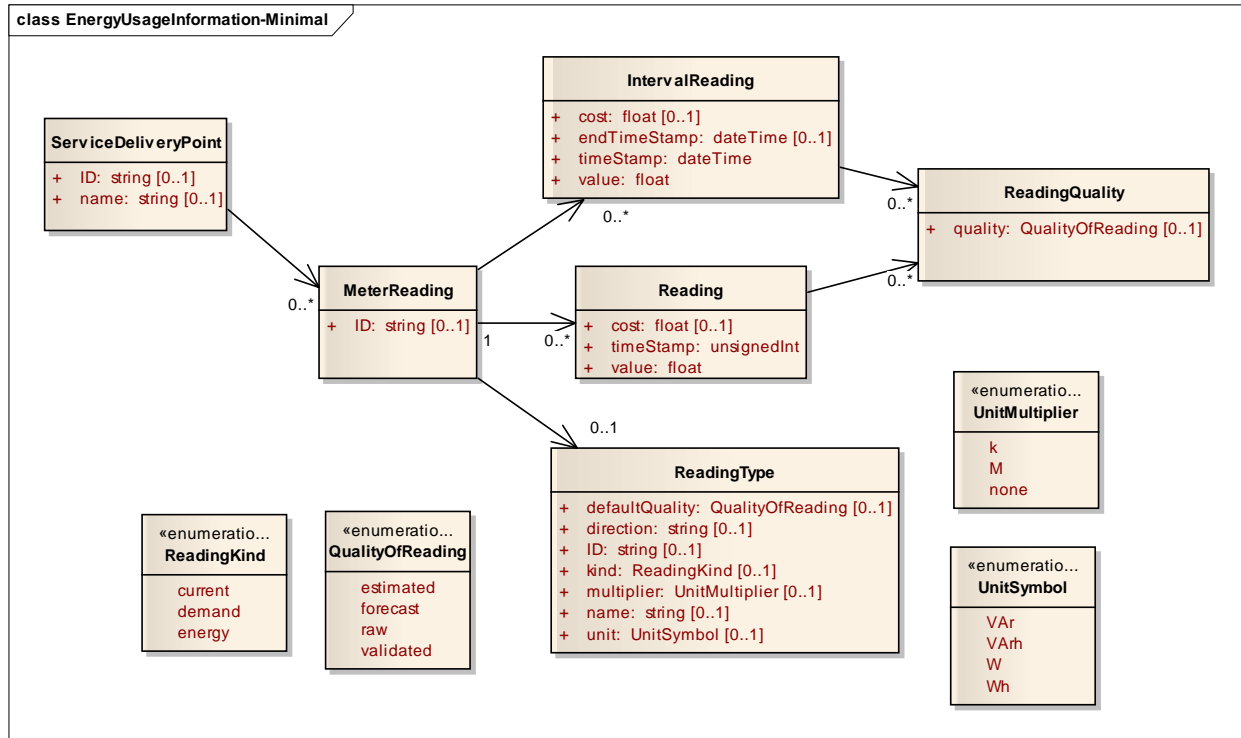
455 The Energy Usage Information model includes many optional components. The complete set of
456 information expressible using the model satisfies a wide range of applicability requirements
457 identified by industry. User of this standard may optionally take advantage of these extended
458 definitions based on need without requiring them. Applications built on the the Energy Usage
459 Information model may elect which optional components to present. However, clients of this
460 information can be expected to recognize all components provided in the application.

461 Section REQ.18.3.4.3 identifies a minimum set of core model elements that shall be defined in
462 all implementations of this standard. The following class diagram illustrates this core of the
463 Energy Usage Information model:



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464

465 The full expression of the Energy Usage Information model, Illustrated in Figure 2, forms the
 466 basis of the required standard.

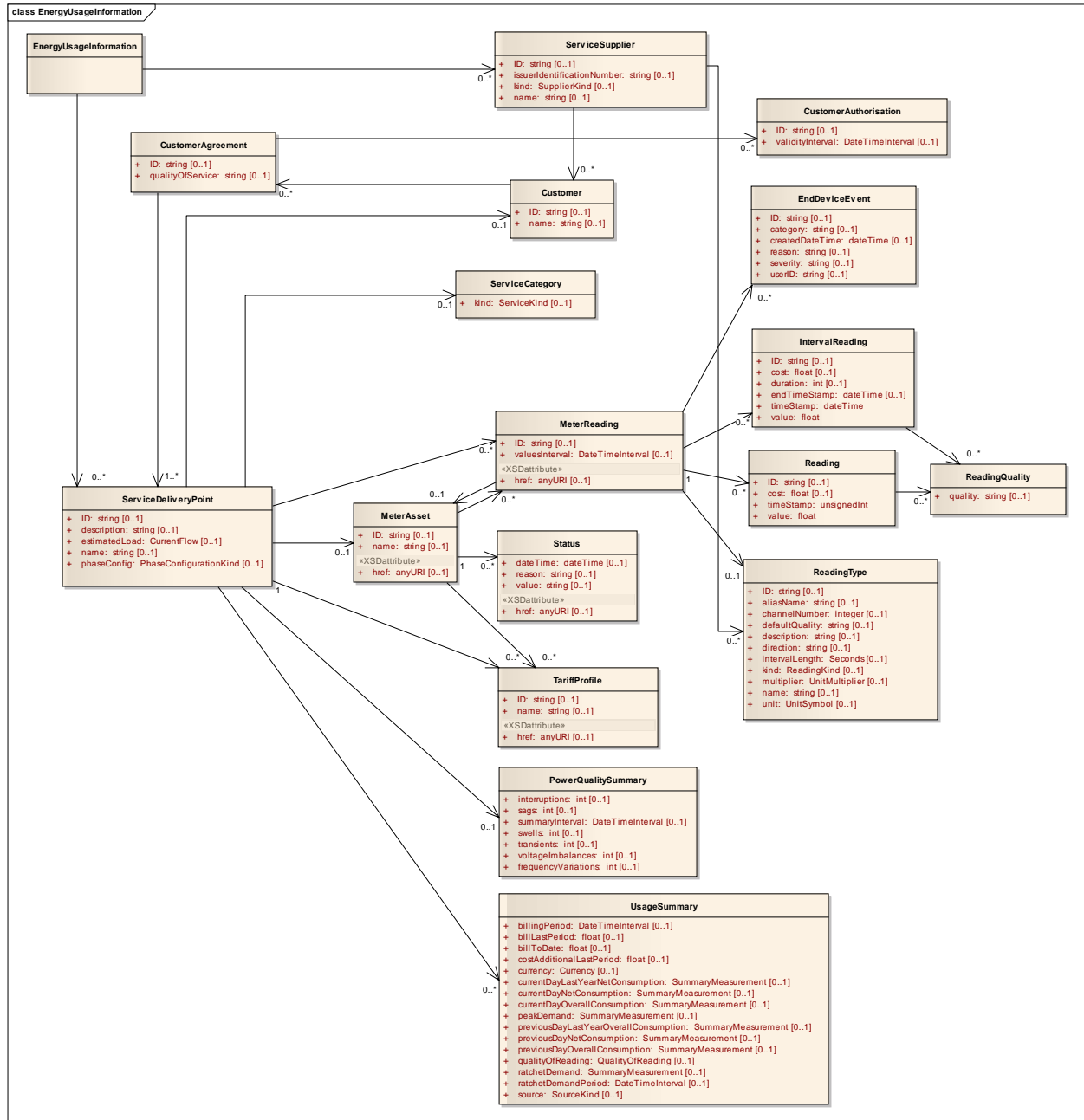
467



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469 **REQ.18.4.1** **Energy Usage Information Model Details**

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

473 **REQ.18.4.1.1** **Currency «enumeration»**

474 Monetary currencies. Apologies for this list not being exhaustive.

| Name | Type | Description |
|--------------|------|---------------------------|
| AUD | | Australian dollar |
| CAD | | Canadian dollar |
| CHF | | Swiss francs |
| CNY | | Chinese yuan renminbi |
| DKK | | Danish crown |
| EUR | | European euro |
| GBP | | British pound |
| INR | | India rupees |
| JPY | | Japanese yen |
| NOK | | Norwegian crown |
| other | | Another type of currency. |
| RUR | | Russian ruble |
| SEK | | Swedish crown |
| USD | | US dollar |

475 **REQ.18.4.1.2** **CurrentFlow**

476 Electrical current (positive flow is out of the ConductingEquipment into the
 477 ConnectivityNode)

| Name | Type | Description |
|-------------------|-----------------------|------------------------|
| multiplier | <i>UnitMultiplier</i> | Multiplier for 'unit'. |
| unit | <i>UnitSymbol</i> | Unit in symbol |
| value | <i>float</i> | Value in type of float |

478 **REQ.18.4.1.3** **Customer**

479 Organisation receiving services from ServiceSupplier.

| Name | Type | Description |
|------|------|-------------|
|------|------|-------------|



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| | | |
|-------------|---------------|-----------------------|
| ID | <i>string</i> | Object identifier |
| name | <i>string</i> | Name of an attribute. |

480 **REQ.18.4.1.4**

CustomerAgreement

481 Agreement between the Customer and the ServiceSupplier to pay for service at a specific
 482 ServiceLocation. It records certain billing information about the type of service provided
 483 at the ServiceLocation and is used during charge creation to determine the type of
 484 service.

| Name | Type | Description |
|-------------------------|---------------|--|
| ID | <i>string</i> | A Model Authority issues mRIDs. Given that each Model Authority has a unique id and this id is part of the mRID, then the mRID is globally unique. |
| qualityOfService | <i>string</i> | Quality of service provided to customer related to contracted level of power quality events |

485 **REQ.18.4.1.5**

DateTimeInterval

486 Interval of date and time.

| Name | Type | Description |
|--------------|--------------------|---|
| end | <i>unsignedInt</i> | Date and time that this interval ended. |
| start | <i>unsignedInt</i> | Date and time that this interval started. |

487 **REQ.18.4.1.6**

EndDeviceEvent

488 Event detected by a DeviceFunction associated with EndDeviceAsset.

| Name | Type | Description |
|------------------------|-----------------|---|
| ID | <i>string</i> | A Model Authority issues mRIDs. Given that each Model Authority has a unique id and this id is part of the mRID, then the mRID is globally unique. |
| category | <i>string</i> | Category of event resulting in this activity record. |
| createdDateTime | <i>dateTime</i> | Date and time this activity record has been created (different from the 'status.dateTime', which is the time of a status change of the associated object, if applicable). |
| reason | <i>string</i> | Reason for event resulting in this activity record, typically supplied when user initiated. |
| severity | <i>string</i> | Severity level of event resulting in this |



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| | | |
|---------------|---------------|---|
| | | activity record. |
| userID | <i>string</i> | (if user initiated) ID of user who initiated this end device event. |

489 **REQ.18.4.1.7** **EnergyUsageInformation**

490

491 **REQ.18.4.1.8** **IntervalReading**

492 Data captured at regular intervals of time. Interval data could be captured as incremental
 493 data, absolute data, or relative data. The source for the data is usually a tariff quantity or
 494 an engineering quantity. Data is typically captured in time-tagged, uniform, fixed-length
 495 intervals of 5, 10, 15, 30, or 60 minutes.

496 Note: Interval Data is sometimes also called "Interval Data Readings" (IDR).

| Name | Type | Description |
|---------------------|-----------------|--|
| ID | <i>string</i> | Object identifier |
| cost | <i>float</i> | |
| duration | <i>int</i> | The duration of the interval, in seconds. |
| endTimeStamp | <i>dateTime</i> | End interval timestamp |
| timeStamp | <i>dateTime</i> | The start date and time of an interval reading |
| value | <i>float</i> | Value in type of float |

497 **REQ.18.4.1.9** **MeterAsset**

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

| Name | Type | Description |
|-------------|---------------|---------------------------------------|
| ID | <i>string</i> | Object identifier |
| name | <i>string</i> | Meter name |
| href | <i>anyURI</i> | Hypertext reference pointing to a URI |

500 **REQ.18.4.1.10** **MeterReading**

501 Set of values obtained from the meter.

| Name | Type | Description |
|-----------------------|-------------------------|---------------------------------------|
| href | <i>anyURI</i> | Hypertext reference pointing to a URI |
| ID | <i>string</i> | Object identifier |
| valuesInterval | <i>DateTimeInterval</i> | Interval in date time (start & end) |

502 **REQ.18.4.1.11** **PhaseConfigurationKind** «enumeration»



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503
504
505
506

Kind of phase configuration.
 Note that there is an enum Wires::WindingConnection with values {D, Y, Z, Yn, Zn}.
 However, there are many more phase configurations than delta (threePhaseThreeWire)
 and wye (threePhaseFourWire), which are defined here.

| Name | Type | Description |
|---------------------|------|-------------|
| onePhaseThreeWire | | |
| onePhaseTwoWire | | |
| other | | |
| threePhaseFourWire | | |
| threePhaseThreeWire | | |
| threePhaseTwoWire | | |
| twoPhaseThreeWire | | |
| twoPhaseTwoWire | | |

507 **REQ.18.4.1.12**
508

PowerQualitySummary

| Name | Type | Description |
|---------------------|-------------------------|--------------------------------|
| interruptions | <i>int</i> | Number of interruptions |
| sags | <i>int</i> | Number of sags |
| summaryInterval | <i>DateTimeInterval</i> | Interval of summary period |
| swells | <i>int</i> | Number of swells |
| transients | <i>int</i> | Number of transients |
| voltageImbalances | <i>int</i> | Number of voltage imbalances |
| frequencyVariations | <i>int</i> | Number of frequency variations |

509 **REQ.18.4.1.13**
510

QualityOfReading *«enumeration»*

| Name | Type | Description |
|-----------|------|-------------|
| estimated | | |



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| | | |
|----------------------|--|--|
| forecast | | |
| mixed | | |
| raw | | |
| validated | | |
| normalizedForWeather | | |
| other | | |

511 **REQ.18.4.1.14**

Reading

512 Specific value measured by a meter or other asset. Each Reading is associated with a
 513 specific ReadingType.

| Name | Type | Description |
|------------------|--------------------|--------------------------------|
| ID | <i>string</i> | Object identifier |
| cost | <i>float</i> | Cost in a currency |
| timeStamp | <i>unsignedInt</i> | The date and time of a reading |
| value | <i>float</i> | Value in type of float |

514 **REQ.18.4.1.15**

ReadingKind «enumeration»

515 Kind of reading.

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



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| | | |
|--------------------|--|--|
| NOx | | |
| carbon | | |
| SOx | | |
| methane | | |
| HCH | | |
| perfluorocarbons | | |
| sulfurHexafluoride | | |

516 **REQ.18.4.1.16**

ReadingQuality

517 Quality of a specific reading value or interval reading value. Note that more than one
 518 Quality may be applicable to a given Reading. Typically not used unless problems or
 519 unusual conditions occur (i.e., quality for each Reading is assumed to be 'Good' unless
 520 stated otherwise in associated ReadingQuality).

| Name | Type | Description |
|----------------|---------------|--|
| quality | <i>string</i> | Quality, to be specified if different than 'Good'. |

521 **REQ.18.4.1.17**

ReadingType

522 Type of data conveyed by a specific Reading.

| Name | Type | Description |
|-----------------------|----------------|--|
| ID | <i>string</i> | A Model Authority issues mRIDs. Given that each Model Authority has a unique id and this id is part of the mRID, then the mRID is globally unique. |
| aliasName | <i>string</i> | The aliasName is free text human readable name of the object alternative to IdentifiedObject.name. It may be non unique and may not correlate to a naming hierarchy. |
| channelNumber | <i>integer</i> | Logical positioning of this measurement data. |
| defaultQuality | <i>string</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. |
| description | <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. |



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| | | |
|-----------------------|-----------------------|---|
| direction | <i>string</i> | Specifies the direction of flow of the measurement. |
| intervalLength | <i>Seconds</i> | (if incremental reading value) Length of increment interval. Interval duration specified at the IntervalReading overrides this default. |
| kind | <i>ReadingKind</i> | Kind of reading. |
| multiplier | <i>UnitMultiplier</i> | Multiplier for 'unit'. |
| name | <i>string</i> | Name of an attribute. |
| unit | <i>UnitSymbol</i> | Unit in symbol |

523 **REQ.18.4.1.18**

Seconds

524 Time, in seconds

| Name | Type | Description |
|-------------------|-----------------------|------------------------|
| multiplier | <i>UnitMultiplier</i> | Multiplier for 'unit'. |
| unit | <i>UnitSymbol</i> | Unit in symbol |
| value | <i>float</i> | Value in type of float |

525 **REQ.18.4.1.19**

ServiceDeliveryPoint

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

| Name | Type | Description |
|----------------------|------------------------------------|--|
| ID | <i>string</i> | A Model Authority issues mRIDs. Given that each Model Authority has a unique id and this id is part of the mRID, then the mRID is globally unique. |
| description | <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. |
| estimatedLoad | <i>CurrentFlow</i> | Estimated load. |
| name | <i>string</i> | Name of an attribute. |
| phaseConfig | <i>PhaseConfiguratio nKind</i> | Phase configuration kind. |

530 **REQ.18.4.1.20**

SourceKind «enumeration»

531

| Name | Type | Description |
|------|------|-------------|
|------|------|-------------|



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| | | |
|-----------------|--|--|
| consumer | | |
| provider | | |
| other | | |

532 **REQ.18.4.1.21**

Status

533 Current status information relevant to an entity.

| Name | Type | Description |
|-----------------|-----------------|--|
| dateTime | <i>dateTime</i> | Date and time for which status 'value' applies. |
| href | <i>anyURI</i> | Hypertext reference pointing to a URI |
| reason | <i>string</i> | Reason code or explanation for why an object went to the current status 'value'. |
| value | <i>string</i> | Value in string |

534 **REQ.18.4.1.22**

SummaryMeasurement

535

| Name | Type | Description |
|-------------------|-----------------------|-------------|
| multiplier | <i>UnitMultiplier</i> | |
| timeStamp | <i>dateTime</i> | |
| unit | <i>UnitSymbol</i> | |
| value | <i>float</i> | |

536 **REQ.18.4.1.23**

TariffProfile

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

| Name | Type | Description |
|-------------|---------------|---------------------------------------|
| ID | <i>string</i> | Object identifier |
| name | <i>string</i> | Name of an attribute. |
| href | <i>anyURI</i> | Hypertext reference pointing to a URI |

541 **REQ.18.4.1.24**

UnitMultiplier «enumeration»

542 The unit multipliers defined for the CIM

| Name | Type | Description |
|----------|------|--------------|
| c | | Centi 10**-2 |



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| | | |
|--------------|--|--------------|
| d | | Deci 10**-1 |
| G | | Giga 10**9 |
| k | | Kilo 10**3 |
| m | | Milli 10**-3 |
| M | | Mega 10**6 |
| micro | | Micro 10**-6 |
| n | | Nano 10**-9 |
| none | | |
| p | | Pico 10**-12 |
| T | | Tera 10**12 |

543 **REQ.18.4.1.25**

UnitSymbol «enumeration»

544

The units defiend for usage in the CIM

| Name | Type | Description |
|-------------|-------------|---|
| A | | Current in ampere |
| deg | | Plane angle in degrees |
| F | | Capacitance in farad |
| g | | Mass in gram |
| h | | Time in hours |
| H | | Inductance in henry |
| Hz | | Frequency in hertz |
| Hz-1 | | per Hertz |
| J | | Energy in joule |
| J/s | | Joule per second |
| kg/J | | Mass per energy |
| m | | Length in meter |
| m2 | | Area in square meters |
| m3 | | Volume in cubic meters |
| min | | Time in minutes |
| N | | Force in newton |
| none | | Dimension less quantity, e.g. count, per unit, etc. |
| C | | Relative temperature in degrees Celsius |
| ohm | | Resistance in ohm |



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| | | |
|-------------|--|---|
| Pa | | Pressure in pascal (n/m2) |
| rad | | Plane angle in radians |
| S | | Conductance in siemens |
| s | | Time in seconds |
| s-1 | | per second |
| V | | Voltage in volt |
| V/VA | | Volt per volt ampere reactive |
| VA | | Apparent power in volt ampere |
| VAh | | Apparent energy in volt ampere hours |
| VAr | | Reactive power in volt ampere reactive |
| VArh | | Reactive energy in volt ampere reactive hours |
| W | | Active power in watt |
| W/Hz | | Watt per hertz |
| W/s | | Watt per second |
| Wh | | Real energy in what hours |

545 **REQ.18.4.1.26**

UsageSummary

546

| Name | Type | Description |
|--|---------------------------|--------------------|
| billingPeriod | <i>DateTimeInterval</i> | |
| billLastPeriod | <i>float</i> | |
| billToDate | <i>float</i> | |
| costAdditionalLastPeriod | <i>float</i> | |
| currency | <i>Currency</i> | |
| currentDayLastYearNetConsumption | <i>SummaryMeasurement</i> | |
| currentDayNetConsumption | <i>SummaryMeasurement</i> | |
| currentDayOverallConsumption | <i>SummaryMeasurement</i> | |
| peakDemand | <i>SummaryMeasurement</i> | |
| previousDayLastYearOverallConsumption | <i>SummaryMeasurement</i> | |



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| | | |
|--------------------------------------|---------------------------|--|
| sumption | | |
| previousDayNetConsumption | <i>SummaryMeasurement</i> | |
| previousDayOverallConsumption | <i>SummaryMeasurement</i> | |
| qualityOfReading | <i>QualityOfReading</i> | |
| ratchetDemand | <i>SummaryMeasurement</i> | |
| ratchetDemandPeriod | <i>DateTimeInterval</i> | |
| source | <i>SourceKind</i> | |

547 **REQ.18.4.1.27**

ServiceKind «enumeration»

548

Kind of service.

| Name | Type | Description |
|--------------------|------|-------------|
| electricity | | |
| gas | | |
| water | | |
| time | | |
| heat | | |
| refuse | | |
| sewerage | | |
| rates | | |
| tvLicence | | |
| internet | | |
| other | | |

549 **REQ.18.4.1.28**

CustomerAuthorisation

550

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

551

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

552 **REQ.18.4.1.29**

ServiceCategory



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553 Category of service provided to the customer.

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

554 **REQ.18.4.1.30** **SupplierKind** «enumeration»

555 Kind of supplier.

| Name | Type | Description |
|-----------------|------|-------------|
| utility | | |
| retailer | | |
| other | | |

556 **REQ.18.4.1.31** **ServiceSupplier**

557 Organisation that provides services to Customers.

| Name | Type | Description |
|-----------------------------------|---------------------|--|
| ID | <i>string</i> | Unique identifier of this service supplier. |
| issuerIdentificationNumber | <i>string</i> | Unique transaction reference prefix number issued to an entity by the International Standards Organisation for the purpose of tagging onto electronic financial transactions, as defined in ISO/IEC 7812-1 and ISO/IEC 7812-2. |
| kind | <i>SupplierKind</i> | Kind of supplier. |
| name | <i>string</i> | The human-readable name for the service supplier. |

558



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559 **APPENDIX A Principle Verifications Against The Energy Information**
560 **Usage Model**

561

562 **REQ.18.4.2 Requirements validation method**

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

568 The PAP10 charter – the text of the abstract, description, and objectives from the NIST Framework – are high level
569 user requirements {insert reference to NIST Framework Rev 1.0}. The requirements presented in REQ.18.6.1.1 can
570 be considered the first level requirements breakdown of derived requirements.

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

574 Here is a sample requirement and how it is verified:

575 <<requirement reference>> *Standard load and usage information shall enable improved energy*
576 *efficiency by defining a consistent way to communicate usage*
577 *information.*

578 *In the Model, There is at least one Schema, see*
579 *{reference} produced as a part of this standard. With a*
580 *schema at least one specific consistent way to*
581 *communicate usage information is thereby specified.*
582 *Thus, the presence of the agreed upon schema or*
583 *equivalent satisfies this requirement.*

584 **REQ.18.4.2.1 General**

585 *REQ.18.4.2.1.1 Facilities shall include residences, buildings, and industrial installations*

586 *No specific limit as to the nature of the facility appears in the EUI model.*
587 *Identifiers are for user, location, and device only.*

588 *REQ.18.4.2.1.2 Usage and load information shall be readily available*

589 *While the availability of information is the realm of the utility and its customer,*
590 *this model facilitates availability by providing a single simple information*
591 *model for client applications*



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- 592 *REQ.18.4.2.1.3* *PAP 10 is an information model concept which is transport agnostic.*
- 593 *Because it is defined within a UML model as a series of classes and no services*
594 *are specifically defined in the standard for those classes, it is by this definition*
595 *transport agnostic.*
- 596 **REQ.18.4.2.2** **Timeliness of Delivery**
- 597 *REQ.18.4.2.2.1* *Customers shall be able to use the information defined in these standards for real-time*
598 *feedback on present and projected performance*
- 599 *There are no constraints on time stamps, latency or performance imposed by the*
600 *model, so it is possible to represent past, present, or future usage.*
- 601 *REQ.18.4.2.2.2* *Premises based systems (e.g. EMS/ESI) shall be able to use the information defined in*
602 *these standards for real-time feedback on present and projected performance*
- 603 *There are no constraints on time stamps, latency or performance imposed by the*
604 *model, so it is possible to represent past, present, or future usage.*
- 605 *REQ.18.4.2.2.3* *Information exchanged shall be delivered in sufficient time to affect usage ["and this is*
606 *the definition of real-time and near real-time "]*
- 607 *There are no constraints on time stamps, latency or performance imposed by the*
608 *model, so it is possible to represent past, present, or future usage.*
- 609 *REQ.18.4.2.2.4* *Operations, Distribution, and Service Providers shall be able to use the information*
610 *defined in these standards with the facility in near-real-time*
- 611 *There are no constraints on time stamps, latency or performance imposed by the*
612 *model, so it is possible to represent past, present, or future usage.*
- 613 *REQ.18.4.2.2.4.1* *Customers and premises-based systems shall be able to use the information defined in*
614 *these standards to provide real-time feedback on present and projected performance*
- 615 *There are no constraints on time stamps, latency or performance imposed by the*
616 *model, so it is possible to represent past, present, or future usage.*
- 617 **REQ.18.4.2.3** **Benefits to Facilities**
- 618 *REQ.18.4.2.3.1* *Standard load and usage information shall enable improved energy efficiency by*
619 *defining a consistent way to communicate usage information.*
- 620 *By minimizing the number of different physical representations of usage*
621 *information, and aligning the logical elements included in the definition of this*
622 *information, it will allow for the development of applications that require this*
623 *information to provide energy efficiency services and functionality.*
- 624 *REQ.18.4.2.3.2* *Standard load and usage information shall enable helping [all] Customers and*
625 *operations manage their energy usage [and load]*



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- 626 The data model standardizes load and usage information so customer usage data
627 provider services may be developed to interface with systems that help
628 customers and operations with energy management.
- 629 *REQ.18.4.2.3.3* *Standard load and usage information shall enable improved [facility] energy usage by*
630 *availability of fine grained and timely information*
- 631 The data model standard provides for measurement intervals enabling the
632 availability of fine grained and timely load and usage information.
- 633 *REQ.18.4.2.3.4* *Availability of fine grained and timely information will enable better decisions about*
634 *energy usage and conservation*
- 635 The data model enables a standard approach for fine grained and timely load
636 and usage information so customer usage data provider services can interface to
637 systems that help customers and/or operations with energy conservation.
- 638 *REQ.18.4.2.3.5* *Facilities will benefit from consistent usage information exchange inside the facility,*
639 *including meeting the energy efficiency goals of EISA 2007 and DOE initiatives*
- 640 The data model provides consistent energy usage data representation so
641 information exchanges are uniformly understood. This ensures facility energy
642 efficiency systems using this data are acting on correct and consistent
643 information.
- 644 *REQ.18.4.2.3.6* *Standard model shall support aggregated projections that can be passed on to*
645 *operations [the System Operator's] or [building management] [?] make forecasting and*
646 *management better and increase the value of a facility to the Smart Grid*
- 647 *Aggregated projections are supported via future timestamps in interval and other*
648 *data.*
- 649 *REQ.18.4.2.3.7* *Sharing usage and load information inside a facility makes that facility more valuable to*
650 *the Smart Grid*
- 651 The data model provides usage, load, and pricing information from which a
652 facility manager or system may take optimization actions.
- 653 *REQ.18.4.2.3.8* *The information exchanged shall allow integration of usage information throughout*
654 *facility decision processes*
- 655 The data model standardizes usage information so customer usage data provider
656 services may be developed to integrate with systems handling facility decision
657 processes.
- 658 **REQ.18.4.2.4** **RBenefits to Grid and Service Provider Operations**
- 659 *REQ.18.4.2.4.1* *Standard load and usage information will improve forecasting and grid management by*
660 *delivering aggregated projections to operations.*



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- 661 By specifying future intervals, which could be larger than measured intervals, it
662 is possible to represent aggregated projections.
- 663 *REQ.18.4.2.4.2* *Standard load and usage information will improve forecasting and grid management by*
664 *delivering aggregated projections to service providers.*
- 665 By specifying future intervals, which could be larger than measured intervals, it
666 is possible to represent aggregated projections.
- 667 *REQ.18.4.2.4.3* *Standard load and usage information will enable more responsive facilities.*
- 668 Interoperable models of load and usage information allow coordination of
669 response capability, allowing those capabilities to be utilized more efficiently.
- 670 *REQ.18.4.2.4.4* *Standard load and usage information will enable early deployment of devices that*
671 *deliver and understand usage information.*
- 672 By standardizing the information to be made available, devices and applications
673 will be able to get access to that information.
- 674 **REQ.18.4.2.5** **Internet-Like Future**
- 675 *REQ.18.4.2.5.1* *Standard usage and load information enables innovation in novel ways to help customers*
676 *manage energy usage.*
- 677 By standardizing on simple data sets that many providers and consumers can
678 utilize, this information can be combined with additional information to find the
679 specific way that will help customers the most.
- 680 *REQ.18.4.2.5.2* *Standard usage and load information enables innovation by third party service and*
681 *software providers.*
- 682 By standardizing on simple data sets that many providers and consumers can
683 utilize, this information can be combined with additional information to find the
684 specific way that will help customers the most.
- 685 **REQ.18.4.2.6** **Improved Collaboration**
- 686 *REQ.18.4.2.6.1* *The Information model shall not restrict two way flows of information.*
- 687 Customers, utilities and third parties will have access to the model in real time
688 with the appropriate usage information and customer permissions/allowances.
- 689 *REQ.18.4.2.6.2* *By standardizing usage and load information exchange, devices that deliver and*
690 *understand usage and load can be deployed more quickly, contributing to achieving the*
691 *energy efficiency goals of EISA 2007 and DOE.*
- 692 Uniformity among signals as required by the model standards will lead to
693 greater acceptance and adoption.



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- 694 **REQ.18.4.2.7** **Information Sources and Accessibility**
- 695 *REQ.18.4.2.7.1* *Usage and load information shall be provided by utilities and aggregating service*
696 *providers and may be provided by others.*
- 697 *With consent from the customer, utilities and aggregators will provide access to*
698 *usage and load information in the provided format for model integration.*
- 699 *REQ.18.4.2.7.2* *Usage and load information shall be provided by devices and EMS/ESI implementations.*
- 700 *With consent from the customer, devices and EMS/ESI implementations will*
701 *provide usage and load information in the provided format for model*
702 *integration.*
- 703 *REQ.18.4.2.7.3* *Usage and load information can be accessed from the meter.*
- 704 *With consent from the customer and the utility, usage and load information will*
705 *be provided by the meter to accredited sources for purposes of running the*
706 *model.*
- 707 *REQ.18.4.2.7.4* *Usage and load information can be accessed from the Smart Grid.*
- 708 *With consent from the customer and the utility, usage and load information will*
709 *be made available by any Smart Grid services provider via the public Internet.*
- 710 **REQ.18.4.2.8** **Interactions and Information Exchanges Supported**
- 711 *REQ.18.4.2.8.1* *Interactions supported shall include those between Distribution [and Operations] and*
712 *the industrial, commercial, and residential premises.*
- 713 *The model does not exclude/include specific actors or potential exchange points,*
714 *it merely describes data and format of information.*
- 715 *REQ.18.4.2.8.2* *Standard information models and understanding of usage and load are essential to cross*
716 *domain interactions between Distribution [and Operations]: and Industrial,*
717 *Commercial, Residential, and PEVs.*
- 718 *The standard information format does not exclude potential actors or exchange*
719 *points including potential cross domain interaction including those between*
720 *Distribution companies and other actors.*
- 721 *REQ.18.4.2.8.3* *Interactions supported shall include those between Distribution [and Operations] and*
722 *the industrial, commercial, residential premises, and plug-in electric vehicles.*
- 723 *The model does not exclude/include specific actors or potential exchange points,*
724 *it merely describes data and format of information.*
- 725 *REQ.18.4.2.8.4* *Standard information models and understanding of usage and load are essential to cross*
726 *domain interactions between Service Providers: and Industrial, Commercial,*
727 *Residential, and PEVs.*



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

731 *REQ.18.4.2.8.5 Interactions supported shall include those between Service Providers and the industrial,*
732 *commercial, residential premises, and plug-in electric vehicles.*

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

736 *REQ.18.4.2.8.6 This effort shall support information standards for load curtailment, load shaping, and*
737 *energy market operations, hence load and usage must be supported (see PAP09, PAP03,*
738 *and PAP04).*

739 Load and usage information are part of the model.

740 *REQ.18.4.2.8.7 Information exchanges shall include to, from, and within facilities.*

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

743 **REQ.18.4.2.9 Information Characteristics**

744 *REQ.18.4.2.9.1 Information model shall support exchange of both Fine Grained and summary*
745 *information.*

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

752 *REQ.18.4.2.9.2 Fine grained means that there is disaggregated information. Disaggregated information*
753 *can include for example load, subsystem, premise, and variable time interval.*

754 Fine grained (disaggregated) information is described throughout the
755 information model. From CustomerAccount, EventType, MeterAsset,
756 ReadingKind, etc. there seems to be enough detailed data elements to support
757 “Fine grained” information.

758 *REQ.18.4.2.9.3 Support for exchanging standard historical, present, and projected load information is*
759 *required.*

760 Historical information seems to be supported by the UsageSummary attributes
761 for billing items only. Present (meter reading) information has fine grained as
762 well as billing attributes defined. Projected usage is supported in the



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763 QualityOfReading <<enumeration>> attribute, which delineates the “estimated”
764 and “forecast” attribute names.

765 *REQ.18.4.2.9.4 Energy Usage Information shall include usage, usage profile, and some component of*
766 *cost (consistent with PAP03, PAP04)*

767 Energy usage information, including costs is contained in the data model.
768 Interval data is supportive of usage profiles and PAP04.

769 *REQ.18.4.2.9.5 The PAP 10 Energy Usage Information model shall allow for exchange of greater or*
770 *lesser detail.*

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

777 **REQ.18.4.2.10 Timing and Goals**

778 *REQ.18.4.2.10.1 Initial steps include making usage information more readily available by defining and*
779 *standardizing usage information [delivered] through existing SG infrastructure.*

780 The EUI data structures enable a diverse range of technologies to deliver usage
781 information in a timely and protocol agnostic manner. Examples of this might
782 be a premise ESI or through services provided by a utility or facility.

783 *REQ.18.4.2.10.2 Information on device and facility usage is a primary goal in the initial focus.*

784 As the EUI data structures cover summary and device level information, device
785 and facility (aggregated) information can be delivered.

786 *REQ.18.4.2.10.3 Standard load and usage information will enable early deployment of devices that*
787 *deliver and understand usage information.*

788 As the EUI data models are standardized, producers may deliver usage based
789 devices with confidence in interoperability.

790 **REQ.18.4.2.11 Requirements on Quality of Consensus Standard**

791 *The information model shall support:*

792 *REQ.18.4.2.11.1 Consistent data representation for REST & Web Services.*

793 The Schema in section **Error! Reference source not found.** ensures that a
794 consistent data representation can be achieved when a Schema is developed in a
795 supporting standard carrying EUI in REST and Web Services.



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- 796 *REQ.18.4.2.11.2* *Specification of transactional exchange, syntax, and required population of the*
797 *information model are beyond the scope of these requirements.*
- 798 *No transactional syntaxes or message services are defined in this standard.*
- 799 *REQ.18.4.2.11.3* *an extensible information model – e.g. ability to add custom extensions as needed*
- 800 *This model may be extended by adding new elements (classes, attributes, and*
801 *associations). Implementations must utilize conventions to ignore any elements*
802 *not understood by components, to allow them to continue to operate when*
803 *future extensions are added.*
- 804 *REQ.18.4.2.11.4* *have an evolvable information model – e.g. the standards process supports future*
805 *revisions*
- 806 **Error! Reference source not found.** *identifies how the model is evolvable.*
807 *Section 0 defines how the standard version can be revised.*
- 808 *REQ.18.4.2.11.5* *Forward compatible as we evolve*
- 809 *To maintain forward and backward compatibility, no model elements may be*
810 *removed or restricted in future versions. Only additions and expansions are*
811 *allowed, so that previous version representations maintain validity against future*
812 *versions, and vice-versa.*
- 813 *REQ.18.4.2.11.6* *Supportive of versioning*
- 814 *Versioning in the UML Model is addressed by a tagged value. The tagged value*
815 *“version” is used additionally in the XML Schema export (see **Error!***
816 ***Reference source not found.**) as the schema version value.*
- 817 *REQ.18.4.2.11.7* *Usable without “knowing all the details”*
- 818 *Information in the model is arranged hierarchically. Greater detail can be*
819 *understood the deeper into this hierarchy the reader goes. Summary information*
820 *is exposed near the top of the hierarchy. These arrangements make it*
821 *straightforward to accessing applications to ignore the level of detail they do not*
822 *plan to use or comprehend, while getting value out of higher level information.*
- 823 *More flexibility for independent innovation shall be achieved through:*
- 824 *REQ.18.4.2.11.8* *Focus on information exchanged*
- 825 *The specification of an information-only model allows the standard to focus on*
826 *the information exchanged.*
- 827 *REQ.18.4.2.11.9* *Agreed upon interfaces are maintained over time*
- 828 *See section 0 which describes*



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- 829 *REQ.18.4.2.11.10* *Minimal details = maximum interoperation*
- 830 The model provides a hierarchy of summary and detailed information. A
831 balance is achieved by the definition of minimal set of details necessary to
832 satisfy the cumulative set of use cases of the EUI and allocated to this model.
- 833 *REQ.18.4.2.11.11* *Intellectual Property Rights shall be clear & clean*
- 834 [Need section on IPR and access to model and schema]
- 835 *Results of PAP 10 shall produce:*
- 836 *REQ.18.4.2.11.12* *Information model and XML schema*
- 837 See sections **Error! Reference source not found.** and **Error! Reference**
838 **source not found.** which describe the delivery of an information model and
839 XML schema respectively.
- 840 *REQ.18.4.2.11.13* *At information exchange level*
- 841 The information model is designed to be exchanged between participants. The
842 information model and XML Schema provide the specificity to define an
843 information exchange, but stops short of mandating one (see **Error! Reference**
844 **source not found.**).
- 845 *The information model shall be:*
- 846 *REQ.18.4.2.11.14* *Readable without charge*
- 847 NAESB has agreed to make the Energy Usage Information Model included in
848 REQ.18.4 and REQ.18.4.1 available to the public without charge.
- 849 *REQ.18.4.2.11.15* *Reusable without restriction or charge*
- 850 The use of the Energy Usage Information Model included in REQ.18.4 and
851 REQ.18.4.1 for the production of derivative work products is not prohibited.
- 852 *REQ.18.4.2.11.16* *Adaptable without restriction or charge*
- 853 All NAESB standards maybe modified through the NAESB process. . (Please
854 see: http://www.naesb.org/misc/naesb_process_for_standards_dev.doc)
- 855 *REQ.18.4.2.11.17* *REQ.18.1.2.13.17 Usable for open source*
- 856 The use of the Energy Usage Information Model included in REQ.18.4 and
857 REQ.18.4.1.maybe distributed in any manner, however, must be made available
858 without charge.



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)
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| | | |
|-----|------------------------|--|
| 859 | REQ.18.4.2.12 | Additional Considerations |
| 860 | <i>REQ.18.4.2.12.1</i> | <i>In communicating energy usage information, the Energy Usage Information Model should be used and the information outlined within the model should be available.</i> |
| 861 | | |
| 862 | | The model provides a common, consensus-based, vendor-neutral model to |
| 863 | | represent usage information, to be used in exchange scenarios where it is |
| 864 | | applicable and desired by usage information providers and Customers. |
| 865 | <i>REQ.18.4.2.12.2</i> | <i>The Energy Usage Information Model data set has three unique identifiers, which serve</i> |
| 866 | | <i>the purpose of allowing various aggregations of data sets.</i> |
| 867 | | Owner (customer): This is represented by the Customer class, provided the use |
| 868 | | of the term “owner” or similar verbiage is not indicative or dispositive of any |
| 869 | | ownership or other rights under applicable law in the Model or any data. |
| 870 | | Location: This is represented by ServiceDeliveryPoint. |
| 871 | | Device: This is represented by MeterAsset. |
| 872 | <i>REQ.18.4.2.12.3</i> | <i>The Tariff Profile component should be included in the Energy Information Usage</i> |
| 873 | | <i>Model.</i> |
| 874 | | Recommend marking as a “Future” – TariffProfile provides the representation |
| 875 | | of the rate elements, and would expand the scope beyond our initial target |
| 876 | | schedule. |
| 877 | <i>REQ.18.4.2.12.4</i> | <i>UsageSummary should include an optional cost attribute to interval and reading class.</i> |
| 878 | | Recommend marking as “Future”. |
| 879 | <i>REQ.18.4.2.12.5</i> | <i>REQ.18.1.2.14.5 A known base currency should be included in the top level class</i> |
| 880 | | <i>associated with the MeterAsset for the Energy Usage Information Model, which would be</i> |
| 881 | | <i>applicable to all instances</i> |
| 882 | | Recommend marking as “Future” – If performance considerations require |
| 883 | | optimization, global defaults for this and other repetitious elements should be |
| 884 | | considered. |
| 885 | <i>REQ.18.4.2.12.6</i> | <i>The Energy Usage Information Model should be compliant with ISO8601.</i> |
| 886 | | The current model does not define the primitive to be used to represent the |
| 887 | | dateTime, however the default xs:dateTime is ISO8601 compliant. |
| 888 | <i>REQ.18.4.2.12.7</i> | <i>Optionally, both start and end of interval can be defined in order to support non-uniform</i> |
| 889 | | <i>interval information, which is accomplished in the Energy Information Usage Model</i> |
| 890 | | <i>through endTimestamp to IntervalReading.</i> |
| 891 | | The endTimeStamp element is included as an optional component of |
| 892 | | IntervalReading. |



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- 893 *REQ.18.4.2.12.8* *Demand based elements are maintained in the TariffProfile including common demand*
894 *and demand ratchets.*
- 895 *The model does not currently contain the full definition of TariffProfile, but this*
896 *is the CIM element where thresholds associated with the rate are specified.*
- 897 *REQ.18.4.2.12.9* *The Energy Information Usage Model status structure includes a named pair of*
898 *QualityOfReading and values of raw, forecast, validated, estimated, mixed, and other for*
899 *qualifying the associated data set, as an explicit representation of these name value pairs*
900 *can be processed in implementations by sending and receiving actors. The*
901 *UsageSummary class also includes such summary information.*
- 902 *Model is specified as described.*
- 903 *REQ.18.4.2.12.10* *MeterEvent should be associated with meterAsset, not MeterReading.*
- 904 *The events are currently associated to the MeterAsset through MeterReading,*
905 *but could be represented in other ways if the group decides this should be*
906 *changed.*
- 907 *REQ.18.4.2.12.11* *PQSummary as events of enumerated type are provided in the Energy Information Usage*
908 *Model to represent a simple exposure of summary information.*
- 909 *The model exposes these events in summary form as described.*
- 910 *REQ.18.4.2.12.12* *The Energy Usage Information Model should represent and take into account pollutant*
911 *energy emissions such as O2, SO2, and NOX.*
- 912 *Detailed information about these emissions is possible through definition of a*
913 *ReadingType specifying the appropriate kindReading values as enumerated in*
914 *ReadingKind.*
- 915 *REQ.18.4.2.12.13* *Energy Usage Information Model should include a top level cost summary – billStart,*
916 *billEnd, billToDate, lastPeriod, and costAdditional, so that the bill to date and bill as of*
917 *the last billing period could be conveyed through a formula:*
- 918 *billLastPeriod = costAdditionalLastPeriod + \sum MeterReading[i].Reading.cost*
919 *(constrained by datetime)*
- 920 *The model represents these elements in the UsageSummary class.*
- 921 *REQ.18.4.2.12.14* *The model shall use the work being produced by OASIS on common schedule*
922 *information pursuant to the SGIP PAP04 Requirements. As this work is not complete as*
923 *of this draft, the abstract definition of time intervals is the most appropriate way to*
924 *ensure consistency.*
- 925 *TBD – Group to discuss alignment with PAP04*
- 926 *REQ.18.4.2.12.15* *The model shall use the work being produced by OASIS on common price and product*
927 *definition information pursuant to the SGIP PAP03 Requirements. As this work is not*



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complete as of this draft, should information related to price be included in the Seed Specification it must be at an appropriate level of abstraction.

TBD – Group to discuss alignment with PAP03



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931 **4. SUPPORTING DOCUMENTATION**

932 a. Description of Request:

933

934 b. Description of Recommendation:

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936 c. Business Purpose:

937

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

939 NAESB Process for Standards Development -

940 http://www.naesb.org/misc/naesb_process_for_standards_dev.doc

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