

SMUD

# OpenADR Implementation Design Guide

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Document Release Version History

<u>Version</u>	<u>Date</u>	<u>Description</u>
<u>2.0</u>	<u>8/4/2023</u>	<p><u>Additional use case descriptions and sample XML for:</u></p> <p><u>Control</u></p> <ul style="list-style-type: none"> <li>- <u>“Load Control” use case name change to “Load Dispatch” to align with OpenADR definition.</u></li> <li>- <u>Load Optimization – removed</u></li> </ul> <p><u>Reporting</u></p> <ul style="list-style-type: none"> <li>- <u>“State of Charge” Reporting use case name change to Status Reporting to be consistent with the use of the standard OpenADR TELEMETRY STATUS report.</u></li> <li>- <u>Operational Forecast – planned resource generation/load</u></li> </ul> <p><u>Other</u></p> <ul style="list-style-type: none"> <li>- <u>Grouping – Dynamic assignment of resources to aggregator groups.</u></li> </ul>
<u>1.0</u>	<u>3/26/2021</u>	<p><u>Preliminary use case descriptions and sample XML for:</u></p> <p><u>Control</u></p> <ul style="list-style-type: none"> <li>- <u>Load Control - load control using setpoint</u></li> <li>- <u>Load Optimization - maps resources to other signals.</u></li> </ul> <p><u>Pricing</u></p> <ul style="list-style-type: none"> <li>- <u>Time of Use Pricing - TOU pricing signal</u></li> <li>- <u>Day Ahead Hourly Pricing - day ahead pricing signal</u></li> <li>- <u>Peak Price Events- peak price signaling</u></li> </ul> <p><u>Reporting</u></p> <ul style="list-style-type: none"> <li>- <u>Energy Metering – current telemetry</u></li> <li>- <u>State of Charge - current charge state</u></li> <li>- <u>Capability Forecast – potential generation/load capacity</u></li> </ul>

# SMUD OpenADR Implementation Design Guide

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## 1. Design Guide Summary

This is intended to guide the implementation of OpenADR VTN and VEN services to deliver upon the use case needs of SMUD's DER programs. The information in this document is intended to be shared openly with potential technology vendors. No confidential information is included

### 1.1. Use Case Summary

Category	Use Case	Brief Description
Control	Load Dispatch	Event based load dispatch using consumption/generation setpoint
Pricing	Time of Use Pricing	Event based TOU pricing signal
	Day Ahead Hourly Pricing	Event based day ahead pricing signal
	Peak Price Events	Event based peak price signaling
Reporting	Energy Metering	Telemetry reporting of current consumption/generation
	Status	Telemetry reporting of current connectivity and charge state
	Capability Forecast	Reporting of potential generation and load shed capacity
	Operational Forecast (NEW)	Reporting of planned operational load/generation
Other	Group Assignment	Dynamic mapping of DER resources to groups for aggregated forecast data and event dispatch.

## 2. Use of OpenADR Conventions

### 2.1. General Assumptions:

- 1) Fast DR with event frequencies in the sub 5 minute range are out of scope for this version of the design guide, although nothing in the proposed mappings should preclude evolving these use cases to fast DR in the future. For Fast DR, review oadrResponseRequired settings and response timing window requirements for VEN oadrCreatedEvent payloads.
- 2) All payloads will use the OpenADR 2.0B profile
- 3) All payloads exchanges will use the pull exchange model
- 4) VENs that lose communication, are reset, or power up should probe the VTN to see if they are in a registered state (via oadrQueryRegistration), and if not in a registered state go through the full bootstrap process including registration, metadata report exchange, and event initialization with oadrRequestEvent
- 5) Deployed VENs and VTNs will use OpenADRs "out of the box" security characteristics including...
  - a. -Kyrio OpenADR production x.509 certs, with mutual client server authentication
  - b. -TLS 1.2
  - c. -ECC or RSA OpenADR specific ciphers
- 6) VENs and VTNs are OpenADR Certified.

## 2.2. Event Targeting Mechanisms:

OpenADR provides the following mechanisms to map a specific event signal to the resources associated with a VEN:

- 1) VEN ID – A venID for each VEN will either be provided by the VEN or assigned by the VTN during registration. The venID uniquely identifies a given aggregator’s OpenADR endpoint. The venID can be included as an event level target to signal all resources managed by a VEN, for a given marketContext.
- 2) Market Context (Program unique identifier provided by SMUD) – A VEN can participate in one or more independent utility programs with many resources mapped to each program as required. MarketContext serves as a primary Event targeting filter and must be included in all event messages. The VEN may only dispatch resources explicitly assigned to the included MarketContext. SMUD will maintain a master list of MarketContext URI values, one for each pairing of utility program and VEN.
- 3) Group– For the purposes of the use cases described in this implementation guide, group level event targets will use a GroupID to target resources that have been assigned membership into abstract groups. Group assignment will be communicated to aggregators according to the details of section 2.4 Dynamic Grouping.
- 4) Resource – A resourceID will be provided by the aggregator and assigned to a marketContext during enrollment with the VTN. A resource may be the aggregate of multiple DER or a single DER managed by the aggregator. Resources will be assigned a device type or “No type” during enrollment. Resources of different device types cannot be assigned to the same group.

Multiple VENs, Groups, and Resources may be listed as targets in a single event signal. The VEN must identify and apply those filters to map the signals to the DER it manages.

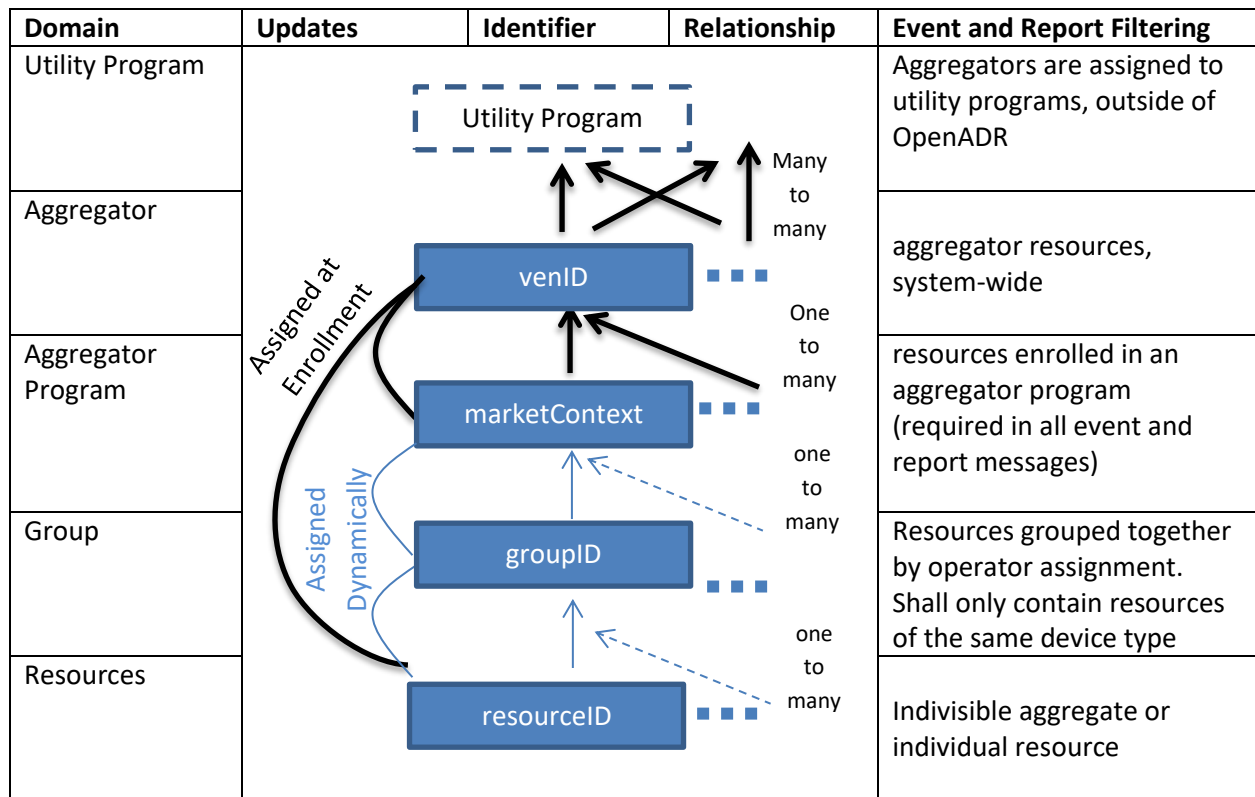
## 2.3. Report Data Source Mapping:

- 1) OpenADR reports provide data for resources within a given marketContext, associated with a utility program. The marketContext object of a report must be populated with the URI assigned to all reporting groups and resources.
- 2) OpenADR reports are aggregate reports, that may include the aggregate of just a single resource or many resources. The sources from which data is aggregated should be listed in the ReportDataSource object of the register report payload. Any of the defined event level target objects may be used, so for instance the reportDataSource could be “groupID\_rateplan123” or a venID “.
- 3) The source of the report data can be further qualified using the reportSubject object of the register report payload. Any of the defined signal level device classes may be used in this object.
- 4) OpenADR does not provide a simple way to communicate a large set of non-aggregated data values for multiple resources in a single report. However, reports are described that include resource identifiers as part of the data set itself using the rid element, providing a way to do non-aggregated reporting efficiently in a single report payload

### 2.4. Dynamic Grouping

SMUD has defined a methodology where VTNs can dynamically map resources to groups within OpenADR messages, then utilize the groupID as a target for an event or a report data source for a report. The functionality is primarily used as a part of programs that include the Capabilities Forecast reporting. However, it should be considered a generic mechanism that could be deployed for any use case.

Figure: Event Targeting and Report sourcing Mapping





The following is a high-level synopsis of how this dynamic grouping works...

- An aggregator sends DERMS a list of all resources for a given marketContext and associated utility program, at the time of enrollment, outside of OpenADR. Customer information for each resource will be provided to SMUD so location assignment can be made in DERMS. (Not an OpenADR message exchange)
- A single aggregator can provide aggregations of resources for multiple independent aggregator programs by assigning resources to different marketContexts during enrollment. Aggregator programs have mutually exclusive resource sets and may have differing business rules. Enrollment/unenrollment would be the mechanism for adding or removing resources from a program.
- The VTN sends resource to group assignments and group to aggregator program assignments using oadrExtension during (re)registration. Each resource may only belong to one group. Each group may only belong to one marketContext. Group assignment at the system level is unnecessary. All resources for a given aggregator program and VEN can be targeted using the venID within a given market context.
- A VEN responds during registration with a list of available reports for each group, and one aggregated Capabilitiy report for all resources managed by the VEN within the aggregator program.
- If the VEN is not yet able to provide reports for a group, it will flag the report data as invalid, by leaving reportDataSource empty, until it reregisters the report with valid data and populates reportDataSource.
- If the VTN dispatches a group prior to a valid report being available, the VEN will attempt to meet the event request, but the results will be uncertain.
- Once the reportDataSource for a capabilities report is populated, Group or program level events may be dispatched to achieve the power response for a given duration provided in the corresponding report.

Appendix B provides technical details as to how dynamic grouping **can be** implemented.

## 2.5. Default Data Element Formatting

The following provides general guidelines for the naming of payload data elements. Some use cases may require modified forms of these identifiers which will be documented in the individual use case guidelines. In general, most identifiers will have a human readable prefix follow by a unique identifier (uid) whose scope, if required to be unique, is defined in the OpenADR B profile specification

<b>Data Element</b>	<b>Format</b>	<b>Comments</b>
<i>venID</i>	<i>venID_[Customer identifier]_[uid]</i>  <i>Example: venID_Company_4321</i>	<i>venID's can be dynamically allocated by the VTN at time of registration or pre-allocated on deployment of the VEN. If dynamically allocated, the UUID portion of the venID may change at each registration</i>
<i>Vtn_ID</i>	<i>venID_[Customer identifier]_[uid]</i>  <i>Example: vtnID_Company_4321</i>	
<i>MarketContext</i>	<i>Valid URI</i> <a href="http://www.smud.org/[use case]/[version]">http://www.smud.org/[use case]/[version]</a>  <i>Example: http://www.smud.org/tou/01</i>	<i>MarketContext will identify a unique DR programs or use case and will be included in all Event payloads. The VEN will use MarketContext as a primary filter in determining which resources are targeted for an event.</i>
<i>EventID</i>	<i>eventID_[uid]_</i>  <i>Example: eventID_123432</i>	
<i>SignalName</i>	<i>Standard OpenADR signal</i> <i>Or</i> <i>x-[custom signal name]</i>  <i>Examples:</i> <i>x-ELECTRICITY_PRICE_TOU</i> <i>x-ELECTRICITY_PRICE_HOURLY</i> <i>x-ELECTRICITY_PRICE_PEAK</i>	
<i>signalID</i>	<i>[signal name]_[purpose]</i>  <i>Example: ELECTRICITY_PRICE_TOU retail</i>	<i>Used to differentiate two signals of the same name in an event. Custom signal IDs are expected for this data element</i>

		<i>and need not include “x-“ prefix. Postfix can be a uid if only one signal of this type is present, otherwise should be a human readable differentiating descriptor as to the purpose of each signal of the same type</i>
<i>reportName</i>	<p><i>Standard OpenADR Report Or x-[custom report name]</i></p> <p><i>Example: x-DELIVERED_CAPACITY x-METADATA_x-DELIVERED_CAPACITY</i></p>	
<i>reportSpecifierID</i>	<p><i>[report name]_[uid]</i></p> <p><i>Examples: DELIVERED_CAPACITY_4321 GROUP_CAPABILITY_FORECAST_Group123</i></p> <p><i>Note: The Capability Forecast use case requires the uid postfix for reportSpecifierID be the name of the groupID being reported.</i></p>	<i>Custom IDs are expected for this data element and need not include “x-“ prefix.</i>
<i>reportRequestID</i>	<p><i>[reportname]_request_[uid]</i></p> <p><i>Example: DELIVERED_CAPACITY_request_4321</i></p>	<i>Custom IDs are expected for this data element and need not include “x-“ prefix.</i>
<i>rid</i>	<p><i>[ReportName]_[UOM_Descriptor]_[postfix]</i></p> <p><i>Examples: TELEMETRY_STATUS_resource2 GROUP_CAPABILITY_FORECAST_powerReal_OneHour Window_MAX</i></p>	<i>UOM is Unit of Measure (i.e. Watts). Descriptor might be something like resourceID or groupID, but can be omitted if there is no need. Custom IDs are expected for this data element and need not include “x-“ prefix. An optional prefix can be included if the use case warrants</i>
<i>reportID</i>	<i>Ignored by OpenADR</i>	
<i>resourceID</i>	<p><i>resourceID_[descriptor]_[uid]</i></p> <p><i>Example: resourceID_lighting_4313</i></p>	<i>Descriptor is optional, but should be used if resource is of some common type such as lighting or HVAC. ResourceID may not include “-“ (hyphen) character and should always be the last element in the string.</i>

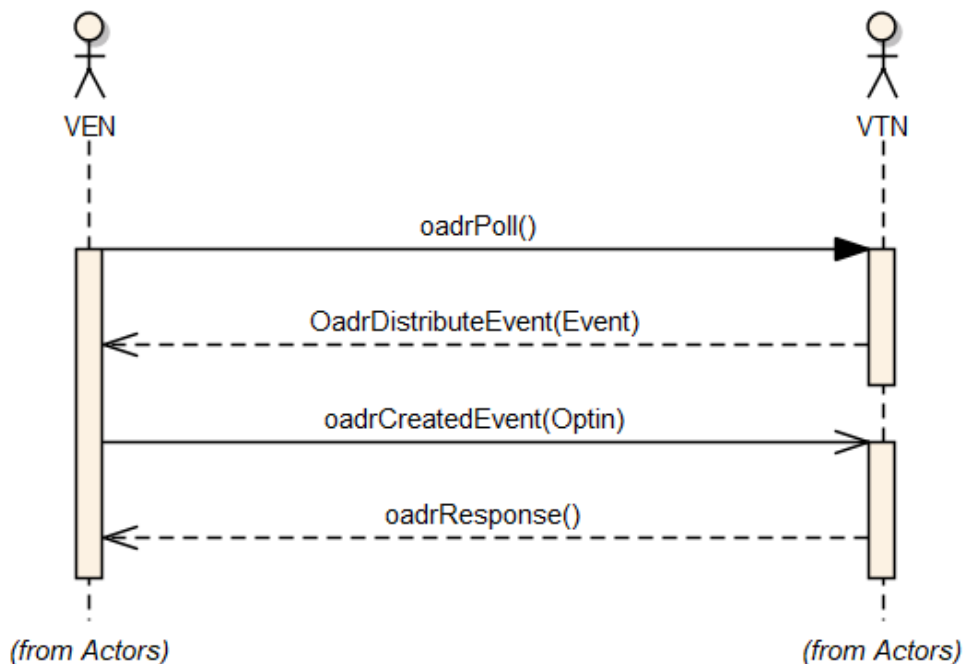
<i>groupID</i>	<i>groupID_[descriptor]</i>  <i>Example: groupID_rateplan123</i> <i>Example: Group_EastSide</i>	<i>Descriptor will provide a human readable identifier where practical, such as rate plan or locational grouping</i>
<i>requestID</i>	<i>requestID_[uid]</i>  <i>Example: requestID_1234</i>	

## 2.7. Default Event Sequence Diagrams

Documents a global pattern to include an initial opt in scenarios including event participation qualification.

### 2.7.1. VEN Polls for new events

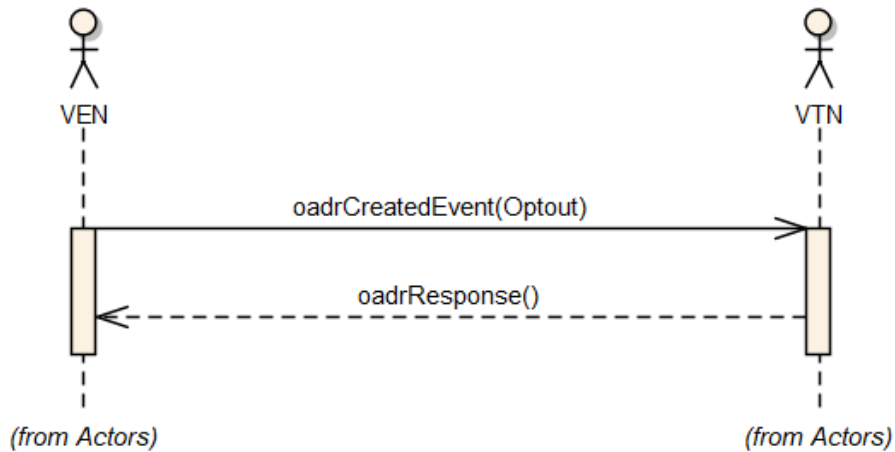
The default behavior pattern for Event related use cases is for the VEN to Optin after receiving an event as the result of an `oadrPoll` request as shown in the sequence diagram below:



Business rules will dictate whether a VEN must optin to an event, whether then ven can asynchronously optout after having initially done an optin, and whether a ven can optin to an event after having first done an optout.

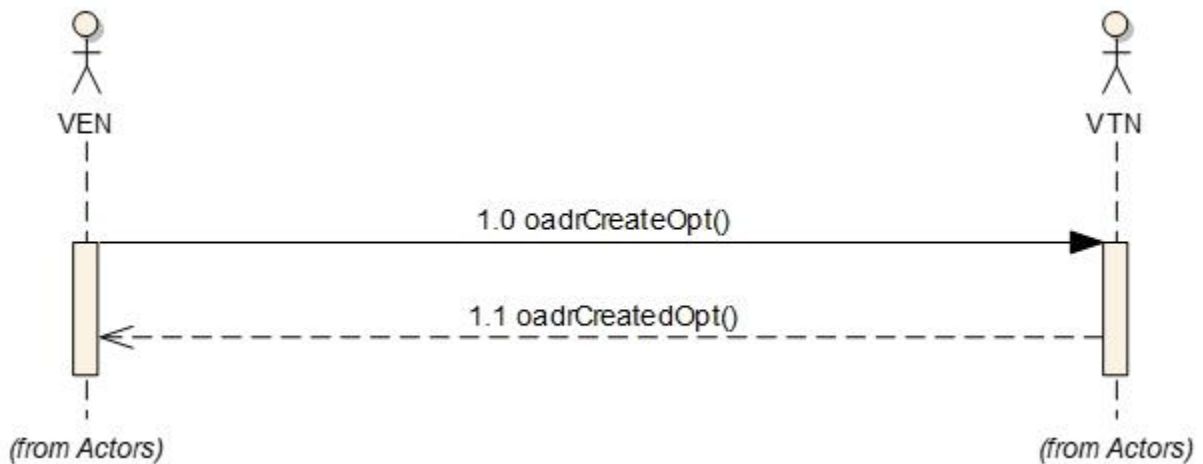
### 2.7.2. VEN Asynchronously opts out of event

At any time after the VEN has opted into the event it can asynchronously opt out of the event as shown in the sequence diagram below:



### 2.7.3. VEN Qualifies Event participation

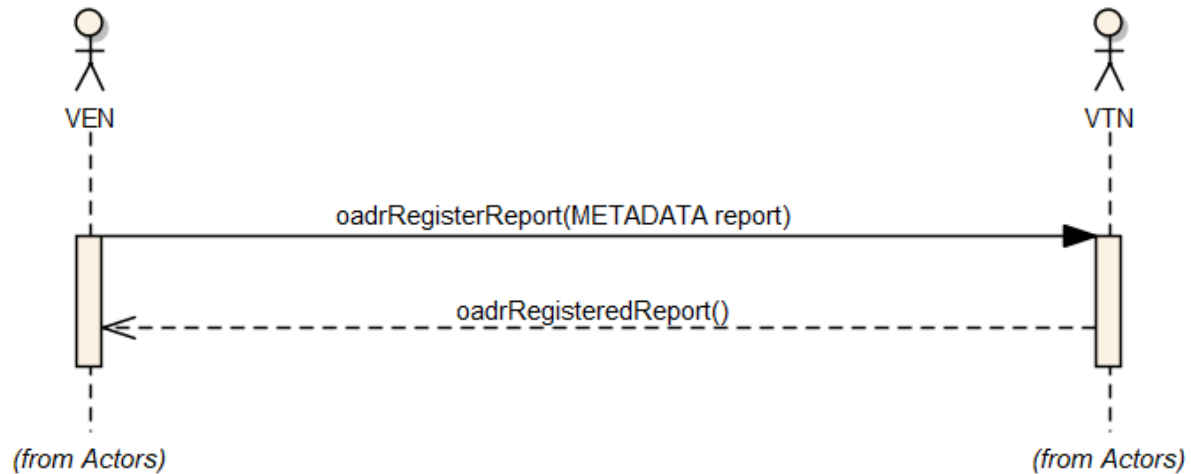
After initially opting into an event, a VEN can communicate to the VTN that some resources cannot participate in the event.



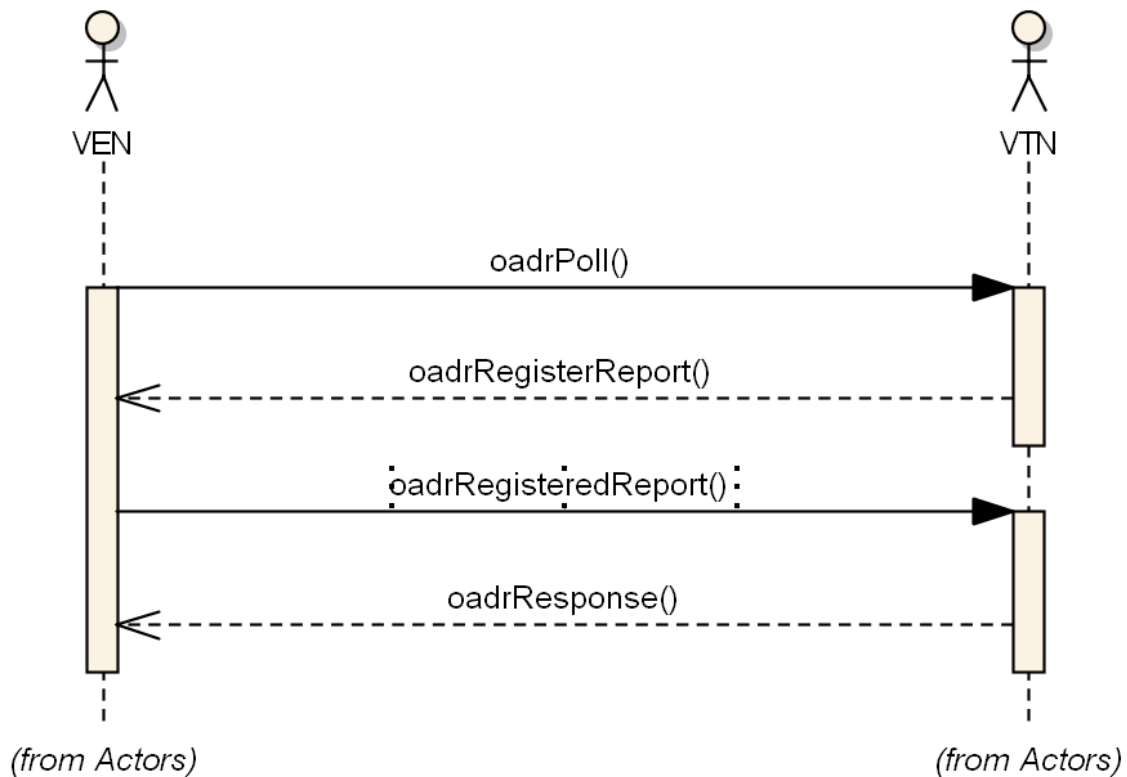
## 2.8. Default Reporting Sequence Diagrams

The following sequence diagrams illustrate the expected pull message exchange pattern for reporting service operations.

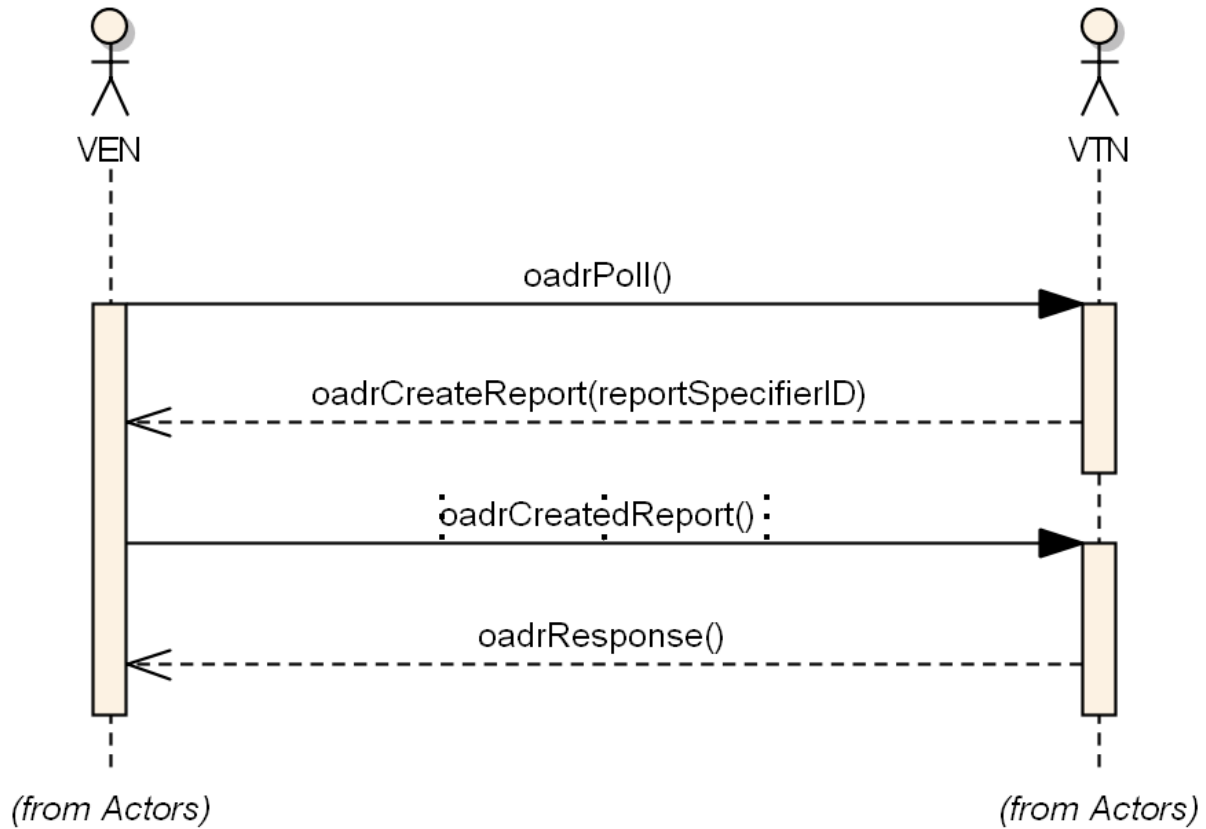
### 2.8.1. VEN Registers Reporting Capabilities



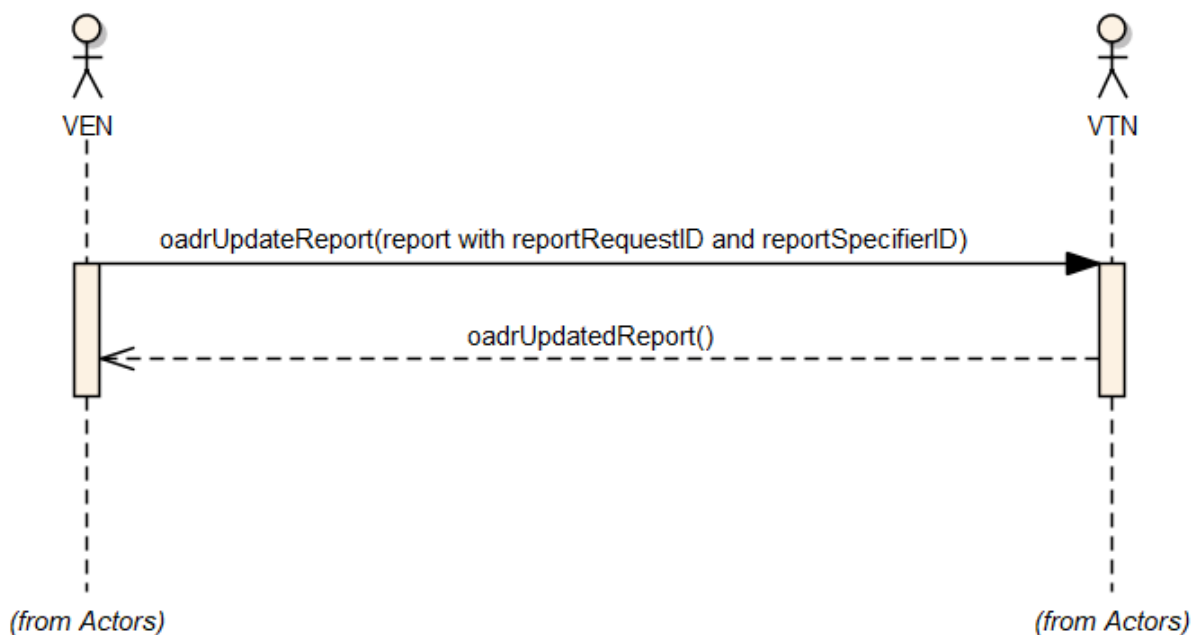
### 2.8.2. VTN Registers Reporting Capabilities



### 2.8.3. VTN Requests Report

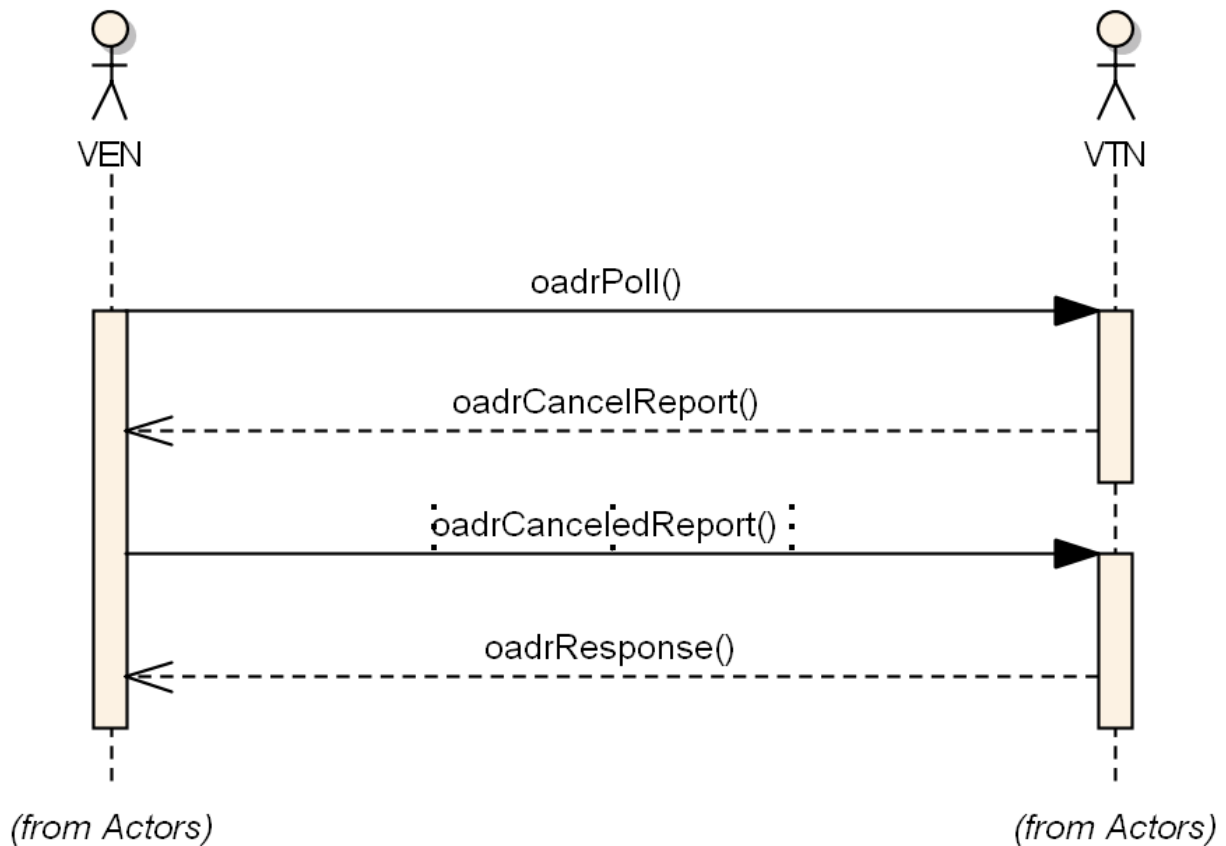


### 2.8.4. VEN Delivers Report





### 2.8.5. VTN Cancels Periodic Report



### 2.9. Default Error Codes

Unless specified otherwise in the use case definitions, the following application layer and HTTP response codes will be used.

#### Compliance Error Codes (Application Layer)

- 450 – Out of sequence (event ordering, uid ordering, modification number sequencing)
- 451 – Not Allowed (changing an event in the past)
- 452 – Invalid ID (eventID, optID, requestID, registrationID, etc.)
- 453 – Not recognized (reportName, signalName, etc.)
- 454 – Invalid Data (out of range signal or report data)
- Deployment Error Codes (Application Layer)
- 460 – Signal not supported (recognized, but not supported)
- 461 – Report not supported (recognized, but not supported)
- 462 – Target mismatch (cannot resolve target/ market context to VEN or its resources)
- 463 – Not registered/ Authorized

## HTTP Response Codes

- 200 OK – any response that the endpoint was able to handle completely and send a valid OpenADR response payload. This includes responses that may indicate an error at the application level.
- 404 Not Found – the VEN does not support requested operation. The requestor must not re-send the request.
- 406 Not Acceptable – If a payload is sent that does not validate against the EI schema, or if a request content-type is unsupported. The requestor must not re-send the request without first modifying it.

## 3. Use Case Descriptions

### 3.1. Load Dispatch Use Case

Load Dispatch Use Case Characteristic Table	
Characteristic	Description
Use Case Objective	Send power setpoint event to aggregator managing residential resources capable of modifying their load (or export) profile.
Description	Send day ahead LOAD_DISPATCH event signal targeted to one or many aggregators, with the aggregator managing the load profile of behind the meter batteries, water heaters, BYOD thermostats, and EV (Should this be separate use case?).
Customer Segment	Residential
Signaling end point	Aggregator
Benefit	<p>Utility – Manage load shaping for bulk market cost shifting, distribution level economic optimization, distribution operations support such as capacity relief. Includes signals to increase load during periods of abundant supply.</p> <p>Aggregator – Compensation by utility, added customer value increases sales Consumer-up front and recurring incentive compensation for grid support services - ??</p> <p>Customer experience – Batteries and HPWH are not allowed to override because of no customer experience impact. For EVs we are thinking of allowing a dozen overrides per year per customer due to potential compromises to EV use. Smart thermostat programs have also historically allowed for override.</p>
Target Load	Behind the meter batteries, water heaters, BYOD thermostats, and EV (V1G or throttled one way power flow or V2G throttled two-way power flow). In the case of load dispatch of EVs, the utility takes on responsibility of ensuring customer use of the EV is not compromised.

Event Signals	<p>Signal Name: LOAD_DISPATCH  Signal Type: Setpoint or Delta  SignalID: As defined in default data element formatting  Units: powerReal (W)  scaleCode "k"  powerAttribute Hertz: 60  powerAttribute, voltage: 110 or 220  powerAttribute, ac: True  SignalPayload: target setpoint value used to modify load. Positive value indicates consumption, negative value indicates generation.</p>
Custom Error Codes	None
Event Time Frames	<p>-Typically, events may be called 1 time per day, with limitations by season or year as defined in the program parameters  -Typically, a single multi-hour block per day.  -Notification between 1 day and 1 hour before start of event</p>
Event Randomization	Not Used. Omit tolerance element from payload or set tolerate to zero
Event Ramp Up / Recovery	Not Used. Omit x-eiRampUp and x-eiRecovery from payload or set duration to zero.
Event Baselines	Omit eiEventBaseline from payload
Event Opt Responses	See default Event Sequence diagram and associated narrative. ResponseRequired set to always
Event Targeting	<p>GroupID – VTN will create abstract groups by location or other constructs and send those to the VEN during registration.  venID (or blank) – all resources for the VEN and marketContext</p>
Event Signal Level Targeting	Omit from payload
Polling	1 minute polling?
Sequence Diagram	Default Event Sequence
Other	<p>Example – MarketContext: <a href="http://www.smud.org/load_dispatch/01">http://www.smud.org/load_dispatch/01</a>  Priority set to indicate which events VENs should give precedence to during their active time period, per OpenADR 2.0b Profile Conformance Rule 15.  Current Value – Omit from payload</p>

### 3.2. Time of Use Pricing Use Case

Time of Use Pricing Use Case	
Characteristic	Description
Use Case Objective	Notification of current TOU Tariff Rates
Description	SMUDs default rates are defined in annual Tariff sheets. Those should be converted to price signals and communicated to the VEN on a day ahead hourly basis.
Customer Segment	Residential?
Signaling end point	Facilitator/aggregator, who will in turn distribute pricing to SMUD customer resources
Benefit	<p>Utility: Lower system costs by increasing automated Load response to TOU rate, reducing peak, increasing beneficial off-peak load Precursor to future more dynamic pricing models.</p> <p>Customer: Manage costs through automating response to and awareness of electricity pricing</p>
Target Load	Any – Best effort program I assume
Event Signals	<p>Signal Name: x-ELECTRICITY_PRICE_TOU</p> <p>Signal Type: price</p> <p>Units: currencyPerKWh</p> <p>ItemDescription:currencyPerKWh</p> <p>ItemUnits: USD</p> <p>ScaleCode: none</p>
Event Time Frames	<p>-Typically, events may be called 1 times per day</p> <p>- Events start at midnight and end at midnight.</p> <p>- 23hr and 25hr event on Daylight Savings Transition Days.</p> <p>-Notification between 1 day and 1 hour before start of new day</p> <p>-24 hours of pricing values per event. one hour or multi-hour intervals of pricing values in signal. In later phases, individual interval length could be arbitrary.</p>
Event Randomization	None
Event Ramp Up / Recovery	None
Event Baselines	None
Event Opt Responses	VEN to provide a mandatory opt-in as a confirmation signal that they received the event.

Event Targeting	GroupID – VTN will create abstract groups by location or other constructs and send those to the VEN during registration. venID (or blank) – all resources for the VEN and marketContext
Event Signal Level Targeting	None
Polling	1 minute polling?
Sequence Diagram	Default Event Sequence
Other	Example - MarketContext: <a href="http://www.smud.org/tou/01">http://www.smud.org/tou/01</a> Priority set to indicate which events VENS should give precedence to during their active time period, per OpenADR 2.0b Profile Conformance Rule 15 Current Value – Omit from payload

### 3.3. Day Ahead Hourly Pricing Use Case

Day Ahead Hourly Pricing	
Characteristic	Description
Use Case Objective	Notification of day ahead hourly pricing
Description	Provide event notification of next day's pricing on a day ahead hourly basis. Price changes are a function of wholesale market pricing or the situational use of short-term price differentials to influence customer load use behavior.
Customer Segment	Residential?
Signaling end point	Facilitator/aggregator, who will in turn distribute pricing to SMUD customer resources
Benefit	Utility: Shape load via price, optimizing generation costs, defer T&D upgrades Customer: Manage costs through pricing awareness?
Target Load	Any – Best effort program I assume
Event Signals	Signal Name: ELECTRICITY_PRICE_HOURLY Signal Type: price Units: currencyPerKWh ItemDescription:currencyPerKWh ItemUnits: USD ScaleCode: none
Event Time Frames	-Typically, events may be called 1 times per day - Events start at midnight and end at midnight. - 23hr and 25hr event on Daylight Savings Transition Days. -Notification between 1 day and 1 hour before start of new day -24 hours of pricing values per event. one hour or multi-hour intervals of pricing values in the signal. In later phases, individual interval length could be arbitrary.
Event Randomization	None
Event Ramp Up / Recovery	None
Event Baselines	None
Event Opt Responses	VEN to provide a mandatory opt-in as a confirmation signal that they received the event.
Event Targeting	GroupID – VTN will create abstract groups by location or other constructs and send those to the VEN during registration. venID (or blank) – all resources for the VEN and marketContext
Event Signal Level Targeting	None

Polling	1 minute polling?
Sequence Diagram	Default Event Sequence
Other	Example - MarketContext: <a href="http://www.smud.org/day_ahead_hourly/01">http://www.smud.org/day_ahead_hourly/01</a> Priority set to indicate which events VENS should give precedence to during their active time period, per OpenADR 2.0b Profile Conformance Rule 15. Current Value – Omit from payload



### 3.4. Peak Price Event Use Case

Peak Price Event Use Case	
Characteristic	Description
Use Case Objective	Notification of peak price events
Description	Provide event notification of peak price events
Customer Segment	Residential
Signaling end point	Aggregator
Benefit	Utility: Load reduction in times of stress, economic or capacity Customer: reduction in rates during non-peak time frames?
Target Load	Any
Event Signals	Signal Name: ELECTRICITY_PRICE_PEAK Signal Type: price Units: currencyPerKWh ItemDescription:currencyPerKWh ItemUnits: USD ScaleCode: none
Event Time Frames	-Typically, events may be called 1 times per day, with limitations by season or year as defined in the program parameters -Event duration from one-to-many hours. - Price signal intervals are full hour increments. Sub-hour increments could be addressed in future phases. -Notification between 1 day and 1 hour before start of event. - Event periods are intra-day. And can start at any hour of the day.
Event Randomization	None
Event Ramp Up / Recovery	None
Event Baselines	None
Event Opt Responses	VEN to provide a mandatory opt-in as a confirmation signal that they received the event.
Event Targeting	GroupID – VTN will create abstract groups by location or other constructs and send those to the VEN during registration. venID (or blank) – all resources for the VEN and marketContext
Event Signal Level Targeting	None
Polling	1 minute polling?
Sequence Diagram	Default Event Sequence

Other	Example - MarketContext: <a href="http://www.smud.org/peak_price/01">http://www.smud.org/peak_price/01</a> Priority set to indicate which events VENS should give precedence to during their active time period, per OpenADR 2.0b Profile Conformance Rule 15. Current Value – Omit from payload

### 3.5. Energy Metering Reporting Use Case

Energy Metering Use Case	
Characteristic	Description
Use Case Objective	Telemetry feedback of energy consumption or generation
Description	<p>Use OpenADRs' reporting service to gather supplementary consumption or generation data beyond that gathered via the AMI network.</p> <p>Report sampling rate for Energy Metering expected to be 15-minute intervals.</p>
Customer Segment	Residential
Signaling end point	Aggregator
Benefit	Additional data for analytics and DERMS forecasting. Potentially used for settlement in future program design.
Report Description	<p><b>Aggregate report for all resources associated with VEN or groupID</b></p> <ul style="list-style-type: none"> <li>• Report Name: TELEMETRY_USAGE</li> <li>• Report Type: usage</li> <li>• Reading Type: Direct Read</li> <li>• Units: powerReal (W)</li> <li>• scaleCode "k"</li> <li>• powerAttribute Hertz: 60</li> <li>• powerAttribute, voltage: 110 or 220</li> <li>• powerAttribute, ac: True</li> <li>• samplingRate: Deployment specific</li> <li>• reportDataSource: venID or groupID</li> </ul> <p><b>Resource specific reporting</b></p> <ul style="list-style-type: none"> <li>• Report Name: x-TELEMETRY_RESOURCE</li> <li>• Report Type: usage</li> <li>• Reading Type: Direct Read</li> <li>• Units: powerReal (W)</li> <li>• scaleCode "k"</li> <li>• powerAttribute Hertz: 60</li> <li>• powerAttribute, voltage: 110 or 220</li> <li>• powerAttribute, ac: True</li> <li>• samplingRate: Deployment specific</li> <li>• reportDataSource – Omit from payload</li> </ul>

Report Data Points (rid)	<p><b>Positive value indicates consumption, negative value indicates generation</b></p> <p>TELEMETRY_USAGE - As defined in default data element formatting</p> <p>Example: TELEMETRY_USAGE_powerReal</p> <p>x-TELEMETRY_RESOURCE – The rid will include the resourceID of the data source from which the data was derived. Format as defined in default data element formatting.</p> <p>Example: TELEMETRY_RESOURCE_powerReal_Resource123</p>
Report Request Characteristics	<ul style="list-style-type: none"> <li>-Periodic report</li> <li>-dtStart = current time</li> <li>-duration: 0 (open ended)</li> <li>-reportBackDuration and granularity: Values should be equal and should be within the supported samplingRate, but not less than 1 report per minute</li> </ul>
Polling	Bounded by event polling requirements as requested by the VTN
Sequence Diagram	Refer to default reporting sequence diagrams
Other	MarketContext required – value program dependent

### 3.7 Status Reporting Use Case

Status Use Case	
Characteristic	Description
Use Case Objective	Situational awareness of resource online status, and energy state relevant to storage-based DER such as Electric Vehicles and Battery Storage (primary use case)
Description	<p>Report DER online status periodically to upstream entities so that they are aware of the resource availability to receive event signals</p> <p>For storage resources only, report DER charge state periodically to upstream entities so that they are aware of the current charge state of the resource in order to forecast event response potential</p> <p>Report sampling rate for Status telemetry expected to be 15-minute intervals.</p>
Customer Segment	Residential
Signaling end point	Aggregator
Benefit	Gives the utility the ability to forecast the aggregate load responsiveness for use as a distribution operations management tool or market participating resource, or load forecast modifier.
Target Load	Battery
Reports	<p><b>Resource specific reporting</b></p> <ul style="list-style-type: none"> <li>• Report Name: TELEMETRY_STATUS</li> <li>• Report Type: x-resourceStatus</li> <li>• Reading Type: x-notApplicable</li> <li>• Units: N/A</li> <li>• samplingRate: Deployment specific</li> <li>• reportDataSource – Omit from payload</li> </ul>

Report Data Points	<p>The TELEMETRY_STATUS rid will include the resourceID of the battery system from which the data was derived. Format as defined in default data element formatting.</p> <p>Example: TELEMETRY_STATUS_Resource123</p> <p>These mandatory oadrPayloadResourceStatus elements will be included in oadrUpdateReport payloads for all resources:</p> <ul style="list-style-type: none"> <li>• oadrOnline – True/False, whether asset is online</li> <li>• oadrManualOverride – True/False, whether control of the asset has been manually overridden.</li> </ul> <p>The following additional oadrPayloadResourceStatus elements will be included in oadrUpdateReport payloads only for resources with fixed energy storage limitations, e.g. batteries and V2G:</p> <ul style="list-style-type: none"> <li>• oadrLoadControlState:oadsoadrSetPoint:oadrMax – Maximum battery system capacity in kWh</li> <li>• oadrLoadControlState:oadrSetPoint:oadrMin – Minimum battery system capacity in kWh</li> <li>• oadrLoadControlState:oadrSetPoint:oadrCurrent – Current charge state as a percentage of maximum capacity</li> </ul> <p>Reporting data points will map to specific battery systems where name plate max/min capacity and current percentage charge state can be used to calculate potential load response</p> <p>Note aggregation of potential load response across multiple battery systems will need to be done at the VTN application layer (i.e., by the aggregator). A VEN may be associated with one or more battery systems.</p> <p>The TELEMETRY_STATUS report uses the x-resourceStatus object which does not include specification for units of measure so VENs and VTNs must establish a common understanding of units for values included in oadrUpdateReport payloads.</p>
Report Request Characteristics	<p>-Periodic report</p> <p>-dtStart = current time</p> <p>-duration: 0 (open ended)</p> <p>-reportBackDuration and granularity: Values should be equal and should be within the supported samplingRate, but not less than 1 report per minute</p>
Polling	Bounded by event polling requirements as requested by the VTN
Sequence Diagram	Refer to telemetry status reporting sequence diagrams
Other	MarketContext required – value program dependent



### 3.8 Capability Forecast Reporting Use Case

This use case requires the dynamic grouping functionality described in Appendix D and summarized in section 2.4.

<b>Capability Forecast Reporting Use Case</b>	
<b>Characteristic</b>	<b>Description</b>
Use Case Objective	Receive a rolling forecast of the aggregated load flexibility so that the upstream VTN's application layer is aware of how much load shed or generation can be dispatched up to 48hrs in the future.
Description	<p>Hourly Capabilities reports for the groups and program aggregations will contain data indicating the VEN ability to sustain a level of load shed (or generation over 1,2,3 or 4-hour windows. The report will contain 48 one-hour intervals forecasts. The report structure will allow the VEN to include datapoints for any combination of the 4 durations, which it supports. Group or program level events may be dispatched to achieve the power response for a given duration provided in the corresponding capabilities report</p> <p>Depending on the program design, this reported load flexibility will represent either a delta from forecasted normal operations unique to each program, or an absolute resource setpoint.</p> <p>For instance, if the forecasted normal operations are 100KW and the minimum operational level is 70KW, then the interval value in reports of deltaUsage type would be -30KW, indicating that the VEN can shed from 0 to 30KW of load over the give window (1 to 4 hours). The interval value in reports of Usage type would be +70kW indicating that the VEN can operate the resource to consume 70kW.</p>
Customer Segment	Residential
Signaling end point	Aggregator
Benefit	Reference point for more accurate estimates of potential load flexibility
Target Load	Any



Reports	<p><b>Reports must contain 48 one-hour intervals reflecting the next 48 hours of forecasted load flexibility as a delta from forecasted normal operations or an absolute resource setpoint.</b></p> <p><b>Aggregate Forecast for all resources associated with the VEN and marketContext</b></p> <ul style="list-style-type: none"> <li>• Report Name: x-AGGREGATE_CAPABILITY_FORECAST</li> <li>• Report Type: deltaUsage or Usage</li> <li>• Reading Type: x-notApplicable</li> <li>• Units: powerReal (W)</li> <li>• scaleCode “k”</li> <li>• powerAttribute Hertz: 60</li> <li>• powerAttribute, voltage: 110 or 220</li> <li>• powerAttribute, ac: True</li> <li>• samplingRate: PT1H</li> <li>• reportDataSource: venID</li> <li>• reportSpecifiedID: [report name]_[venID]</li> </ul> <p><b>Group specific forecast reporting</b></p> <ul style="list-style-type: none"> <li>• Report Name: x-GROUP_CAPABILITY_FORECAST</li> <li>• Report Type: deltaUsage or Usage</li> <li>• Reading Type: x-notApplicable</li> <li>• Units: powerReal (W)</li> <li>• scaleCode “k”</li> <li>• powerAttribute Hertz: 60</li> <li>• powerAttribute, voltage: 110 or 220</li> <li>• powerAttribute, ac: True</li> <li>• samplingRate: PT1H</li> <li>• reportDataSource – groupID</li> <li>• reportSpecifiedID: [report name]_[groupID]</li> </ul> <p>The VEN will offer one report for each group, with just that group’s groupID in the reportDataSource element</p>
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Report Data Points	<p>The post fixes “_MAX” and “_MIN” will used respectively on “rid” names to indicate load generation and load shed flexibility. Forecast values in oadrUpdateReport payloads will be signed floats.</p> <p><b>For deltaUsage Report Type values, positive values indicate a net consumption increase and negative values a net consumption decrease, either of which could represent a charge or discharge of the resource.</b></p> <p><b>For Usage Report Type values, positive values indicate an absolute consumption amount by the resource and negative values indicate an absolute generation amount by the resource.</b></p> <p>The x-AGGREGATE_CAPABILITY_FORECAST report will use the following well-known “rid” values:</p> <p>AGGREGATE_FORECAST_powerReal_OneHourWindow_MAX  AGGREGATE_FORECAST_powerReal_OneHourWindow_MIN  AGGREGATE_FORECAST_powerReal_TwoHourWindow_MAX  AGGREGATE_FORECAST_powerReal_TwoHourWindow_MIN  AGGREGATE_FORECAST_powerReal_ThreeHourWindow_MAX  AGGREGATE_FORECAST_powerReal_ThreeHourWindow_MIN  AGGREGATE_FORECAST_powerReal_FourHourWindow_MAX  AGGREGATE_FORECAST_powerReal_FourHourWindow_MIN</p> <p>The x-GROUP_CAPABILITY_FORECAST report will use the following well-known “rid” values:</p> <p>GROUP_FORECAST_powerReal_OneHourWindow_MAX  GROUP_FORECAST_powerReal_OneHourWindow_MIN  GROUP_FORECAST_powerReal_TwoHourWindow_MAX  GROUP_FORECAST_powerReal_TwoHourWindow_MIN  GROUP_FORECAST_powerReal_ThreeHourWindow_MAX  GROUP_FORECAST_powerReal_ThreeHourWindow_MIN  GROUP_FORECAST_powerReal_FourHourWindow_MAX  GROUP_FORECAST_powerReal_FourHourWindow_MIN</p> <p>VEN’s need only offer data points for time windows they support. Furthermore, if there is no available load shed or generation capability for a given time window over the 48 hours, there is no need to include that data point in the report. Example: A VEN has not generation capacity for the next 48 hours, therefore you could exclude all of the data points (rid values that end with “_MIN”).</p>
--------------------	---

Report Request Characteristics	-Periodic report -dtStart = 6 hours before 24 hour forecasted time frame -duration: 0 (open ended) -reportBackDuration: 48 -granularity: 1 hour
Report Time Frames:	Although the report request outlined above would normally cause the VEN to publish an updateReport once every 48 hours that contains 48 one hour intervals, this use case requires some special handling by the VEN. The VEN will be required to send an updateReport once an hour containing a rolling forecast of 48 one-hour intervals. This is allowed per OpenADR conformance rule 346.
Report Data Source	Refer to Appendix B for the usage model for reportDataSource
Polling	Bounded by event polling requirements as requested by the VTN
Sequence Diagram	Refer to telemetry status reporting sequence diagrams
Other	MarketContext required – value program dependent

### 3.9 Operational Forecast Reporting Use Case (NEW)

<b>Operational Forecast Reporting Use Case</b>	
<b>Characteristic</b>	<b>Description</b>
Use Case Objective	Receive a forecast of the aggregated resource load utilization or generation taking into account planned price and event optimizations and other operational considerations so that the upstream VTN's application layer is aware of how much load utilization is likely to occur over the reporting period.
Description	The VENs will offer a day ahead report containing 24 one hour intervals which represent the forecast for aggregated average load utilization or generation for the resources associated with the VTN over the duration of each interval. This load utilization will represent the normal operation state taking into account planned event participation and other operational considerations.
Customer Segment	Residential
Signaling end point	Aggregator
Benefit	Reference point for more accurate estimates of load utilization
Target Load	Any

Reports	<p><b>Reports must contain 24 one-hour intervals reflecting the next calendar days forecasted load utilization.</b></p> <p><b>Aggregate Forecast for all resources associated with the VEN and marketContext</b></p> <ul style="list-style-type: none"> <li>• Report Name: x-AGGREGATE_OPERATIONAL_FORECAST</li> <li>• Report Type: Usage</li> <li>• Reading Type: x-notApplicable</li> <li>• Units: powerReal (W)</li> <li>• scaleCode “k”</li> <li>• powerAttribute Hertz: 60</li> <li>• powerAttribute, voltage: 110 or 220</li> <li>• powerAttribute, ac: True</li> <li>• samplingRate: PT1H</li> <li>• reportDataSource: venID</li> <li>• reportSpecifiedID: [report name]_[venID]</li> </ul> <p><b>Group specific forecast reporting</b></p> <ul style="list-style-type: none"> <li>• Report Name: x-GROUP_OPERATIONAL_FORECAST</li> <li>• Report Type: Usage</li> <li>• Reading Type: x-notApplicable</li> <li>• Units: powerReal (W)</li> <li>• scaleCode “k”</li> <li>• powerAttribute Hertz: 60</li> <li>• powerAttribute, voltage: 110 or 220</li> <li>• powerAttribute, ac: True</li> <li>• samplingRate: PT1H</li> <li>• reportDataSource – groupID</li> <li>• reportSpecifiedID: [report name]_[groupID]</li> </ul>
Report Data Points	<p>Positive value indicates consumption, negative value indicates generation by the resource.</p> <p>x-AGGREGATE_OPERATIONAL_FORECAST - As defined in default data element formatting</p> <p style="padding-left: 40px;">Example AGGREGATE_OPERATIONAL_FORECAST_powerReal</p> <p>x-GROUP_OPERATIONAL_FORECAST – The rid will include the GroupID of the data source from the forecast applies. Format as defined in default data element formatting.</p> <p style="padding-left: 40px;">Example: GROUP_OPERATIONAL_FORECAST_powerReal_Group123</p>

Report Request Characteristics	<ul style="list-style-type: none"> <li>-Periodic report</li> <li>-dtStart = 6 hours before 24 hour forecasted time frame</li> <li>-duration: 0 (open ended)</li> <li>-reportBackDuration: every 24 hours</li> <li>-granularity: 1 hour</li> </ul>
Report Time Frames	Although the report request outlined above would normally cause the VEN to publish an updateReport once every 24 hours that contains 24 one hour intervals, this use case requires some special handling by the VEN. The VEN will be required to send an updateReport once an hour containing a rolling operational forecast of 24 one-hour intervals. This is allowed per OpenADR conformance rule 346.
Polling	Bounded by event polling requirements as requested by the VTN
Sequence Diagram	Refer to telemetry status reporting sequence diagrams
Other	MarketContext required – value program dependent

## 4 Sample Payloads

### 4.1 Load Dispatch Use Case – Sample XML

oadrDistributeEvent Payload (Load Dispatch Use Case)

```

1. <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2. <ns7:oadrPayload xmlns="http://www.w3.org/2000/09/xmldsig#" xmlns:ns10="http://www.opengis.net/gml
   /3.2" xmlns:ns11="http://docs.oasis-
   open.org/ns/emix/2011/06/siscale" xmlns:ns12="http://www.w3.org/2009/xmldsig11#" xmlns:ns13="urn:u
   n:unece:uncefact:odelist:standard:5:ISO42173A:2010-04-07" xmlns:ns2="http://docs.oasis-
   open.org/ns/energyinterop/201110" xmlns:ns3="http://docs.oasis-
   open.org/ns/energyinterop/201110/payloads" xmlns:ns4="http://docs.oasis-
   open.org/ns/emix/2011/06" xmlns:ns5="urn:ietf:params:xml:ns:icalendar-
   2.0" xmlns:ns6="urn:ietf:params:xml:ns:icalendar-2.0:stream" xmlns:ns7="http://openadr.org/oadr-
   2.0b/2012/07" xmlns:ns8="http://www.w3.org/2005/Atom" xmlns:ns9="http://docs.oasis-
   open.org/ns/emix/2011/06/power" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
3.   <ns7:oadrSignedObject>
4.     <ns7:oadrDistributeEvent ns2:schemaVersion="2.0b">
5.       <ns2:eiResponse>
6.         <ns2:responseCode>200</ns2:responseCode>
7.         <ns2:responseDescription>OK</ns2:responseDescription>
8.         <ns3:requestID/>
9.       </ns2:eiResponse>
10.      <ns3:requestID>requestID_12345</ns3:requestID>
11.      <ns2:vtnID>vtnID_CompanyName_1234</ns2:vtnID>
12.      <ns7:oadrEvent>
13.        <ns2:eiEvent>
14.          <ns2:eventDescriptor>
15.            <ns2:eventID>eventID_1234</ns2:eventID>
16.            <ns2:modificationNumber>0</ns2:modificationNumber>
17.            <ns2:modificationDateTime>2020-09-30T18:58:32Z</ns2:modificationDateTime>
18.            <ns2:priority>1</ns2:priority>
19.            <ns2:eiMarketContext>
20.              <ns4:marketContext>http://MarketContext1</ns4:marketContext>
21.            </ns2:eiMarketContext>
22.            <ns2:createdDateTime>2020-09-30T18:58:31Z</ns2:createdDateTime>
23.            <ns2:eventStatus>far</ns2:eventStatus>
24.            <ns2:testEvent>false</ns2:testEvent>
25.            <ns2:vtnComment>Sample Payload</ns2:vtnComment>
26.          </ns2:eventDescriptor>
27.          <ns2:eiActivePeriod>
28.            <ns5:properties>
29.              <ns5:dtstart>
30.                <ns5:date-time>2020-09-30T18:59:32Z</ns5:date-time>
31.              </ns5:dtstart>
32.              <ns5:duration>
33.                <ns5:duration>PT4H</ns5:duration>
34.              </ns5:duration>
35.              <ns2:x-eiNotification>
36.                <ns5:duration>PT24H</ns5:duration>
37.              </ns2:x-eiNotification>
38.            </ns5:properties>
39.            <ns5:components/>
40.          </ns2:eiActivePeriod>
41.          <ns2:eiEventSignals>
42.            <ns2:eiEventSignal>

```

```

43.         <ns6:intervals>
44.             <ns2:interval>
45.                 <ns5:duration>
46.                     <ns5:duration>PT4H</ns5:duration>
47.                 </ns5:duration>
48.                 <ns5:uid>
49.                     <ns5:text>0</ns5:text>
50.                 </ns5:uid>
51.                 <ns2:signalPayload>
52.                     <ns2:payloadFloat>
53.                         <ns2:value>40.0</ns2:value>
54.                     </ns2:payloadFloat>
55.                 </ns2:signalPayload>
56.             </ns2:interval>
57.         </ns6:intervals>
58.         <ns2:signalName>LOAD_DISPATCH</ns2:signalName>
59.         <ns2:signalType>setpoint</ns2:signalType>
60.         <ns2:signalID>LOAD_DISPATCH_01</ns2:signalID>
61.         <ns9:powerReal>
62.             <ns9:itemDescription>RealPower</ns9:itemDescription>
63.             <ns9:itemUnits>W</ns9:itemUnits>
64.             <ns11:siScaleCode>k</ns11:siScaleCode>
65.             <ns9:powerAttributes>
66.                 <ns9:hertz>0.0</ns9:hertz>
67.                 <ns9:voltage>0.0</ns9:voltage>
68.                 <ns9:ac>true</ns9:ac>
69.             </ns9:powerAttributes>
70.         </ns9:powerReal>
71.     </ns2:eiEventSignal>
72. </ns2:eiEventSignals>
73. <ns2:eiTarget>
74.     <ns2:groupID>group_1234</ns2:groupID>
75. </ns2:eiTarget>
76. </ns2:eiEvent>
77.     <ns7:oadrResponseRequired>always</ns7:oadrResponseRequired>
78. </ns7:oadrEvent>
79. </ns7:oadrDistributeEvent>
80. </ns7:oadrSignedObject>
81. </ns7:oadrPayload>

```





## 4.2 Time of Use and Day Ahead Hourly Price Use Cases – Sample XML

oadrDistributeEvent Payload (Time of Use and Day Ahead Hourly Price Use Cases)

```

1. <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2. <ns2:oadrPayload xmlns="http://www.w3.org/2000/09/xmldsig#" xmlns:ns2="http://openadr.org/oadr-
   2.0b/2012/07" xmlns:ns3="http://docs.oasis-
   open.org/ns/energyinterop/201110" xmlns:ns4="http://docs.oasis-
   open.org/ns/energyinterop/201110/payloads" xmlns:ns5="urn:ietf:params:xml:ns:icalendar-
   2.0" xmlns:ns6="http://docs.oasis-
   open.org/ns/emix/2011/06" xmlns:ns7="urn:ietf:params:xml:ns:icalendar-
   2.0:stream" xmlns:ns8="http://www.w3.org/2005/Atom" xmlns:ns9="http://docs.oasis-
   open.org/ns/emix/2011/06/power" xmlns:ns10="http://www.opengis.net/gml/3.2" xmlns:ns11="http://doc
   s.oasis-
   open.org/ns/emix/2011/06/siscale" xmlns:ns12="http://www.w3.org/2009/xmldsig11#" xmlns:ns13="http:
   //openadr.org/oadr-2.0b/2012/07/xmldsig-
   properties" xmlns:ns14="urn:un:uncefact:codelist:standard:5:ISO42173A:2010-04-
   07" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
3.   <ns2:oadrSignedObject>
4.     <ns2:oadrDistributeEvent ns3:schemaVersion="2.0b">
5.       <ns3:eiResponse>
6.         <ns3:responseCode>200</ns3:responseCode>
7.         <ns3:responseDescription>OK</ns3:responseDescription>
8.         <ns4:requestID>683efed865b6f6a4603e</ns4:requestID>
9.       </ns3:eiResponse>
10.      <ns4:requestID>requestID_12345</ns4:requestID>
11.      <ns3:vtnID>vtnID_CompanyName_1234</ns3:vtnID>
12.      <ns2:oadrEvent>
13.        <ns3:eiEvent>
14.          <ns3:eventDescriptor>
15.            <ns3:eventID>eventID_1234</ns3:eventID>
16.            <ns3:modificationNumber>0</ns3:modificationNumber>
17.            <ns3:modificationReason/>
18.            <ns3:priority>0</ns3:priority>
19.            <ns3:eiMarketContext>
20.              <ns6:marketContext>http://MarketContext1</ns6:marketContext>
21.            </ns3:eiMarketContext>
22.            <ns3:createdDateTime>2020-01-15T23:24:06Z</ns3:createdDateTime>
23.            <ns3:eventStatus>far</ns3:eventStatus>
24.            <ns3:testEvent>false</ns3:testEvent>
25.            <ns3:vtnComment>Test TOU</ns3:vtnComment>
26.          </ns3:eventDescriptor>
27.          <ns3:eiActivePeriod>
28.            <ns5:properties>
29.              <ns5:dtstart>
30.                <ns5:date-time>2020-10-31T00:00:00Z</ns5:date-time>
31.              </ns5:dtstart>
32.              <ns5:duration>
33.                <ns5:duration>PT1440M</ns5:duration>
34.              </ns5:duration>
35.              <ns3:x-eiNotification>
36.                <ns5:duration>PT0M</ns5:duration>
37.              </ns3:x-eiNotification>
38.            </ns5:properties>
39.            <ns5:components/>
40.          </ns3:eiActivePeriod>
41.          <ns3:eiEventSignals>
42.            <ns3:eiEventSignal>
43.              <ns7:intervals>

```

```

44.         <ns3:interval>
45.             <ns5:duration>
46.                 <ns5:duration>PT720M</ns5:duration>
47.             </ns5:duration>
48.             <ns5:uid>
49.                 <ns5:text>0</ns5:text>
50.             </ns5:uid>
51.             <ns3:signalPayload>
52.                 <ns3:payloadFloat>
53.                     <ns3:value>0.149</ns3:value>
54.                 </ns3:payloadFloat>
55.             </ns3:signalPayload>
56.         </ns3:interval>
57.         <ns3:interval>
58.             <ns5:duration>
59.                 <ns5:duration>PT300M</ns5:duration>
60.             </ns5:duration>
61.             <ns5:uid>
62.                 <ns5:text>1</ns5:text>
63.             </ns5:uid>
64.             <ns3:signalPayload>
65.                 <ns3:payloadFloat>
66.                     <ns3:value>0.192</ns3:value>
67.                 </ns3:payloadFloat>
68.             </ns3:signalPayload>
69.         </ns3:interval>
70.         <ns3:interval>
71.             <ns5:duration>
72.                 <ns5:duration>PT180M</ns5:duration>
73.             </ns5:duration>
74.             <ns5:uid>
75.                 <ns5:text>2</ns5:text>
76.             </ns5:uid>
77.             <ns3:signalPayload>
78.                 <ns3:payloadFloat>
79.                     <ns3:value>0.265</ns3:value>
80.                 </ns3:payloadFloat>
81.             </ns3:signalPayload>
82.         </ns3:interval>
83.         <ns3:interval>
84.             <ns5:duration>
85.                 <ns5:duration>PT240M</ns5:duration>
86.             </ns5:duration>
87.             <ns5:uid>
88.                 <ns5:text>3</ns5:text>
89.             </ns5:uid>
90.             <ns3:signalPayload>
91.                 <ns3:payloadFloat>
92.                     <ns3:value>0.192</ns3:value>
93.                 </ns3:payloadFloat>
94.             </ns3:signalPayload>
95.         </ns3:interval>
96.     </ns7:intervals>
97.     <ns3:signalName>ELECTRICITY_PRICE</ns3:signalName>
98.     <ns3:signalType>price</ns3:signalType>
99.     <ns3:signalID>ELECTRICITY_PRICE_01</ns3:signalID>
100.    <ns2:currencyPerKWh>
101.        <ns2:itemDescription>currencyPerKWh</ns2:itemDescription>
102.        <ns2:itemUnits>USD</ns2:itemUnits>
103.        <ns11:siScaleCode>none</ns11:siScaleCode>
104.    </ns2:currencyPerKWh>

```

```
105.         </ns3:eiEventSignal>
106.         </ns3:eiEventSignals>
107.         <ns3:eiTarget>
108.             <ns3:groupID>group_1234</ns3:groupID>
109.         </ns3:eiTarget>
110.     </ns3:eiEvent>
111.     <ns2:oadrResponseRequired>always</ns2:oadrResponseRequired>
112. </ns2:oadrEvent>
113. </ns2:oadrDistributeEvent>
114. </ns2:oadrSignedObject>
115.</ns2:oadrPayload>
```

### 4.3 Peak Price Event Use Case – Sample XML

oadrDistributeEvent Payload (Peak Price Event Use Case)

```

1. <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2. <ns2:oadrPayload xmlns="http://www.w3.org/2000/09/xmldsig#" xmlns:ns2="http://openadr.org/oadr-
   2.0b/2012/07" xmlns:ns3="http://docs.oasis-
   open.org/ns/energyinterop/201110" xmlns:ns4="http://docs.oasis-
   open.org/ns/energyinterop/201110/payloads" xmlns:ns5="urn:ietf:params:xml:ns:icalendar-
   2.0" xmlns:ns6="http://docs.oasis-
   open.org/ns/emix/2011/06" xmlns:ns7="urn:ietf:params:xml:ns:icalendar-
   2.0:stream" xmlns:ns8="http://www.w3.org/2005/Atom" xmlns:ns9="http://docs.oasis-
   open.org/ns/emix/2011/06/power" xmlns:ns10="http://www.opengis.net/gml/3.2" xmlns:ns11="http://doc
   s.oasis-
   open.org/ns/emix/2011/06/siscale" xmlns:ns12="http://www.w3.org/2009/xmldsig11#" xmlns:ns13="http:
   //openadr.org/oadr-2.0b/2012/07/xmldsig-
   properties" xmlns:ns14="urn:un:uncefact:codelist:standard:5:ISO42173A:2010-04-
   07" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
3.   <ns2:oadrSignedObject>
4.     <ns2:oadrDistributeEvent ns3:schemaVersion="2.0b">
5.       <ns3:eiResponse>
6.         <ns3:responseCode>200</ns3:responseCode>
7.         <ns3:responseDescription>OK</ns3:responseDescription>
8.         <ns4:requestID>683efed865b6f6a4603e</ns4:requestID>
9.       </ns3:eiResponse>
10.      <ns4:requestID> requestID_12345</ns4:requestID>
11.      <ns3:vtnID> vtnID_CompanyName_1234</ns3:vtnID>
12.      <ns2:oadrEvent>
13.        <ns3:eiEvent>
14.          <ns3:eventDescriptor>
15.            <ns3:eventID> eventID_1234</ns3:eventID>
16.            <ns3:modificationNumber>0</ns3:modificationNumber>
17.            <ns3:modificationReason/>
18.            <ns3:priority>0</ns3:priority>
19.            <ns3:eiMarketContext>
20.              <ns6:marketContext>http://MarketContext</ns6:marketContext>
21.            </ns3:eiMarketContext>
22.            <ns3:createdDateTime>2020-10-30T18:25:40Z</ns3:createdDateTime>
23.            <ns3:eventStatus>far</ns3:eventStatus>
24.            <ns3:testEvent>false</ns3:testEvent>
25.            <ns3:vtnComment>Test TOU</ns3:vtnComment>
26.          </ns3:eventDescriptor>
27.          <ns3:eiActivePeriod>
28.            <ns5:properties>
29.              <ns5:dtstart>
30.                <ns5:date-time>2020-10-31T10:00:00Z</ns5:date-time>
31.              </ns5:dtstart>
32.              <ns5:duration>
33.                <ns5:duration>PT120M</ns5:duration>
34.              </ns5:duration>
35.              <ns3:x-eiNotification>
36.                <ns5:duration>PT0M</ns5:duration>
37.              </ns3:x-eiNotification>
38.            </ns5:properties>
39.            <ns5:components/>
40.          </ns3:eiActivePeriod>
41.          <ns3:eiEventSignals>
42.            <ns3:eiEventSignal>
43.              <ns7:intervals>

```

```

44.         <ns3:interval>
45.             <ns5:duration>
46.                 <ns5:duration>PT120M</ns5:duration>
47.             </ns5:duration>
48.             <ns5:uid>
49.                 <ns5:text>0</ns5:text>
50.             </ns5:uid>
51.             <ns3:signalPayload>
52.                 <ns3:payloadFloat>
53.                     <ns3:value>0.149</ns3:value>
54.                 </ns3:payloadFloat>
55.             </ns3:signalPayload>
56.         </ns3:interval>
57.     </ns7:intervals>
58.     <ns3:signalName>ELECTRICITY_PRICE</ns3:signalName>
59.     <ns3:signalType>price</ns3:signalType>
60.     <ns3:signalID>ELECTRICITY_PRICE_01</ns3:signalID>
61.     <ns2:currencyPerKWh>
62.         <ns2:itemDescription>currencyPerKWh</ns2:itemDescription>
63.         <ns2:itemUnits>USD</ns2:itemUnits>
64.         <ns11:siScaleCode>none</ns11:siScaleCode>
65.     </ns2:currencyPerKWh>
66. </ns3:eiEventSignal>
67. </ns3:eiEventSignals>
68. <ns3:eiTarget>
69.     <ns3:groupID>group_4342</ns3:groupID>
70. </ns3:eiTarget>
71. </ns3:eiEvent>
72.     <ns2:oadrResponseRequired>always</ns2:oadrResponseRequired>
73. </ns2:oadrEvent>
74. </ns2:oadrDistributeEvent>
75. </ns2:oadrSignedObject>
76. </ns2:oadrPayload>

```

## 4.4 Energy Metering Reporting Use Case – Sample XML

VEN -> VTN oadrRegisterReport Payload (Energy Metering Use Case, TELEMETRY\_USAGE and TELEMETRY\_RESOURCE reports)

```

1. <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2. <ns7:oadrPayload xmlns="http://www.w3.org/2000/09/xmldsig#" xmlns:ns10="http://www.opengis.net/gml
   /3.2" xmlns:ns11="http://docs.oasis-
   open.org/ns/emix/2011/06/siscale" xmlns:ns12="http://www.w3.org/2009/xmldsig11#" xmlns:ns13="urn:u
   n:unec:unecfact:codelist:standard:5:ISO42173A:2010-04-07" xmlns:ns2="http://docs.oasis-
   open.org/ns/energyinterop/201110" xmlns:ns3="http://docs.oasis-
   open.org/ns/energyinterop/201110/payloads" xmlns:ns4="http://docs.oasis-
   open.org/ns/emix/2011/06" xmlns:ns5="urn:ietf:params:xml:ns:icalendar-
   2.0" xmlns:ns6="urn:ietf:params:xml:ns:icalendar-2.0:stream" xmlns:ns7="http://openadr.org/oadr-
   2.0b/2012/07" xmlns:ns8="http://www.w3.org/2005/Atom" xmlns:ns9="http://docs.oasis-
   open.org/ns/emix/2011/06/power" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
3.   <ns7:oadrSignedObject>
4.     <ns7:oadrRegisterReport ns2:schemaVersion="2.0b">
5.       <ns3:requestID>requestID_4322</ns3:requestID>
6.       <ns7:oadrReport>
7.         <ns5:duration>
8.           <ns5:duration>PT8H</ns5:duration>
9.         </ns5:duration>
10.        <ns7:oadrReportDescription>
11.          <ns2:rID>TELEMETRY_USAGE_powerReal</ns2:rID>
12.          <ns2:reportDataSource
13.            ns2:venID>venID_CompanyName_54342</ns2:venID
14.          </ns2:reportDataSource
15.          <ns2:reportType>usage</ns2:reportType>
16.          <ns9:powerReal>
17.            <ns9:itemDescription>RealPower</ns9:itemDescription>
18.            <ns9:itemUnits>W</ns9:itemUnits>
19.            <ns11:siScaleCode>k</ns11:siScaleCode>
20.            <ns9:powerAttributes>
21.              <ns9:hertz>60</ns9:hertz>
22.              <ns9:voltage>110</ns9:voltage>
23.              <ns9:ac>>true</ns9:ac>
24.            </ns9:powerAttributes>
25.          </ns9:powerReal>
26.          <ns2:readingType>Direct Read</ns2:readingType>
27.          <ns4:marketContext>http://MarketContext1</ns4:marketContext>
28.          <ns7:oadrSamplingRate>
29.            <ns7:oadrMinPeriod>PT1M</ns7:oadrMinPeriod>
30.            <ns7:oadrMaxPeriod>PT15M</ns7:oadrMaxPeriod>
31.            <ns7:oadrOnChange>false</ns7:oadrOnChange>
32.          </ns7:oadrSamplingRate>
33.        </ns7:oadrReportDescription>
34.        <ns2:reportRequestID>0</ns2:reportRequestID>
35.        <ns2:reportSpecifierID>TELEMETRY_USAGE_1234</ns2:reportSpecifierID>
36.        <ns2:reportName>METADATA_TELEMETRY_USAGE</ns2:reportName>
37.        <ns2:createdDateTime>2020-10-11T23:54:22Z</ns2:createdDateTime>
38.      </ns7:oadrReport>
39.    </ns7:oadrReport>
40.    <ns5:duration>
41.      <ns5:duration>PT8H</ns5:duration>
42.    </ns5:duration>
43.    <ns7:oadrReportDescription>
44.      <ns2:rID>TELEMETRY_RESOURCE_powerReal_resource1</ns2:rID>

```

```

45.         <ns2:reportType>usage</ns2:reportType>
46.         <ns9:powerReal>
47.             <ns9:itemDescription>RealPower</ns9:itemDescription>
48.             <ns9:itemUnits>W</ns9:itemUnits>
49.             <ns11:siScaleCode>k</ns11:siScaleCode>
50.             <ns9:powerAttributes>
51.                 <ns9:hertz>60</ns9:hertz>
52.                 <ns9:voltage>110</ns9:voltage>
53.                 <ns9:ac>true</ns9:ac>
54.             </ns9:powerAttributes>
55.         </ns9:powerReal>
56.         <ns2:readingType>Direct Read</ns2:readingType>
57.         <ns4:marketContext>http://MarketContext1</ns4:marketContext>
58.         <ns7:oadrSamplingRate>
59.             <ns7:oadrMinPeriod>PT1M</ns7:oadrMinPeriod>
60.             <ns7:oadrMaxPeriod>PT15M</ns7:oadrMaxPeriod>
61.             <ns7:oadrOnChange>false</ns7:oadrOnChange>
62.         </ns7:oadrSamplingRate>
63.     </ns7:oadrReportDescription>
64.     <ns7:oadrReportDescription>
65.         <ns2:rID>TELEMETRY_RESOURCE_powerReal_resource2</ns2:rID>
66.         <ns2:reportType>usage</ns2:reportType>
67.         <ns9:powerReal>
68.             <ns9:itemDescription>RealPower</ns9:itemDescription>
69.             <ns9:itemUnits>W</ns9:itemUnits>
70.             <ns11:siScaleCode>k</ns11:siScaleCode>
71.             <ns9:powerAttributes>
72.                 <ns9:hertz>60</ns9:hertz>
73.                 <ns9:voltage>110</ns9:voltage>
74.                 <ns9:ac>true</ns9:ac>
75.             </ns9:powerAttributes>
76.         </ns9:powerReal>
77.         <ns2:readingType>Direct Read</ns2:readingType>
78.         <ns4:marketContext>http://MarketContext1</ns4:marketContext>
79.         <ns7:oadrSamplingRate>
80.             <ns7:oadrMinPeriod>PT1M</ns7:oadrMinPeriod>
81.             <ns7:oadrMaxPeriod>PT15M</ns7:oadrMaxPeriod>
82.             <ns7:oadrOnChange>false</ns7:oadrOnChange>
83.         </ns7:oadrSamplingRate>
84.     </ns7:oadrReportDescription>
85.     <ns2:reportRequestID>0</ns2:reportRequestID>
86.     <ns2:reportSpecifierID>TELEMETRY_RESOURCE_1234</ns2:reportSpecifierID>
87.     <ns2:reportName>x-METADATA_x-TELEMETRY_RESOURCE</ns2:reportName>
88.     <ns2:createdDateTime>2020-10-11T23:54:22Z</ns2:createdDateTime>
89. </ns7:oadrReport>
90.     <ns2:venID>venID_CompanyName_54342</ns2:venID>
91. </ns7:oadrRegisterReport>
92. </ns7:oadrSignedObject>
93. </ns7:oadrPayload>

```

```

<ns2:rID>TELEMETRY_RESOURCE_powerReal_resource1</ns2:rID>

```





VTN -> VEN oadrCreateReport Payload Energy Metering Use Case, TELEMETRY\_USAGE report)

```

1. <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2. <ns7:oadrPayload xmlns="http://www.w3.org/2000/09/xmldsig#" xmlns:ns10="http://www.opengis.net/gml
   /3.2" xmlns:ns11="http://docs.oasis-
   open.org/ns/emix/2011/06/siscale" xmlns:ns12="http://www.w3.org/2009/xmldsig11#" xmlns:ns13="urn:u
   n:unece:uncefact:codelist:standard:5:ISO42173A:2010-04-07" xmlns:ns2="http://docs.oasis-
   open.org/ns/energyinterop/201110" xmlns:ns3="http://docs.oasis-
   open.org/ns/energyinterop/201110/payloads" xmlns:ns4="http://docs.oasis-
   open.org/ns/emix/2011/06" xmlns:ns5="urn:ietf:params:xml:ns:icalendar-
   2.0" xmlns:ns6="urn:ietf:params:xml:ns:icalendar-2.0:stream" xmlns:ns7="http://openadr.org/oadr-
   2.0b/2012/07" xmlns:ns8="http://www.w3.org/2005/Atom" xmlns:ns9="http://docs.oasis-
   open.org/ns/emix/2011/06/power" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
3.   <ns7:oadrSignedObject>
4.     <ns7:oadrCreateReport ns2:schemaVersion="2.0b">
5.       <ns3:requestID>requestID_4323</ns3:requestID>
6.       <ns7:oadrReportRequest>
7.         <ns2:reportRequestID>TELEMETRY_USAGE_request_1234</ns2:reportRequestID>
8.         <ns2:reportSpecifier>
9.           <ns2:reportSpecifierID>TELEMETRY_USAGE_1234</ns2:reportSpecifierID>
10.          <ns5:granularity>
11.            <ns5:duration>PT10M</ns5:duration>
12.          </ns5:granularity>
13.          <ns2:reportBackDuration>
14.            <ns5:duration>PT10M</ns5:duration>
15.          </ns2:reportBackDuration>
16.          <ns2:reportInterval>
17.            <ns5:properties>
18.              <ns5:dtstart>
19.                <ns5:date-time>2020-10-11T23:58:30Z</ns5:date-time>
20.              </ns5:dtstart>
21.              <ns5:duration>
22.                <ns5:duration>PT0M</ns5:duration>
23.              </ns5:duration>
24.            </ns5:properties>
25.          </ns2:reportInterval>
26.          <ns2:specifierPayload>
27.            <ns2:rID>TELEMETRY_USAGE_powerReal</ns2:rID>
28.            <ns2:readingType>x-notApplicable</ns2:readingType>
29.          </ns2:specifierPayload>
30.        </ns2:reportSpecifier>
31.      </ns7:oadrReportRequest>
32.    <ns2:venID>venID_CompanyName_54342</ns2:venID>
33.  </ns7:oadrCreateReport>
34. </ns7:oadrSignedObject>
35. </ns7:oadrPayload>

```

VTN -> VEN oadrCreateReport Payload Energy Metering Use Case, TELEMETRY\_RESOURCE report)

```

36. <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
37. <ns7:oadrPayload xmlns="http://www.w3.org/2000/09/xmldsig#" xmlns:ns10="http://www.opengis.net/gml
   /3.2" xmlns:ns11="http://docs.oasis-
   open.org/ns/emix/2011/06/siscale" xmlns:ns12="http://www.w3.org/2009/xmldsig11#" xmlns:ns13="urn:u
   n:unece:uncefact:codelist:standard:5:ISO42173A:2010-04-07" xmlns:ns2="http://docs.oasis-
   open.org/ns/energyinterop/201110" xmlns:ns3="http://docs.oasis-
   open.org/ns/energyinterop/201110/payloads" xmlns:ns4="http://docs.oasis-
   open.org/ns/emix/2011/06" xmlns:ns5="urn:ietf:params:xml:ns:icalendar-
   2.0" xmlns:ns6="urn:ietf:params:xml:ns:icalendar-2.0:stream" xmlns:ns7="http://openadr.org/oadr-
   2.0b/2012/07" xmlns:ns8="http://www.w3.org/2005/Atom" xmlns:ns9="http://docs.oasis-
   open.org/ns/emix/2011/06/power" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
38.   <ns7:oadrSignedObject>
39.     <ns7:oadrCreateReport ns2:schemaVersion="2.0b">
40.       <ns3:requestID>requestID_4323</ns3:requestID>
41.       <ns7:oadrReportRequest>
42.         <ns2:reportRequestID>TELEMETRY_RESOURCE_request_1234</ns2:reportRequestID>
43.         <ns2:reportSpecifier>
44.           <ns2:reportSpecifierID>TELEMETRY_RESOURCE_1234</ns2:reportSpecifierID>
45.           <ns5:granularity>
46.             <ns5:duration>PT10M</ns5:duration>
47.           </ns5:granularity>
48.           <ns2:reportBackDuration>
49.             <ns5:duration>PT10M</ns5:duration>
50.           </ns2:reportBackDuration>
51.           <ns2:reportInterval>
52.             <ns5:properties>
53.               <ns5:dtstart>
54.                 <ns5:date-time>2020-10-11T23:58:30Z</ns5:date-time>
55.               </ns5:dtstart>
56.               <ns5:duration>
57.                 <ns5:duration>PT0M</ns5:duration>
58.               </ns5:duration>
59.             </ns5:properties>
60.           </ns2:reportInterval>
61.           <ns2:specifierPayload>
62.             <ns2:rID>TELEMETRY_RESOURCE_powerReal_resource1</ns2:rID>
63.             <ns2:readingType>x-notApplicable</ns2:readingType>
64.           </ns2:specifierPayload>
65.           <ns2:specifierPayload>
66.             <ns2:rID>TELEMETRY_RESOURCE_powerReal_resource2</ns2:rID>
67.             <ns2:readingType>x-notApplicable</ns2:readingType>
68.           </ns2:specifierPayload>
69.         </ns2:reportSpecifier>
70.       </ns7:oadrReportRequest>
71.       <ns2:venID>venID_CompanyName_54342</ns2:venID>
72.     </ns7:oadrCreateReport>
73.   </ns7:oadrSignedObject>
74. </ns7:oadrPayload>

```

```
<ns5:duration>PT10M</ns5:duration>
```

VEN -> VTN oadrUpdateReportPayload (Energy Metering Use Case, TELEMETRY\_USAGE report)

```

1. <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2. <ns7:oadrPayload xmlns="http://www.w3.org/2000/09/xmldsig#" xmlns:ns10="http://www.opengis.net/gml
   /3.2" xmlns:ns11="http://docs.oasis-
   open.org/ns/emix/2011/06/siscale" xmlns:ns12="http://www.w3.org/2009/xmldsig11#" xmlns:ns13="urn:u
   n:unece:uncefact:codelist:standard:5:ISO42173A:2010-04-07" xmlns:ns2="http://docs.oasis-
   open.org/ns/energyinterop/201110" xmlns:ns3="http://docs.oasis-
   open.org/ns/energyinterop/201110/payloads" xmlns:ns4="http://docs.oasis-
   open.org/ns/emix/2011/06" xmlns:ns5="urn:ietf:params:xml:ns:icalendar-
   2.0" xmlns:ns6="urn:ietf:params:xml:ns:icalendar-2.0:stream" xmlns:ns7="http://openadr.org/oadr-
   2.0b/2012/07" xmlns:ns8="http://www.w3.org/2005/Atom" xmlns:ns9="http://docs.oasis-
   open.org/ns/emix/2011/06/power" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
3.   <ns7:oadrSignedObject>
4.     <ns7:oadrUpdateReport ns2:schemaVersion="2.0b">
5.       <ns3:requestID>requestID_4324</ns3:requestID>
6.       <ns7:oadrReport>
7.         <ns5:dtstart>
8.           <ns5:date-time>2020-10-11T23:59:27Z</ns5:date-time>
9.         </ns5:dtstart>
10.        <ns6:intervals>
11.          <ns2:interval>
12.            <ns5:dtstart>
13.              <ns5:date-time>2020-10-11T23:59:27Z</ns5:date-time>
14.            </ns5:dtstart>
15.            <ns7:oadrReportPayload>
16.              <ns2:rID>TELEMETRY_USAGE_powerReal</ns2:rID>
17.              <ns2:confidence>100</ns2:confidence>
18.              <ns2:accuracy>0.0</ns2:accuracy>
19.              <ns2:payloadFloat>
20.                <ns2:value>1523.0</ns2:value>
21.              </ns2:payloadFloat>
22.              <ns7:oadrDataQuality>Quality Good - Non Specific</ns7:oadrDataQuality>
23.            </ns7:oadrReportPayload>
24.          </ns2:interval>
25.        </ns6:intervals>
26.        <ns2:eiReportID>RP_54321</ns2:eiReportID>
27.        <ns2:reportRequestID>TELEMETRY_USAGE_request_1234</ns2:reportRequestID>
28.        <ns2:reportSpecifierID>TELEMETRY_USAGE_1234</ns2:reportSpecifierID>
29.        <ns2:reportName>x-TELEMETRY_USAGE</ns2:reportName>
30.        <ns2:createdDateTime>2020-10-11T23:59:27Z</ns2:createdDateTime>
31.      </ns7:oadrReport>
32.    <ns2:venID>venID_venID_CompanyName_54342</ns2:venID>
33.  </ns7:oadrUpdateReport>
34. </ns7:oadrSignedObject>
35. </ns7:oadrPayload>

```

VEN -> VTN oadrUpdateReportPayload (Energy Metering Use Case,  
TELEMETRY\_RESOURCE report)

```

36. <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
37. <ns7:oadrPayload xmlns="http://www.w3.org/2000/09/xmldsig#" xmlns:ns10="http://www.opengis.net/gml
   /3.2" xmlns:ns11="http://docs.oasis-
   open.org/ns/emix/2011/06/siscale" xmlns:ns12="http://www.w3.org/2009/xmldsig11#" xmlns:ns13="urn:u
   n:unece:uncefact:codelist:standard:5:ISO42173A:2010-04-07" xmlns:ns2="http://docs.oasis-
   open.org/ns/energyinterop/201110" xmlns:ns3="http://docs.oasis-
   open.org/ns/energyinterop/201110/payloads" xmlns:ns4="http://docs.oasis-
   open.org/ns/emix/2011/06" xmlns:ns5="urn:ietf:params:xml:ns:icalendar-
   2.0" xmlns:ns6="urn:ietf:params:xml:ns:icalendar-2.0:stream" xmlns:ns7="http://openadr.org/oadr-
   2.0b/2012/07" xmlns:ns8="http://www.w3.org/2005/Atom" xmlns:ns9="http://docs.oasis-
   open.org/ns/emix/2011/06/power" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
38.   <ns7:oadrSignedObject>
39.     <ns7:oadrUpdateReport ns2:schemaVersion="2.0b">
40.       <ns3:requestID>requestID_4324</ns3:requestID>
41.       <ns7:oadrReport>
42.         <ns5:dtstart>
43.           <ns5:date-time>2020-10-11T23:59:27Z</ns5:date-time>
44.         </ns5:dtstart>
45.         <ns6:intervals>
46.           <ns2:interval>
47.             <ns5:dtstart>
48.               <ns5:date-time>2020-10-11T23:59:27Z</ns5:date-time>
49.             </ns5:dtstart>
50.             <ns7:oadrReportPayload>
51.               <ns2:rID>TELEMETRY_RESOURCE_powerReal_resource1</ns2:rID>
52.               <ns2:confidence>100</ns2:confidence>
53.               <ns2:accuracy>0.0</ns2:accuracy>
54.               <ns2:payloadFloat>
55.                 <ns2:value>410.0</ns2:value>
56.               </ns2:payloadFloat>
57.               <ns7:oadrDataQuality>Quality Good - Non Specific</ns7:oadrDataQuality>
58.             </ns7:oadrReportPayload>
59.             <ns7:oadrReportPayload>
60.               <ns2:rID>TELEMETRY_RESOURCE_powerReal_resource2</ns2:rID>
61.               <ns2:confidence>100</ns2:confidence>
62.               <ns2:accuracy>0.0</ns2:accuracy>
63.               <ns2:payloadFloat>
64.                 <ns2:value>400.0</ns2:value>
65.               </ns2:payloadFloat>
66.               <ns7:oadrDataQuality>Quality Good - Non Specific</ns7:oadrDataQuality>
67.             </ns7:oadrReportPayload>
68.           </ns2:interval>
69.         </ns6:intervals>
70.       <ns2:eiReportID>RP_54321</ns2:eiReportID>
71.       <ns2:reportRequestID>TELEMETRY_RESOURCE_request_1234</ns2:reportRequestID>
72.       <ns2:reportSpecififierID>TELEMETRY_RESOURCE_1234</ns2:reportSpecififierID>
73.       <ns2:reportName>x-TELEMETRY_RESOURCE</ns2:reportName>
74.       <ns2:createdDateTime>2020-10-11T23:59:27Z</ns2:createdDateTime>
75.     </ns7:oadrReport>
76.   <ns2:venID>venID>venID_CompanyName_54342</ns2:venID>
77. </ns7:oadrUpdateReport>
78. </ns7:oadrSignedObject>
79. </ns7:oadrPayload>

```

VTN -> VEN oadrCancelReport Payload Energy Metering Use Case)

```

1. <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2. <ns7:oadrPayload xmlns="http://www.w3.org/2000/09/xmldsig#" xmlns:ns10="http://www.opengis.net/gml
   /3.2" xmlns:ns11="http://docs.oasis-
   open.org/ns/emix/2011/06/siscale" xmlns:ns12="http://www.w3.org/2009/xmldsig11#" xmlns:ns13="urn:u
   n:unece:uncefact:odelist:standard:5:ISO42173A:2010-04-07" xmlns:ns2="http://docs.oasis-
   open.org/ns/energyinterop/201110" xmlns:ns3="http://docs.oasis-
   open.org/ns/energyinterop/201110/payloads" xmlns:ns4="http://docs.oasis-
   open.org/ns/emix/2011/06" xmlns:ns5="urn:ietf:params:xml:ns:icalendar-
   2.0" xmlns:ns6="urn:ietf:params:xml:ns:icalendar-2.0:stream" xmlns:ns7="http://openadr.org/oadr-
   2.0b/2012/07" xmlns:ns8="http://www.w3.org/2005/Atom" xmlns:ns9="http://docs.oasis-
   open.org/ns/emix/2011/06/power" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
3.   <ns7:oadrSignedObject>
4.     <ns7:oadrCancelReport ns2:schemaVersion="2.0b">
5.       <ns3:requestID>requestID_4321</ns3:requestID>
6.       <ns2:reportRequestID>TELEMETRY_USAGE_request_1234</ns2:reportRequestID>
7.       <ns3:reportToFollow>>false</ns3:reportToFollow>
8.       <ns2:venID>venID_CompanyName_1234</ns2:venID>
9.     </ns7:oadrCancelReport>
10.  </ns7:oadrSignedObject>
11. </ns7:oadrPayload>

```

## 4.5 Status Reporting Use Case – Sample XML

VEN -> VTN oadrRegisterReport Payload (Status Use Case, TELEMETRY\_STATUS Report)

```

1. <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2. <ns7:oadrPayload xmlns="http://www.w3.org/2000/09/xmldsig#" xmlns:ns10="http://www.opengis.net/gml
   /3.2" xmlns:ns11="http://docs.oasis-
   open.org/ns/emix/2011/06/siscale" xmlns:ns12="http://www.w3.org/2009/xmldsig11#" xmlns:ns13="urn:u
   n:unec:unefact:codelist:standard:5:ISO42173A:2010-04-07" xmlns:ns2="http://docs.oasis-
   open.org/ns/energyinterop/201110" xmlns:ns3="http://docs.oasis-
   open.org/ns/energyinterop/201110/payloads" xmlns:ns4="http://docs.oasis-
   open.org/ns/emix/2011/06" xmlns:ns5="urn:ietf:params:xml:ns:icalendar-
   2.0" xmlns:ns6="urn:ietf:params:xml:ns:icalendar-2.0:stream" xmlns:ns7="http://openadr.org/oadr-
   2.0b/2012/07" xmlns:ns8="http://www.w3.org/2005/Atom" xmlns:ns9="http://docs.oasis-
   open.org/ns/emix/2011/06/power" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
3.   <ns7:oadrSignedObject>
4.     <ns7:oadrRegisterReport ns2:schemaVersion="2.0b">
5.       <ns3:requestID>requestID_4322</ns3:requestID>
6.       <ns7:oadrReport>
7.         <ns5:duration>
8.           <ns5:duration>PT8H</ns5:duration>
9.         </ns5:duration>
10.        <ns7:oadrReportDescription>
11.          <ns2:rID>TELEMETRY_STATUS_resource1</ns2:rID>
12.          <ns2:reportType>x-resourceStatus</ns2:reportType>
13.          <ns2:readingType>x-notApplicable</ns2:readingType>
14.          <ns4:marketContext>http://MarketContext1</ns4:marketContext>
15.          <ns7:oadrSamplingRate>
16.            <ns7:oadrMinPeriod>PT1M</ns7:oadrMinPeriod>
17.            <ns7:oadrMaxPeriod>PT15M</ns7:oadrMaxPeriod>
18.            <ns7:oadrOnChange>false</ns7:oadrOnChange>
19.          </ns7:oadrSamplingRate>
20.        </ns7:oadrReportDescription>
21.        <ns2:reportRequestID>0</ns2:reportRequestID>
22.        <ns2:reportSpecifierID>TELEMETRY_STATUS_1234</ns2:reportSpecifierID>
23.        <ns2:reportName>METADATA_TELEMETRY_STATUS</ns2:reportName>
24.        <ns2:createdDateTime>2020-10-11T23:54:22Z</ns2:createdDateTime>
25.      </ns7:oadrReport>
26.    </ns7:oadrReport>
27.    <ns5:duration>
28.      <ns5:duration>PT8H</ns5:duration>
29.    </ns5:duration>
30.    <ns7:oadrReportDescription>
31.      <ns2:rID>TELEMETRY_STATUS_resource2</ns2:rID>
32.      <ns2:reportType>x-resourceStatus</ns2:reportType>
33.      <ns2:readingType>x-notApplicable</ns2:readingType>
34.      <ns4:marketContext>http://MarketContext1</ns4:marketContext>
35.      <ns7:oadrSamplingRate>
36.        <ns7:oadrMinPeriod>PT1M</ns7:oadrMinPeriod>
37.        <ns7:oadrMaxPeriod>PT15M</ns7:oadrMaxPeriod>
38.        <ns7:oadrOnChange>false</ns7:oadrOnChange>
39.      </ns7:oadrSamplingRate>
40.    </ns7:oadrReportDescription>
41.    <ns2:reportRequestID>0</ns2:reportRequestID>
42.    <ns2:reportSpecifierID>TELEMETRY_STATUS_1234</ns2:reportSpecifierID>
43.    <ns2:reportName>METADATA_TELEMETRY_STATUS</ns2:reportName>
44.    <ns2:createdDateTime>2020-10-11T23:54:22Z</ns2:createdDateTime>
45.  </ns7:oadrRegisterReport>
46. </ns7:oadrSignedObject>

```

```
47.     </ns7:oadrRegisterReport>  
48. </ns7:oadrSignedObject>  
49. </ns7:oadrPayload>
```



VTN -> VEN oadrCreateReport (Status Use Case, TELEMETRY\_STATUS Report)

```

1. <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2. <ns7:oadrPayload xmlns="http://www.w3.org/2000/09/xmldsig#" xmlns:ns10="http://www.opengis.net/gml
   /3.2" xmlns:ns11="http://docs.oasis-
   open.org/ns/emix/2011/06/siscale" xmlns:ns12="http://www.w3.org/2009/xmldsig11#" xmlns:ns13="urn:u
   n:unece:uncefact:odelist:standard:5:ISO42173A:2010-04-07" xmlns:ns2="http://docs.oasis-
   open.org/ns/energyinterop/201110" xmlns:ns3="http://docs.oasis-
   open.org/ns/energyinterop/201110/payloads" xmlns:ns4="http://docs.oasis-
   open.org/ns/emix/2011/06" xmlns:ns5="urn:ietf:params:xml:ns:icalendar-
   2.0" xmlns:ns6="urn:ietf:params:xml:ns:icalendar-2.0:stream" xmlns:ns7="http://openadr.org/oadr-
   2.0b/2012/07" xmlns:ns8="http://www.w3.org/2005/Atom" xmlns:ns9="http://docs.oasis-
   open.org/ns/emix/2011/06/power" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
3.   <ns7:oadrSignedObject>
4.     <ns7:oadrCreateReport ns2:schemaVersion="2.0b">
5.       <ns3:requestID>requestID_4323</ns3:requestID>
6.       <ns7:oadrReportRequest>
7.         <ns2:reportRequestID>TELEMETRY_STATUS_request_1234</ns2:reportRequestID>
8.         <ns2:reportSpecifier>
9.           <ns2:reportSpecifierID>TELEMETRY_STATUS_1234</ns2:reportSpecifierID>
10.          <ns5:granularity>
11.            <ns5:duration>PT10M</ns5:duration>
12.          </ns5:granularity>
13.          <ns2:reportBackDuration>
14.            <ns5:duration>PT10M</ns5:duration>
15.          </ns2:reportBackDuration>
16.          <ns2:reportInterval>
17.            <ns5:properties>
18.              <ns5:dtstart>
19.                <ns5:date-time>2020-10-11T23:58:30Z</ns5:date-time>
20.              </ns5:dtstart>
21.              <ns5:duration>
22.                <ns5:duration>PT0M</ns5:duration>
23.              </ns5:duration>
24.            </ns5:properties>
25.          </ns2:reportInterval>
26.          <ns2:specifierPayload>
27.            <ns2:rID>TELEMETRY_STATUS_resource1</ns2:rID>
28.            <ns2:readingType>x-notApplicable</ns2:readingType>
29.          </ns2:specifierPayload>
30.          <ns2:specifierPayload>
31.            <ns2:rID>TELEMETRY_STATUS_resource2</ns2:rID>
32.            <ns2:readingType>x-notApplicable</ns2:readingType>
33.          </ns2:specifierPayload>
34.        </ns2:reportSpecifier>
35.      </ns7:oadrReportRequest>
36.      <ns2:venID>venID_CompanyName_54342</ns2:venID>
37.    </ns7:oadrCreateReport>
38.  </ns7:oadrSignedObject>
39. </ns7:oadrPayload>

```

## VEN -&gt; VTN oadrUpdateReport Payload (Status Use Case, TELEMETRY\_STATUS Report)

```

1. <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2. <ns7:oadrPayload xmlns="http://www.w3.org/2000/09/xmldsig#" xmlns:ns10="http://www.opengis.net/gml
   /3.2" xmlns:ns11="http://docs.oasis-
   open.org/ns/emix/2011/06/siscale" xmlns:ns12="http://www.w3.org/2009/xmldsig11#" xmlns:ns13="urn:u
   n:unece:uncefact:odelist:standard:5:ISO42173A:2010-04-07" xmlns:ns2="http://docs.oasis-
   open.org/ns/energyinterop/201110" xmlns:ns3="http://docs.oasis-
   open.org/ns/energyinterop/201110/payloads" xmlns:ns4="http://docs.oasis-
   open.org/ns/emix/2011/06" xmlns:ns5="urn:ietf:params:xml:ns:icalendar-
   2.0" xmlns:ns6="urn:ietf:params:xml:ns:icalendar-2.0:stream" xmlns:ns7="http://openadr.org/oadr-
   2.0b/2012/07" xmlns:ns8="http://www.w3.org/2005/Atom" xmlns:ns9="http://docs.oasis-
   open.org/ns/emix/2011/06/power" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
3.   <ns7:oadrSignedObject>
4.     <ns7:oadrUpdateReport ns2:schemaVersion="2.0b">
5.       <ns3:requestID>requestID_4324</ns3:requestID>
6.       <ns7:oadrReport>
7.         <ns5:dtstart>
8.           <ns5:date-time>2020-10-11T23:59:27Z</ns5:date-time>
9.         </ns5:dtstart>
10.        <ns6:intervals>
11.          <ns2:interval>
12.            <ns5:dtstart>
13.              <ns5:date-time>2020-10-11T23:59:27Z</ns5:date-time>
14.            </ns5:dtstart>
15.            <ns7:oadrReportPayload>
16.              <ns2:rID>TELEMETRY_STATUS_resource1</ns2:rID>
17.              <ns7:oadrPayloadResourceStatus>
18.                <ns7:oadrOnline>true</ns7:oadrOnline>
19.                <ns7:oadrManualOverride>false</ns7:oadrManualOverride>
20.                <ns7:oadrLoadControlState>
21.                  <ns7:oadrSetPoint>
22.                    <ns7:oadrMin>20</ns7:oadrMin>
23.                    <ns7:oadrMax>900</ns7:oadrMax>
24.                    <ns7:oadrCurrent>82.5</ns7:oadrCurrent>
25.                  </ns7:oadrSetPoint>
26.                </ns7:oadrLoadControlState>
27.              </ns7:oadrPayloadResourceStatus>
28.              <ns7:oadrDataQuality>Quality Good - Non Specific</ns7:oadrDataQuality>
29.            </ns7:oadrReportPayload>
30.          </ns7:oadrReportPayload>
31.          <ns2:rID>TELEMETRY_STATUS_resource2</ns2:rID>
32.          <ns7:oadrPayloadResourceStatus>
33.            <ns7:oadrOnline>true</ns7:oadrOnline>
34.            <ns7:oadrManualOverride>false</ns7:oadrManualOverride>
35.            <ns7:oadrLoadControlState>
36.              <ns7:oadrSetPoint>
37.                <ns7:oadrMin>20</ns7:oadrMin>
38.                <ns7:oadrMax>900</ns7:oadrMax>
39.                <ns7:oadrCurrent>84.7</ns7:oadrCurrent>
40.              </ns7:oadrSetPoint>
41.            </ns7:oadrLoadControlState>
42.          </ns7:oadrPayloadResourceStatus>
43.          <ns7:oadrDataQuality>Quality Good - Non Specific</ns7:oadrDataQuality>
44.        </ns7:oadrReportPayload>
45.      </ns2:interval>
46.    </ns6:intervals>
47.    <ns2:eiReportID>RP_54321</ns2:eiReportID>
48.    <ns2:reportRequestID>TELEMETRY_STATUS_request_1234</ns2:reportRequestID>
49.    <ns2:reportSpecifierID>TELEMETRY_STATUS_1234</ns2:reportSpecifierID>

```

```
50.         <ns2:reportName>TELEMETRY_STATUS</ns2:reportName>
51.         <ns2:createdDateTime>2020-10-11T23:59:27Z</ns2:createdDateTime>
52.     </ns7:oadrReport>
53.     <ns2:venID>venID>venID_CompanyName_54342</ns2:venID>
54. </ns7:oadrUpdateReport>
55. </ns7:oadrSignedObject>
56. </ns7:oadrPayload>
```

## 4.6 Capability Forecast Reporting Use Case – Sample XML

VEN -> VTN oadrRegisterReport Payload (Capability Forecast Reporting Use Case, Aggregate Forecast and Group Forecast Reports)

```

1. <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2. <ns7:oadrPayload xmlns="http://www.w3.org/2000/09/xmldsig#" xmlns:ns10="http://www.opengis.net/gml
   /3.2" xmlns:ns11="http://docs.oasis-
   open.org/ns/emix/2011/06/siscale" xmlns:ns12="http://www.w3.org/2009/xmldsig11#" xmlns:ns13="urn:u
   n:unece:uncefact:codelist:standard:5:ISO42173A:2010-04-07" xmlns:ns2="http://docs.oasis-
   open.org/ns/energyinterop/201110" xmlns:ns3="http://docs.oasis-
   open.org/ns/energyinterop/201110/payloads" xmlns:ns4="http://docs.oasis-
   open.org/ns/emix/2011/06" xmlns:ns5="urn:ietf:params:xml:ns:icalendar-
   2.0" xmlns:ns6="urn:ietf:params:xml:ns:icalendar-2.0:stream" xmlns:ns7="http://openadr.org/oadr-
   2.0b/2012/07" xmlns:ns8="http://www.w3.org/2005/Atom" xmlns:ns9="http://docs.oasis-
   open.org/ns/emix/2011/06/power" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
3.   <ns7:oadrSignedObject>
4.     <ns7:oadrRegisterReport ns2:schemaVersion="2.0b">
5.       <ns3:requestID>requestID_4322</ns3:requestID>
6.       <ns7:oadrReport>
7.         <ns5:duration>
8.           <ns5:duration>PT48H</ns5:duration>
9.         </ns5:duration>
10.        <ns7:oadrReportDescription>
11.          <ns2:rID>AGGREGATE_CAPABILITY_FORECAST_powerReal_OneHourWindow_MAX</ns2:rID>
12.          <ns2:reportDataSource>
13.            <ns2:venID>venID_CompanyName_54342</ns2:venID>
14.          </ns2:reportDataSource>
15.          <ns2:reportType>deltaUsage</ns2:reportType>
16.          <ns9:powerReal>
17.            <ns9:itemDescription>RealPower</ns9:itemDescription>
18.            <ns9:itemUnits>W</ns9:itemUnits>
19.            <ns11:siScaleCode>k</ns11:siScaleCode>
20.            <ns9:powerAttributes>
21.              <ns9:hertz>60</ns9:hertz>
22.              <ns9:voltage>110</ns9:voltage>
23.              <ns9:ac>true</ns9:ac>
24.            </ns9:powerAttributes>
25.          </ns9:powerReal>
26.          <ns2:readingType>x-notApplicable</ns2:readingType>
27.          <ns4:marketContext>http://MarketContext1</ns4:marketContext>
28.          <ns7:oadrSamplingRate>
29.            <ns7:oadrMinPeriod>PT1H</ns7:oadrMinPeriod>
30.            <ns7:oadrMaxPeriod>PT1H</ns7:oadrMaxPeriod>
31.            <ns7:oadrOnChange>false</ns7:oadrOnChange>
32.          </ns7:oadrSamplingRate>
33.        </ns7:oadrReportDescription>
34.        <ns7:oadrReportDescription>
35.          <ns2:rID>AGGREGATE_CAPABILITY_FORECAST_powerReal_TwoHourWindow_MIN</ns2:rID>
36.          <ns2:reportDataSource>
37.            <ns2:venID>venID_CompanyName_54342</ns2:venID>
38.          </ns2:reportDataSource>
39.          <ns2:reportType>deltaUsage</ns2:reportType>
40.          <ns9:powerReal>
41.            <ns9:itemDescription>RealPower</ns9:itemDescription>
42.            <ns9:itemUnits>W</ns9:itemUnits>
43.            <ns11:siScaleCode>k</ns11:siScaleCode>
44.            <ns9:powerAttributes>

```

```

45.         <ns9:hertz>60</ns9:hertz>
46.         <ns9:voltage>110</ns9:voltage>
47.         <ns9:ac>true</ns9:ac>
48.     </ns9:powerAttributes>
49. </ns9:powerReal>
50. <ns2:readingType>x-notApplicable</ns2:readingType>
51. <ns4:marketContext>http://MarketContext1</ns4:marketContext>
52. <ns7:oadrSamplingRate>
53.     <ns7:oadrMinPeriod>PT1H</ns7:oadrMinPeriod>
54.     <ns7:oadrMaxPeriod>PT1H</ns7:oadrMaxPeriod>
55.     <ns7:oadrOnChange>false</ns7:oadrOnChange>
56. </ns7:oadrSamplingRate>
57. </ns7:oadrReportDescription>
58. <ns2:reportRequestID>0</ns2:reportRequestID>
59. <ns2:reportSpecifierID>AGGREGATE_CAPABILITY_FORECAST_1234</ns2:reportSpecifierID>
60. <ns2:reportName>x-METADATA_x-AGGREGATE_CAPABILITY_FORECAST</ns2:reportName>
61. <ns2:createdDateTime>2020-10-11T23:54:22Z</ns2:createdDateTime>
62. </ns7:oadrReport>
63. <ns7:oadrReport>
64.     <ns5:duration>
65.         <ns5:duration>PT48H</ns5:duration>
66.     </ns5:duration>
67.     <ns7:oadrReportDescription>
68.         <ns2:rID>GROUP_CAPABILITY_FORECAST_powerReal_OneHourWindow_MAX</ns2:rID>
69.         <ns2:reportDataSource>
70.             <ns2:groupID>group123</ns2:groupID>
71.         </ns2:reportDataSource>
72.         <ns2:reportType>deltaUsage</ns2:reportType>
73.     <ns9:powerReal>
74.         <ns9:itemDescription>RealPower</ns9:itemDescription>
75.         <ns9:itemUnits>W</ns9:itemUnits>
76.         <ns11:siScaleCode>k</ns11:siScaleCode>
77.         <ns9:powerAttributes>
78.             <ns9:hertz>60</ns9:hertz>
79.             <ns9:voltage>110</ns9:voltage>
80.             <ns9:ac>true</ns9:ac>
81.         </ns9:powerAttributes>
82.     </ns9:powerReal>
83. <ns2:readingType>x-notApplicable</ns2:readingType>
84. <ns4:marketContext>http://MarketContext1</ns4:marketContext>
85. <ns7:oadrSamplingRate>
86.     <ns7:oadrMinPeriod>PT1H</ns7:oadrMinPeriod>
87.     <ns7:oadrMaxPeriod>PT1H</ns7:oadrMaxPeriod>
88.     <ns7:oadrOnChange>false</ns7:oadrOnChange>
89. </ns7:oadrSamplingRate>
90. </ns7:oadrReportDescription>
91. <ns7:oadrReportDescription>
92.     <ns2:rID>GROUP_CAPABILITY_FORECAST_powerReal_TwoHourWindow_MAX</ns2:rID>
93.     <ns2:reportDataSource>
94.         <ns2:groupID>group123</ns2:groupID>
95.     </ns2:reportDataSource>
96.     <ns2:reportType>deltaUsage</ns2:reportType>
97. <ns9:powerReal>
98.     <ns9:itemDescription>RealPower</ns9:itemDescription>
99.     <ns9:itemUnits>W</ns9:itemUnits>
100.    <ns11:siScaleCode>k</ns11:siScaleCode>
101.    <ns9:powerAttributes>
102.        <ns9:hertz>60</ns9:hertz>
103.        <ns9:voltage>110</ns9:voltage>
104.        <ns9:ac>true</ns9:ac>
105.    </ns9:powerAttributes>

```

```
106.         </ns9:powerReal>
107.         <ns2:readingType>x-notApplicable</ns2:readingType>
108.         <ns4:marketContext>http://MarketContext1</ns4:marketContext>
109.         <ns7:oadrSamplingRate>
110.             <ns7:oadrMinPeriod>PT1H</ns7:oadrMinPeriod>
111.             <ns7:oadrMaxPeriod>PT1H</ns7:oadrMaxPeriod>
112.             <ns7:oadrOnChange>>false</ns7:oadrOnChange>
113.         </ns7:oadrSamplingRate>
114.         </ns7:oadrReportDescription>
115.         <ns2:reportRequestID>0</ns2:reportRequestID>
116.         <ns2:reportSpecifierID>GROUP_CAPABILITY_FORECAST_group123</ns2:reportSpecifierID>
117.         <ns2:reportName>x-METADATA_x-GROUP_CAPABILITY_FORECAST</ns2:reportName>
118.         <ns2:createdDateTime>2020-10-11T23:54:22Z</ns2:createdDateTime>
119.     </ns7:oadrReport>
120.     <ns2:venID>venID_CompanyName_54342</ns2:venID>
121. </ns7:oadrRegisterReport>
122. </ns7:oadrSignedObject>
123. </ns7:oadrPayload>
```

VTN -> VEN oadrCreateReport Payload (Capability Forecast Reporting Use Case, Group Forecast Report)

```

1.  <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2.  <ns7:oadrPayload xmlns="http://www.w3.org/2000/09/xmldsig#" xmlns:ns10="http://www.opengis.net/gml
   /3.2" xmlns:ns11="http://docs.oasis-
   open.org/ns/emix/2011/06/siscale" xmlns:ns12="http://www.w3.org/2009/xmldsig11#" xmlns:ns13="urn:u
   n:unece:uncefact:codelist:standard:5:ISO42173A:2010-04-07" xmlns:ns2="http://docs.oasis-
   open.org/ns/energyinterop/201110" xmlns:ns3="http://docs.oasis-
   open.org/ns/energyinterop/201110/payloads" xmlns:ns4="http://docs.oasis-
   open.org/ns/emix/2011/06" xmlns:ns5="urn:ietf:params:xml:ns:icalendar-
   2.0" xmlns:ns6="urn:ietf:params:xml:ns:icalendar-2.0:stream" xmlns:ns7="http://openadr.org/oadr-
   2.0b/2012/07" xmlns:ns8="http://www.w3.org/2005/Atom" xmlns:ns9="http://docs.oasis-
   open.org/ns/emix/2011/06/power" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
3.    <ns7:oadrSignedObject>
4.      <ns7:oadrCreateReport ns2:schemaVersion="2.0b">
5.        <ns3:requestID>requestID_4323</ns3:requestID>
6.        <ns7:oadrReportRequest>
7.          <ns2:reportRequestID>GROUP_CAPABILITY_FORECAST_request1234</ns2:reportRequestID>
8.          <ns2:reportSpecifier>
9.            <ns2:reportSpecifierID>GROUP_CAPABILITY_FORECAST_group123</ns2:reportSpecifierID>
10.           <ns5:granularity>
11.             <ns5:duration>PT1H</ns5:duration>
12.           </ns5:granularity>
13.           <ns2:reportBackDuration>
14.             <ns5:duration>PT48H</ns5:duration>
15.           </ns2:reportBackDuration>
16.           <ns2:reportInterval>
17.             <ns5:properties>
18.               <ns5:dtstart>
19.                 <ns5:date-time>2020-10-11T23:58:30Z</ns5:date-time>
20.               </ns5:dtstart>
21.               <ns5:duration>
22.                 <ns5:duration>PT0M</ns5:duration>
23.               </ns5:duration>
24.             </ns5:properties>
25.           </ns2:reportInterval>
26.           <ns2:specifierPayload>
27.             <ns2:rID>GROUP_CAPABILITY_FORECAST_powerReal_OneHourWindow_MAX</ns2:rID>
28.             <ns2:readingType>x-notApplicable</ns2:readingType>
29.           </ns2:specifierPayload>
30.           <ns2:specifierPayload>
31.             <ns2:rID>GROUP_CAPABILITY_FORECAST_powerReal_TwoHourWindow_MAX</ns2:rID>
32.             <ns2:readingType>x-notApplicable</ns2:readingType>
33.           </ns2:specifierPayload>
34.         </ns2:reportSpecifier>
35.       </ns7:oadrReportRequest>
36.       <ns2:venID>venID_CompanyName_54342</ns2:venID>
37.     </ns7:oadrCreateReport>
38.   </ns7:oadrSignedObject>
39. </ns7:oadrPayload>

```

VEN -> VTN oadrUpdateReport Payload (Capability Forecast Reporting Use Case, Group Forecast Report)

```

1. <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2. <ns7:oadrPayload xmlns="http://www.w3.org/2000/09/xmldsig#" xmlns:ns10="http://www.opengis.net/gml/3.2" xmlns:ns11="http://docs.oasis-open.org/ns/emix/2011/06/siscale" xmlns:ns12="http://www.w3.org/2009/xmldsig11#" xmlns:ns13="urn:un:unece:uncefact:codelist:standard:5:ISO42173A:2010-04-07" xmlns:ns2="http://docs.oasis-open.org/ns/energyinterop/201110" xmlns:ns3="http://docs.oasis-open.org/ns/energyinterop/201110/payloads" xmlns:ns4="http://docs.oasis-open.org/ns/emix/2011/06" xmlns:ns5="urn:ietf:params:xml:ns:icalendar-2.0" xmlns:ns6="urn:ietf:params:xml:ns:icalendar-2.0:stream" xmlns:ns7="http://openadr.org/oadr-2.0b/2012/07" xmlns:ns8="http://www.w3.org/2005/Atom" xmlns:ns9="http://docs.oasis-open.org/ns/emix/2011/06/power" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
3.   <ns7:oadrSignedObject>
4.     <ns7:oadrUpdateReport ns2:schemaVersion="2.0b">
5.       <ns3:requestID>requestID_4324</ns3:requestID>
6.       <ns7:oadrReport>
7.         <ns5:dtstart>
8.           <ns5:date-time>2020-10-11T00:00:00Z</ns5:date-time>
9.         </ns5:dtstart>
10.        <ns6:intervals>
11.          <ns2:interval>
12.            <ns5:dtstart>
13.              <ns5:date-time>2020-10-11T00:00:00Z</ns5:date-time>
14.            </ns5:dtstart>
15.            <ns7:oadrReportPayload>
16.              <ns2:rID> Group_CAPABILITY_FORECAST_powerReal_OneHourWindow_MAX </ns2:rID>
17.              <ns2:confidence>100</ns2:confidence>
18.              <ns2:accuracy>0.0</ns2:accuracy>
19.              <ns2:payloadFloat>
20.                <ns2:value>110.0</ns2:value>
21.              </ns2:payloadFloat>
22.              <ns7:oadrDataQuality>Quality Good - Non Specific</ns7:oadrDataQuality>
23.            </ns7:oadrReportPayload>
24.            <ns7:oadrReportPayload>
25.              <ns2:rID> Group_CAPABILITY_FORECAST_powerReal_TwoHourWindow_MAX </ns2:rID>
26.              <ns2:confidence>100</ns2:confidence>
27.              <ns2:accuracy>0.0</ns2:accuracy>
28.              <ns2:payloadFloat>
29.                <ns2:value>400.0</ns2:value>
30.              </ns2:payloadFloat>
31.              <ns7:oadrDataQuality>Quality Good - Non Specific</ns7:oadrDataQuality>
32.            </ns7:oadrReportPayload>
33.          </ns2:interval>
34.        </ns6:intervals>
35.      </ns7:oadrReport>
36.    </ns7:oadrUpdateReport>
37.  </ns7:oadrSignedObject>
38. </ns7:oadrPayload>
39. </ns7:oadrUpdateReportPayload>
40. </ns7:oadrUpdateReportPayload>
41. </ns7:oadrUpdateReportPayload>
42. </ns7:oadrUpdateReportPayload>
43. </ns7:oadrUpdateReportPayload>
44. </ns7:oadrUpdateReportPayload>
45. </ns7:oadrUpdateReportPayload>
46. </ns7:oadrUpdateReportPayload>
47. </ns7:oadrUpdateReportPayload>
48. </ns7:oadrUpdateReportPayload>

```



```

49.         <ns2:confidence>100</ns2:confidence>
50.         <ns2:accuracy>0.0</ns2:accuracy>
51.         <ns2:payloadFloat>
52.             <ns2:value>300.0</ns2:value>
53.         </ns2:payloadFloat>
54.         <ns7:oadrDataQuality>Quality Good - Non Specific</ns7:oadrDataQuality>
55.     </ns7:oadrReportPayload>
56. </ns2:interval>
57.     <!--46 ADDITIONAL INTERVALS OF DATA 1 HOUR APART -->
58. </ns6:intervals>
59. <ns2:eiReportID>RP_54321</ns2:eiReportID>
60. <ns2:reportRequestID>GROUP_CAPABILITIES_FORECAST_request1234</ns2:reportRequestID>
61. <ns2:reportSpecifierID>GROUP_CAPABILITIES_FORECAST_group123<ns2:reportSpecifierID>
62. <ns2:reportName>x-GROUP_CAPABILITIES_FORECAST</ns2:reportName>
63. <ns2:createdDateTime>2020-10-11T23:59:27Z</ns2:createdDateTime>
64. </ns7:oadrReport>
65. <ns2:venID>venID>venID_CompanyName_54342</ns2:venID>
66. </ns7:oadrUpdateReport>
67. </ns7:oadrSignedObject>
68. </ns7:oadrPayload>

```

## 4.7 Operational Forecast Reporting Use Case – Sample XML

VEN -> VTN oadrRegisterReport Payload (Operational Forecast Reporting Use Case, Aggregate Operational and Group Forecast Reports)

```

124.<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
125.<ns7:oadrPayload xmlns="http://www.w3.org/2000/09/xmldsig#" xmlns:ns10="http://www.opengis.net/gml
/3.2" xmlns:ns11="http://docs.oasis-
open.org/ns/emix/2011/06/siscale" xmlns:ns12="http://www.w3.org/2009/xmldsig11#" xmlns:ns13="urn:u
n:unec:unecfact:odelist:standard:5:ISO42173A:2010-04-07" xmlns:ns2="http://docs.oasis-
open.org/ns/energyinterop/201110" xmlns:ns3="http://docs.oasis-
open.org/ns/energyinterop/201110/payloads" xmlns:ns4="http://docs.oasis-
open.org/ns/emix/2011/06" xmlns:ns5="urn:ietf:params:xml:ns:icalendar-
2.0" xmlns:ns6="urn:ietf:params:xml:ns:icalendar-2.0:stream" xmlns:ns7="http://openadr.org/oadr-
2.0b/2012/07" xmlns:ns8="http://www.w3.org/2005/Atom" xmlns:ns9="http://docs.oasis-
open.org/ns/emix/2011/06/power" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
126.  <ns7:oadrSignedObject>
127.    <ns7:oadrRegisterReport ns2:schemaVersion="2.0b">
128.      <ns3:requestID>requestID_4322</ns3:requestID>
129.      <ns7:oadrReport>
130.        <ns5:duration>
131.          <ns5:duration>PT24H</ns5:duration>
132.        </ns5:duration>
133.        <ns7:oadrReportDescription>
134.          <ns2:rID>AGGREGATE_OPERATIONAL_FORECAST_powerReal</ns2:rID>
135.          <ns2:reportDataSource>
136.            <ns2:venID>venID_CompanyName_54342</ns2:venID>
137.          </ns2:reportDataSource>
138.          <ns2:reportType>Usage</ns2:reportType>
139.          <ns9:powerReal>
140.            <ns9:itemDescription>RealPower</ns9:itemDescription>
141.            <ns9:itemUnits>W</ns9:itemUnits>
142.            <ns11:siScaleCode>k</ns11:siScaleCode>
143.            <ns9:powerAttributes>
144.              <ns9:hertz>60</ns9:hertz>
145.              <ns9:voltage>110</ns9:voltage>
146.              <ns9:ac>true</ns9:ac>
147.            </ns9:powerAttributes>
148.          </ns9:powerReal>
149.          <ns2:readingType>x-notApplicable</ns2:readingType>
150.          <ns4:marketContext>http://MarketContext1</ns4:marketContext>
151.          <ns7:oadrSamplingRate>
152.            <ns7:oadrMinPeriod>PT1H</ns7:oadrMinPeriod>
153.            <ns7:oadrMaxPeriod>PT1H</ns7:oadrMaxPeriod>
154.            <ns7:oadrOnChange>false</ns7:oadrOnChange>
155.          </ns7:oadrSamplingRate>
156.        </ns7:oadrReportDescription>
157.        <ns2:reportRequestID>0</ns2:reportRequestID>
158.        <ns2:reportSpecifierID>AGGREGATE_OPERATIONAL_FORECAST_1234</ns2:reportSpecifierID>
159.        <ns2:reportName>x-METADATA_x-AGGREGATE_OPERATIONAL_FORECAST</ns2:reportName>
160.        <ns2:createdDateTime>2020-10-11T23:54:22Z</ns2:createdDateTime>
161.      </ns7:oadrReport>
162.    </ns7:oadrReport>
163.    <ns5:duration>
164.      <ns5:duration>PT28H</ns5:duration>
165.    </ns5:duration>
166.    <ns7:oadrReportDescription>
167.      <ns2:rID>GROUP_OPERATIONAL_FORECAST_powerReal</ns2:rID>

```

```

168.         <ns2:reportDataSource>
169.             <ns2:groupID>group123</ns2:groupID>
170.         </ns2:reportDataSource>
171.         <ns2:reportType>Usage</ns2:reportType>
172.         <ns9:powerReal>
173.             <ns9:itemDescription>RealPower</ns9:itemDescription>
174.             <ns9:itemUnits>W</ns9:itemUnits>
175.             <ns11:siScaleCode>k</ns11:siScaleCode>
176.             <ns9:powerAttributes>
177.                 <ns9:hertz>60</ns9:hertz>
178.                 <ns9:voltage>110</ns9:voltage>
179.                 <ns9:ac>true</ns9:ac>
180.             </ns9:powerAttributes>
181.         </ns9:powerReal>
182.         <ns2:readingType>x-notApplicable</ns2:readingType>
183.         <ns4:marketContext>http://MarketContext1</ns4:marketContext>
184.         <ns7:oadrSamplingRate>
185.             <ns7:oadrMinPeriod>PT1H</ns7:oadrMinPeriod>
186.             <ns7:oadrMaxPeriod>PT1H</ns7:oadrMaxPeriod>
187.             <ns7:oadrOnChange>false</ns7:oadrOnChange>
188.         </ns7:oadrSamplingRate>
189.     </ns7:oadrReportDescription>
190.     <ns2:reportRequestID>0</ns2:reportRequestID>
191.     <ns2:reportSpecifierID>GROUP_OPERATIONAL_FORECAST_group123</ns2:reportSpecifierID>
192.     <ns2:reportName>x-METADATA_x-GROUP_OPERATIONAL_FORECAST</ns2:reportName>
193.     <ns2:createdDateTime>2020-10-11T23:54:22Z</ns2:createdDateTime>
194. </ns7:oadrReport>
195.     <ns2:venID>venID_CompanyName_54342</ns2:venID>
196. </ns7:oadrRegisterReport>
197. </ns7:oadrSignedObject>
198. </ns7:oadrPayload>

```

VTN -> VEN oadrCreateReport Payload (Operational Forecast Reporting Use Case, Operational Forecast Report)

```

40. <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
41. <ns7:oadrPayload xmlns="http://www.w3.org/2000/09/xmldsig#" xmlns:ns10="http://www.opengis.net/gml
   /3.2" xmlns:ns11="http://docs.oasis-
   open.org/ns/emix/2011/06/siscale" xmlns:ns12="http://www.w3.org/2009/xmldsig11#" xmlns:ns13="urn:u
   n:unece:uncefact:codelist:standard:5:ISO42173A:2010-04-07" xmlns:ns2="http://docs.oasis-
   open.org/ns/energyinterop/201110" xmlns:ns3="http://docs.oasis-
   open.org/ns/energyinterop/201110/payloads" xmlns:ns4="http://docs.oasis-
   open.org/ns/emix/2011/06" xmlns:ns5="urn:ietf:params:xml:ns:icalendar-
   2.0" xmlns:ns6="urn:ietf:params:xml:ns:icalendar-2.0:stream" xmlns:ns7="http://openadr.org/oadr-
   2.0b/2012/07" xmlns:ns8="http://www.w3.org/2005/Atom" xmlns:ns9="http://docs.oasis-
   open.org/ns/emix/2011/06/power" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
42.   <ns7:oadrSignedObject>
43.     <ns7:oadrCreateReport ns2:schemaVersion="2.0b">
44.       <ns3:requestID>requestID_4323</ns3:requestID>
45.       <ns7:oadrReportRequest>
46.         <ns2:reportRequestID>GROUP_OPERATIONAL_FORECAST_request1234</ns2:reportRequestID>
47.         <ns2:reportSpecifier>
48.           <ns2:reportSpecifierID>GROUP_OPERATIONAL_FORECAST_group123</ns2:reportSpecifierID>
49.           <ns5:granularity>
50.             <ns5:duration>PT1H</ns5:duration>
51.           </ns5:granularity>
52.           <ns2:reportBackDuration>
53.             <ns5:duration>PT24H</ns5:duration>
54.           </ns2:reportBackDuration>
55.           <ns2:reportInterval>
56.             <ns5:properties>
57.               <ns5:dtstart>
58.                 <ns5:date-time>2020-10-11T23:58:30Z</ns5:date-time>
59.               </ns5:dtstart>
60.               <ns5:duration>
61.                 <ns5:duration>PT0M</ns5:duration>
62.               </ns5:duration>
63.             </ns5:properties>
64.           </ns2:reportInterval>
65.           <ns2:specifierPayload>
66.             <ns2:rID>GROUP_OPERATIONAL_FORECAST_powerReal</ns2:rID>
67.             <ns2:readingType>x-notApplicable</ns2:readingType>
68.           </ns2:specifierPayload>
69.         </ns2:reportSpecifier>
70.       </ns7:oadrReportRequest>
71.       <ns2:venID>venID_CompanyName_54342</ns2:venID>
72.     </ns7:oadrCreateReport>
73.   </ns7:oadrSignedObject>
74. </ns7:oadrPayload>

```

VEN -> VTN oadrUpdateReport Payload (Operational Forecast Reporting Use Case, Operational Forecast Report)

```

1. <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2. <ns7:oadrPayload xmlns="http://www.w3.org/2000/09/xmldsig#" xmlns:ns10="http://www.opengis.net/gml
   /3.2" xmlns:ns11="http://docs.oasis-
   open.org/ns/emix/2011/06/siscale" xmlns:ns12="http://www.w3.org/2009/xmldsig11#" xmlns:ns13="urn:u
   n:unece:uncefact:codelist:standard:5:ISO42173A:2010-04-07" xmlns:ns2="http://docs.oasis-
   open.org/ns/energyinterop/201110" xmlns:ns3="http://docs.oasis-
   open.org/ns/energyinterop/201110/payloads" xmlns:ns4="http://docs.oasis-
   open.org/ns/emix/2011/06" xmlns:ns5="urn:ietf:params:xml:ns:icalendar-
   2.0" xmlns:ns6="urn:ietf:params:xml:ns:icalendar-2.0:stream" xmlns:ns7="http://openadr.org/oadr-
   2.0b/2012/07" xmlns:ns8="http://www.w3.org/2005/Atom" xmlns:ns9="http://docs.oasis-
   open.org/ns/emix/2011/06/power" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
3.   <ns7:oadrSignedObject>
4.     <ns7:oadrUpdateReport ns2:schemaVersion="2.0b">
5.       <ns3:requestID>requestID_4324</ns3:requestID>
6.       <ns7:oadrReport>
7.         <ns5:dtstart>
8.           <ns5:date-time>2020-10-11T00:00:00Z</ns5:date-time>
9.         </ns5:dtstart>
10.        <ns6:intervals>
11.          <ns2:interval>
12.            <ns5:dtstart>
13.              <ns5:date-time>2020-10-11T00:00:00Z</ns5:date-time>
14.            </ns5:dtstart>
15.            <ns7:oadrReportPayload>
16.              <ns2:rID> GROUP_OPERATIONAL_FORECAST_powerReal</ns2:rID>
17.              <ns2:confidence>100</ns2:confidence>
18.              <ns2:accuracy>0.0</ns2:accuracy>
19.              <ns2:payloadFloat>
20.                <ns2:value>110.0</ns2:value>
21.              </ns2:payloadFloat>
22.              <ns7:oadrDataQuality>Quality Good - Non Specific</ns7:oadrDataQuality>
23.            </ns7:oadrReportPayload>
24.          </ns2:interval>
25.          <ns2:interval>
26.            <ns5:dtstart>
27.              <ns5:date-time>2020-10-11T01:00:00Z</ns5:date-time>
28.            </ns5:dtstart>
29.            <ns7:oadrReportPayload>
30.              <ns2:rID> GROUP_OPERATIONAL_FORECAST_powerReal</ns2:rID>
31.              <ns2:confidence>100</ns2:confidence>
32.              <ns2:accuracy>0.0</ns2:accuracy>
33.              <ns2:payloadFloat>
34.                <ns2:value>115.0</ns2:value>
35.              </ns2:payloadFloat>
36.              <ns7:oadrDataQuality>Quality Good - Non Specific</ns7:oadrDataQuality>
37.            </ns7:oadrReportPayload>
38.          </ns2:interval>
39.          <!--22 ADDITIONAL INTERVALS OF DATA 1 HOUR APART -->
40.        </ns6:intervals>
41.      <ns2:eiReportID>RP_54321</ns2:eiReportID>
42.      <ns2:reportRequestID>GROUP_OPERATIONAL_FORECAST_request1234</ns2:reportRequestID>
43.      <ns2:reportSpecifierID>GROUP_OPERATIONAL_FORECAST_group123</ns2:reportSpecifierID>
44.      <ns2:reportName>x-GROUP_OPERATIONAL_FORECAST</ns2:reportName>
45.      <ns2:createdDateTime>2020-10-11T23:59:27Z</ns2:createdDateTime>
46.    </ns7:oadrReport>
47.  <ns2:venID>venID_venID_CompanyName_54342</ns2:venID>
48. </ns7:oadrUpdateReport>

```

```
49.     </ns7:oadrSignedObject>  
50. </ns7:oadrPayload>
```

## Appendix A - Use Case Characteristic Template

This table provides template for defining each OpenADR use case.

Use Case Characteristic Template	
Characteristic	Description
Use Case Objective	A few sentences that communicate the value proposition of the use case.
Description	A more detailed, but still high level, description of the use case. Could include diagram if need be.
Customer Segment	Targeted customer segment such as residential, small business, industrial, etc.
Signaling end point	Who is the entity that will receive the event signaling from the utility and/or generate reports for upstream? Primary usage is to identify if an aggregator is the endpoint.
Benefit	What is the upside for the customer and/or utility of this use case?
Target Load	What is the target load for event-based use cases in terms of resource type or capacity?
Event Signals	Which event signals will be used for this use case in terms of signal name, signal type, units of measure, and other characteristics?
Custom Error Codes	An articulation of error codes in the OpenADR profile specification as they apply to this implementation.
Event Time Frames	-How often are events called? -How often do rates change that drive events? -How much advance notice needs to be provided? -What is the granularity of interval data in events?
Event Randomization	Are events randomized?
Event Ramp Up / Recovery	Are ramp up or recovery times specified as part of event?
Event Opt Responses	-Are VENs required to respond with an OptIn or OptOut response? -Can VENs opt back in after opting out? -Are there any constraints on the VENs ability to effectively cancel or modify an event? -Will the use case use the Opt service to qualify resources participating in events (partial resource participation)?

Use Case Characteristic Template	
Characteristic	Description
Event Targeting	Which eiTarget enumerations will be including in Events to provide guidance to the VEN regarding the resources that should modify their load profile as indicated by the event signal interval data?
Event Signal Level Targeting	-Will signals be qualified by device class enumerations and if so, which device classes are likely to be used? -Will multiple instances of the same identical signal be used in the same event, differentiated by signal ID?
Reports	-Which reports types will be used for this use case in terms of the following characteristics: -Report Name -Report Type -Reading Type -Units -What is the granularity required for reporting data as reflected in the reportDataSource object? May drive number of reports required.
Report Data Points	-What are the data points that will be support for each report in terms of report type, reading type, and unit of measure? -If well know names will be used for rid's in the report payloads, please enumerate those names and how them map to the data points
Report Request Characteristics	-Will reports be one shot or periodic? -For periodic, what will be the typical granularity of data required? -Will the same granularity be available for all data point types? -How often should periodic reports be delivered? -Will periodic report delivery expire or be open ended? -Will there potentially be holes in the data requiring async UpdateReports to correct?
Polling	-What will be a typical polling interval? -Will there be a need to have more frequent bursts of polling?
Sequence Diagram	-Reference to sequence diagram showing payload interactions
Other	-Other characteristics, such as inclusion of marketContext



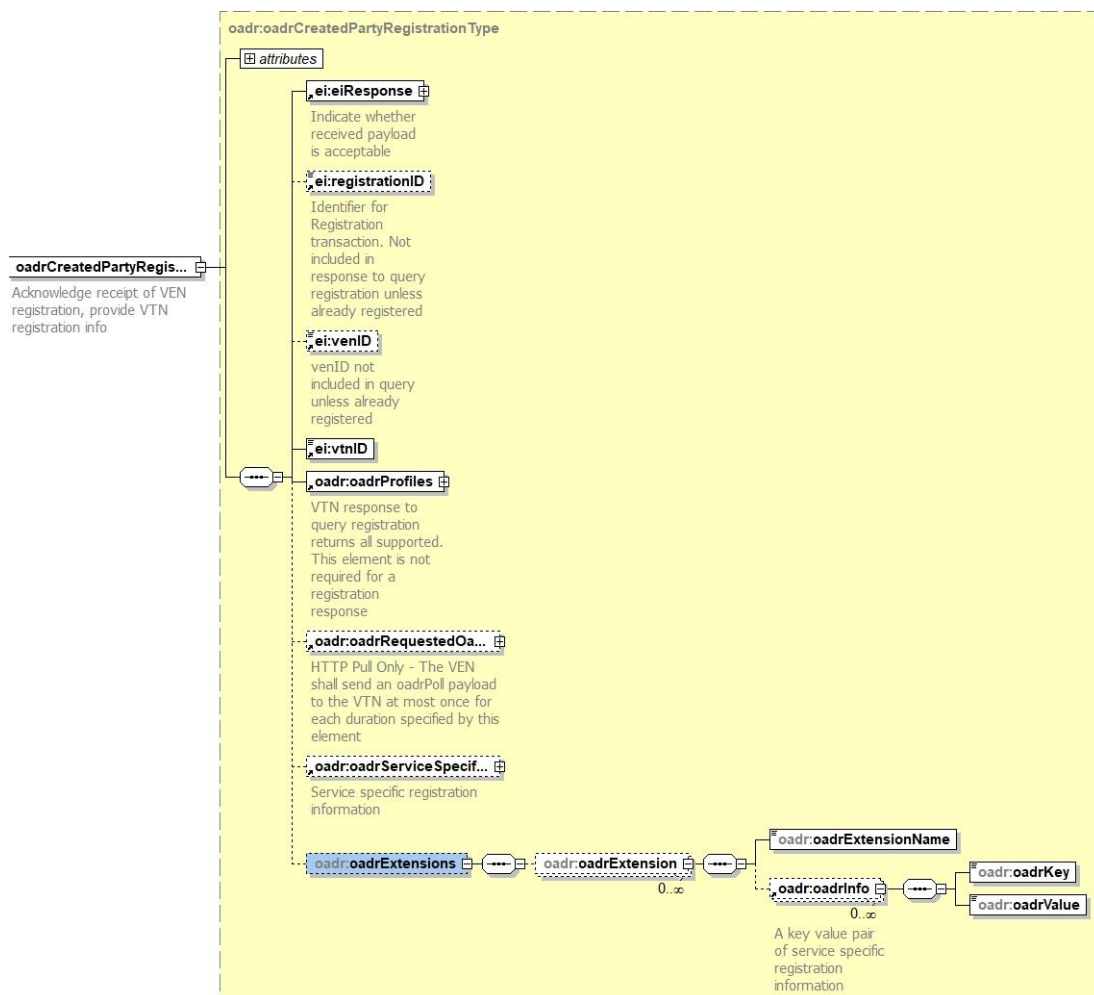
## Appendix B – Dynamic Grouping Details

### Overview

SMUD will utilize the OpenADR protocol to dynamically cluster a population of resources associated with a VEN and given a marketContext into one or more groups. Each group defined would result in offering reports from the VEN containing the aggregate data from the resources associated with that group (i.e. the groupId may appear in the reportDataSource object of the metadata report). These same groupIDs would be utilized to target events at the resources mapped to a given group. This appendix provides guidance on how the oadrCreatedPartyRegistration oadrExtensions object can be utilized to accomplish this objective.

### oadrExtensions Object Usage

In OpenADR the VEN always initiates registration using the oadrCreatePartyRegistration payload. The VTNs response to this payload is oadrCreatedPartyRegistration and this is where the oadrExtensions object lives. This object allows a VTN to communicate a set of key value pairs associated with some extension to OpenADR's capabilities.



The idea is to implement the marketContext to group mapping and group to resource mapping by utilizing the ability to define one or more extensions with one or more key value pairs in each extension. Group and resource naming conventions will follow the SMUD OpenADR Implementation Design Guide.

The following XML example shows how mapping of marketContexts to groups to resources would be implemented. The first type of oadrExtension will have the name of an enrolled marketContext with key value pairs consisting of an index value as a key and values containing each group name within the marketContext. The first oadrExtension will have the name of an enrolled marketContext with key value pairs consisting of an index value as a key and a value containing the group name. Group names will be utilized as subsequent oadrExtension names, with key value pairs being an index and resource name. Thus, mapping a marketContext to a set of group names and a group name to a set of resource identifiers

```
<oadr:oadrCreatedPartyRegistration>
...
  <oadr:oadrExtensions>
    <oadr:oadrExtension>
      <oadr:oadrExtensionName> http://marketContext 1 </oadr:oadrExtensionName>
      <oadr:oadrInfo>
        <oadr:oadrKey>1</oadr:oadrKey>
        <oadr:oadrValue>groupID_rateplan123</oadr:oadrValue>
      </oadr:oadrInfo>
      ... (repeat block for each additional groupID belonging to marketContext)
    </oadr:oadrExtension>
    ... (repeat block for each additional market context assigned to VEN)
    <oadr:oadrExtension>
      <oadr:oadrExtensionName>groupID_rateplan123</oadr:oadrExtensionName>
      <oadr:oadrInfo>
        <oadr:oadrKey>1</oadr:oadrKey>
        <oadr:oadrValue>resourceID_lighting_4313</oadr:oadrValue>
      </oadr:oadrInfo>
      <oadr:oadrInfo>
        <oadr:oadrKey>2</oadr:oadrKey>
        <oadr:oadrValue>resourceID_lighting_7214</oadr:oadrValue>
      </oadr:oadrInfo>
      <oadr:oadrInfo>
        <oadr:oadrKey>3</oadr:oadrKey>
        <oadr:oadrValue>resourceID_lighting_3144</oadr:oadrValue>
      </oadr:oadrInfo>
      ... (repeat block for each additional resource assigned to groupID)
    </oadr:oadrExtension>
    ... (repeat block for each additional groupID)
  </oadr:oadrExtensions>
</oadr:oadrCreatedPartyRegistration>
```

## Grouping Rules

- GroupIDs must not appear in the definition of more than one marketContext
- Groups may include ONLY resourceIDs associated with the VEN and marketContext
- resourceIDs must not appear in the definition of more than one group
- A VEN will ignore any resources that it does not recognize.
- The VTN will cancel all future events for a group prior to changing its resources mapping
- When a group's resources mapping changes, prior forecasts will be considered invalid

## Payload Interactions

The following are some basic pull payload interaction patterns showing how group names would get initialized and updated assuming the XML example on the prior page is utilized. These interaction patterns share a common usage model with respect to the VENs ability to recognize and respond to Events targeted at these groups or to generate reports containing data from the resources mapped to these groups.

When a VEN discovers that it is not in a registered state with the VTN (typically after power up or a probe with `oadrQueryRegistration`), it is required to do a full bootstrap sequence which includes an exchange of registration payloads, an exchange of reporting capabilities, and a request by the VEN for its initial set of events. Behavior as part of this process bootstrap relevant to grouping includes....

1. The VTN will communicate the group to resource mapping in its `oadrCreatedPartyRegistration` response
2. The VEN shall include metadata reports in its `oadrRegisterReport` payload for all groups contained in the mapping provided by the VTN, as well as an aggregate report for all groups. If the VEN is not able to immediately dispatch events or generate reports for a given group, it should leave the `reportDataSource` element empty, indicating to the VTN that event dispatches or report requests for this group may result in indeterminate results.
3. After completion of the bootstrap sequence, the VEN should periodically publish updates to the metadata reports via `oadrRegisterReport` as it gains the capability to reliably respond to events or report requests for given groups. Metadata report for groups that can be responded to reliably should have the `reportDataSource` element populated with the relevant `groupID`, indicating to the VTN that a group is ready to provide reliable response behavior. The updating of the `oadrRegisterReport` will require the VTN to re-request all periodic reports.
4. The `reportdatasource` element of the aggregate report for all groups should leave the `reportDataSource` empty until all groups have reliable report data, then the `reportDataSource` should be changed to the `venID` and a new metadata report published.

Should a VEN or VTN trigger a reregistration while already in a registered state, resulting in an update to the group to resource mapping in the `oadrCreatedPartyRegistration` payload, the VEN should immediately publish an `oadrRegisterReport` payload with metadata reports for groups in the revised mapping. The content of this initial `oadrRegisterReport` and subsequent `oadrRegisterReports` shall follow the patterns noted in item 2 and 3 above for the `reportDataSource` element.

## Payload Exchange Sequences

The bootstrap registration process would look like this...

VEN	Payload	VTN	Comment
	<code>oadrCreatePartyRegistration &gt;&gt;&gt;&gt;&gt;</code>		VEN initiates the registration process
	<code>&lt;&lt;&lt;&lt;&lt;oadrCreatedPartyRegistration</code>		VTN response with group to resource mapping in <code>oadrExtensions</code>

	oadrRegisterReport>>>>>		VEN offers 3 reports for marketContext 'A', one each with reportDataSource containing "venID", "groupID_rateplan123" and "groupID_otherplan_456". Offered reports would contain aggregate data from the resources mapped to the VEN orgroups in the oadrCreatedPartyRegistration payload.
	<<<<<oadrRegistered Report		VTN acknowledges receipt of the register report from the VEN
	<Balance of bootstrap>		Balance of the startup bootstrap
	<VTN requests reports>		
	<VTN dispatches Events>		
	<VEN publishes metadata reports>		As group resources come online

**If the VTN would like to update its group to resource mapping, then it would do the following....**

VEN	Payload	VTN	Comment
	oadrPoll>>>>>		Normal polling
	<<<<<oadrRequestReregistration		VTN asks the VEN to reinitiate registration
	oadrCreatePartyRegistration >>>>>		VEN reinitiates the registration process including the current registrationID and venID in the payload
	<<<<<oadrCreatePartyRegistration		VTN response with updated group to resource mapping in oadrExtensions
	oadrRegisterReport>>>>>		VEN offers updated reports based on revised group to resource mapping
	<<<<<oadrRegistered Report		VEN acknowledges receipt of the register report from the VEN
	<VTN requests reports>		
	<VTN dispatches Events>		
	<VEN publishes metadata reports>		As group resources come online

**If the VEN reboots and forgets what its group to resource mapping, there are two possible sequences**

**Sequence 1 – not in a registered state**

VEN	Payload	VTN	Comment
	oadrQueryRegistration >>>>>		VEN probes to see if it is in a registered state
	<<<<<oadrCreatedPartyRegistration		VTN response with no registrationID or venID in payload, but does include group to resource mapping in oadrExtensions
	oadrCreatePartyRegistration >>>>>		VEN initiates the registration process
	<<<<<oadrCreatedPartyRegistration		VTN response with group to resource mapping in oadrExtensions

	oadrRegisterReport>>>>>		VEN offers reports based on mapping between groups and resources just received
	<<<<<oadrRegistered Report		VEN acknowledges receipt of the register report from the VEN
	<Balance of bootstrap>		Balance of the startup bootstrap
	<VTN requests reports>		VTN requests reports
	<VTN dispatches Events>		
	<VEN publishes metadata reports>		As group resources come online

### Sequence 2 – still in a registered state

	oadrQueryRegistration >>>>>		VEN probes to see if it is in a registered state
	<<<<<oadrCreatedPartyRegistration		VTN response includes a registrationID and venID in payload, in addition to group to resource mapping in oadrExtensions
	oadrRegisterReport>>>>>		VEN offers reports based on mapping between groups and resources just received.
	<<<<<oadrRegistered Report		VEN acknowledges receipt of the register report from the VEN
	<VTN requests reports>		VTN requests reports
	<VTN dispatches Events>		
	<VEN publishes metadata reports>		As group resources come online