IRC Smart Grid Standards Development Project

Base Case Business Process Models

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Table of Contents

Tables

Figures

Overview

This document describes the End-to-End business process flows relating to the communications between the System Operator (SO) and the Demand Response Provider (DRP) common to all ISOs/RTOs that offer opportunities for demand resources to participate in wholesale electricity markets. The business process flows will be described in the context of use cases. This introduction describes the actors, scope, conventions and use case dimensions used throughout these use cases. A glossary of terms in provided in Appendix A.

Actors

Table 1 – Actor Roles

Term	Acronym	Definition
System Operator	PA	A role which carries the responsibility of administering the demand response process, from ***Resource*** enrollment to performance evaluation.
Demand Response Provider	DRP	A role which carries the responsibility of coordinating demand resources to deliver demand response services.
Scheduling Entity	SE	A role which carries the responsibility of submitting bids/offers and receives ***Schedules*** and ***Awards***.
Designated Dispatch Entity	DDE	A role which carries the responsibility of receiving and processing demand resource dispatch instructions or market information and (optionally) providing response information.
Load Serving Entity	LSE	A role which carries the responsibility of serving end-users and selling electric energy to end-users.
Utility Distribution Company	UDC	A role which carries the responsibility of operating an electricity distribution system.
Metering Authority	MA	A role which carries the responsibility of providing data necessary to determine the performance of a ***Resource.***

Assumptions

Scope

1. Market participant registration and Settlements are excluded.
2. All entities are registered through the standard ISO/RTO market participant registration process, including creditworthiness.
3. Inter-system and intra-system operator information exchanges are excluded from the scope of this effort (e.g., control room operating procedures as they pertain to operation of the market and maintaining reliability).
4. Planning functions are out of scope; this includes long-term load forecasting and transmission planning.
5. Capacity auctions/awards processes are external to this effort.
6. Specific SO market rules, calculations and algorithms will not be addressed.
7. Performance evaluation models may vary by SO.
8. Security is implicit in the market design.
9. Each ISO/RTO has its own, established send message or communication infrastructure.

General

1. Outputs from previous flows are inputs to following flows.
2. A single entity may have multiple roles (e.g., a participant can function in the roles of DDE and MA).
3. The process flows describe the standard path. Subsequent use cases will address exceptions other than standard data validation procedures.

Document Conventions

1. Glossary terms are shown in bold, italics.

Use Cases

The use cases presented in this document represent a combination of four dimensions of demand response participation in wholesale markets: product, dispatch type, deployment, performance evaluation method as shown in the table below.

Table 2 - Use Case Dimensions

Product	Dispatch	Deployment	Performance Evaluation Method
Energy	Reliability	Resource	Baseline
Reserve	Economic	Self	Maximum Base Load (MBL)
Regulation		Bulk	Meter Before/Meter After (MB/MA)
Capacity			Meter Generation Output (MGO)

These four dimensions produce 96 possible use case combinations, as shown in Appendix B.

This document illustrates the process flows for two "base case" combinations that are considered to be representative of the most common types of demand response in wholesale electricity markets today:

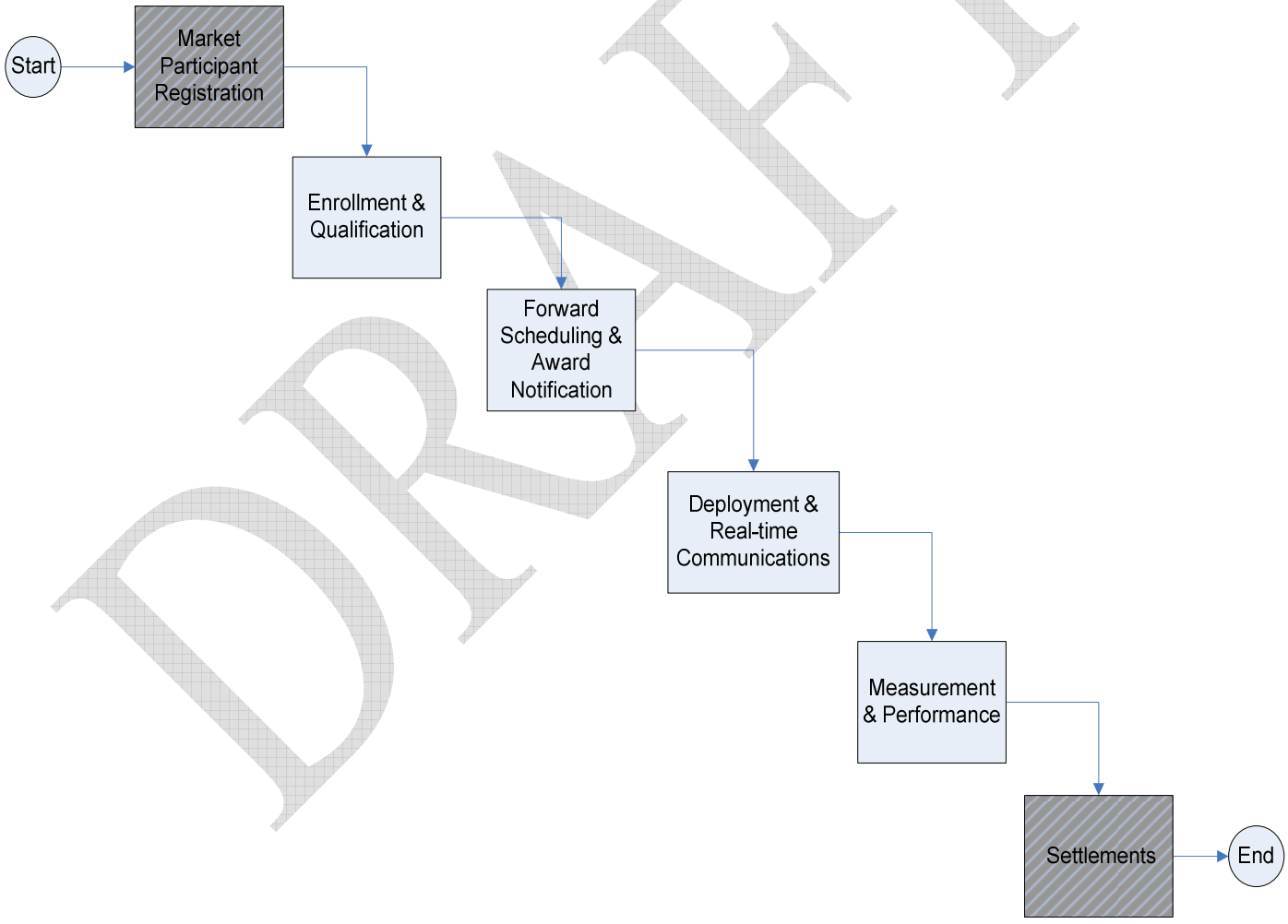
- **Use Case 6**: Energy market, Bulk Deployment of demand resources under emergency conditions (reliability) with a Baseline performance evaluation method, and
- **Use Case 11:** Energy market, Resource-Specific Deployment based on Economics with a Baseline performance evaluation method.

Additional use cases for demand response and other technologies will be developed using the process flows from these base cases. Appendix B contains the complete list of use case combinations and identifies which ISOs and RTOs currently have demand response programs that apply to the use cases.

Activity Diagrams & Data Flow

The Demand Response End-to-End business process flow for the communications between the System Operator (SO) and the Demand Response Provider (DRP) is comprised of four major functions: Registration and Qualification, Day-Ahead/Hour-Ahead Scheduling and Award Notification, Deployment and Real-Time Communications, and Measurement and Performance. Two additional processes, Market Participant Registration and Settlements, are shown in the high-level business process flow, but are considered outside the scope of what is required for the communications flow for demand response.

Figure 1 - Demand Response



Enrollment and Qualification

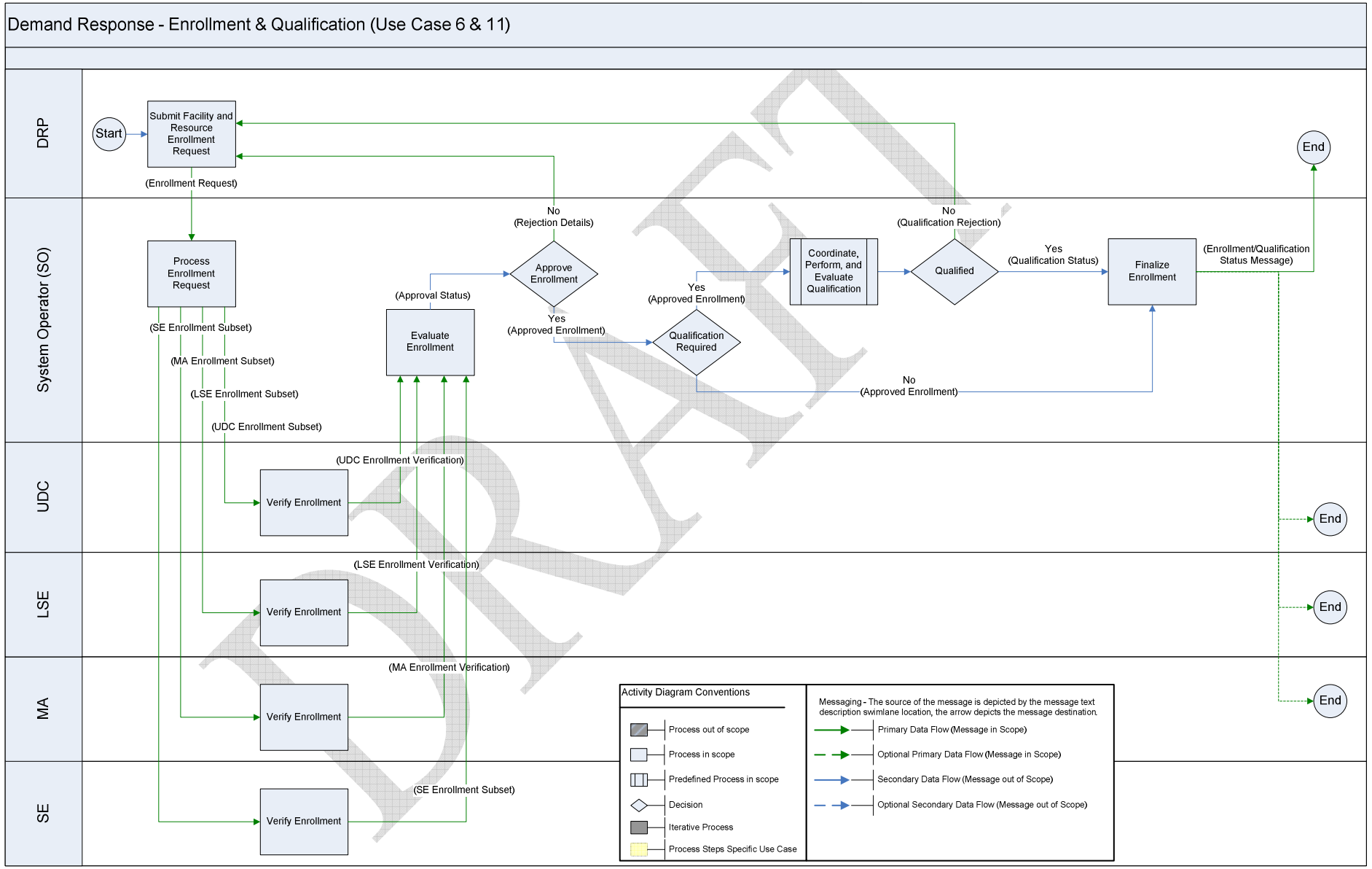
Overview: The Registration and Qualification process documents the steps required to enroll a ***Facility*** or ***Resource*** in a wholesale demand response program.

Use Cases: The entire process described below applies to both Use Case 6 and Use Case 11.

- The process begins when the ***DRP*** submits an enrollment request to the ***SO***.
- The ***SO*** processes the enrollment request, which may include interactions with the ***UDC***, ***LSE***, and/or ***MA***.
- The ***SO*** evaluates the enrollment request, which may include verification information from the ***UDC***, ***LSE***, and/or ***MA***.
- The result of the evaluation is the approval or rejection of the enrollment request.
    - If the enrollment request has been rejected, the ***SO*** sends information to the ***DRP***, indicating the rejection details.
    - If the enrollment request has been approved, a determination is made by the ***SO*** as to whether qualification of the ***facility***'s or ***resource***'s capability is required prior to final approval.
        - If no qualification is required, the ***SO*** sends information to the ***DRP***, indicating the approval of the enrollment.
        - If qualification is required, the ***SO*** coordinates the qualification procedure with the ***DRP***.
            - If the ***facility*** or ***resource*** has failed to qualify, the ***SO*** sends information to the ***DRP***, indicating the qualification rejection details.
            - If the ***facility*** or ***resource*** achieves qualification, the ***SO*** sends information to the ***DRP*** and enrollment is finalized.
- At the end of the Registration and Qualification process, the ***SO*** finalizes enrollment, notifies the ***DRP*** and may also notify the ***UDC***, ***LSE***, and/or ***MA***.

Activity Diagram and Data Flow:

Figure 2 - Enrollment and Qualification



Day-Ahead/Hour-Ahead Scheduling and Award Notification

Overview: The Day-Ahead/Hour-Ahead Scheduling and Award Notification process describes the process from offer submission to day-ahead or hour-ahead award notification. This process also includes the supplemental commitment and reassessment of reliability to determine whether demand resources that are enrolled in reliability-based (emergency) demand response programs should be advised day-ahead of a possible reliability deployment.

Use Cases: The process flow outside of the highlighted box applies to Use Case 11. The process flow within the highlighted box applies to Use Case 6.

Use Case 11: Economic Energy Process

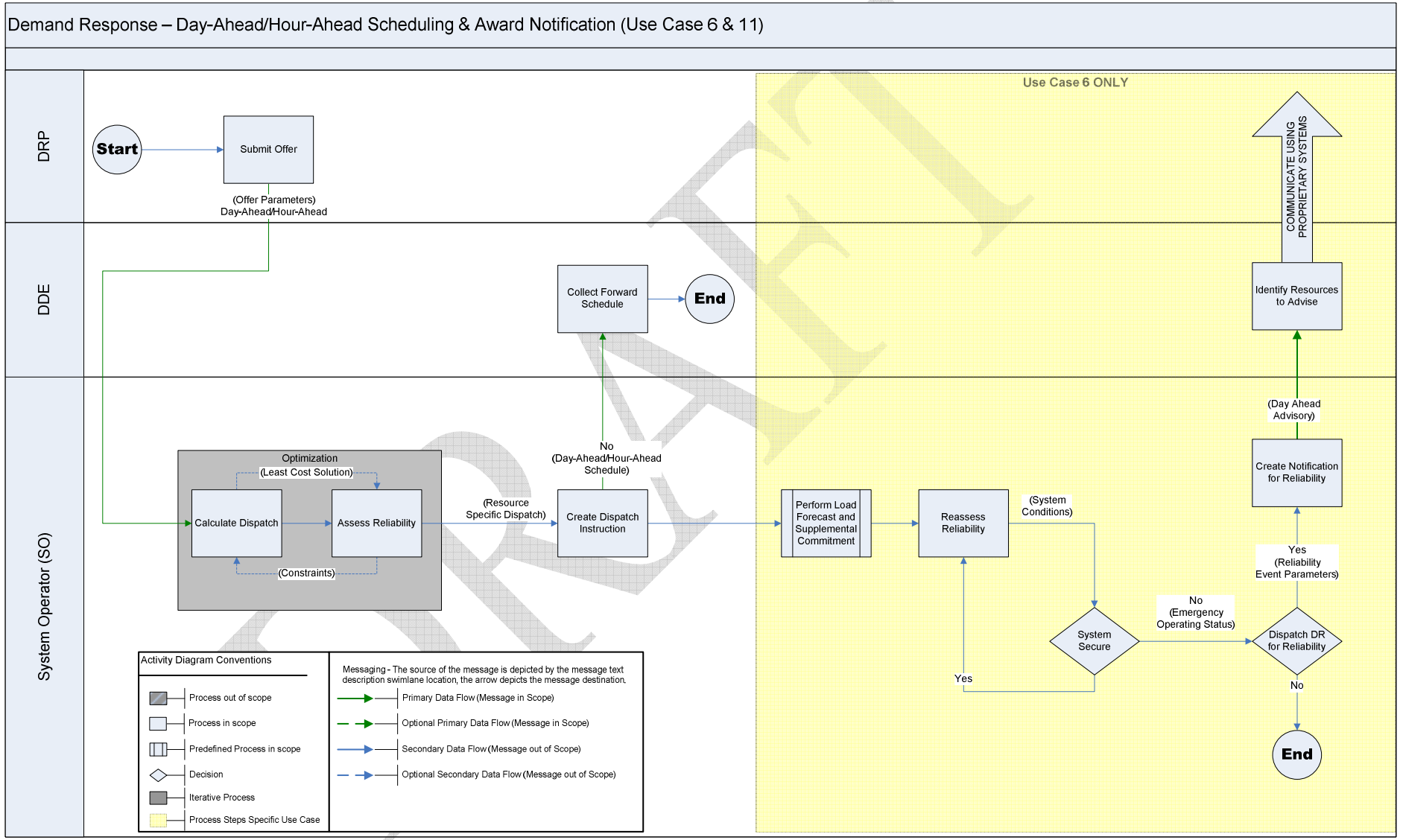
- The process for Use Case 11 begins when the DRP submits a supply offer to the ***SO***.
- The ***SO*** evaluates the offer through its optimization process for solving economic dispatch.
- The resulting resource-specific dispatch information is transformed into dispatch instructions by the ***SO***.
- The ***SO*** makes the day-ahead or hour-ahead schedule available.
- The ***DRP*** collects its forward schedule.

Use Case 6: Reliability Event Process

- The process for Use Case 6 begins after resource-specific dispatch instructions have been created by the ***SO*** through the normal supply resource dispatch process.
- The ***SO*** performs the Load Forecast and Supplemental Commitment process after the day-ahead or hour-ahead market has been settled. Reliability is reassessed by the ***SO*** to determine whether the system is secure (sufficient supply to meet forecasted load conditions).
    - If ***SO*** determines that the system is secure, no demand response advance notification is required and reliability is assessed by the ***SO*** at the next interval.
    - If ***SO*** determines that an emergency operating condition is expected, the ***SO*** decides whether to dispatch demand response for reliability.
        - If demand response will not be dispatched, the process ends.
        - If the ***SO*** determines that demand response will be provided with an advance notification, the reliability event parameters are prepared by the ***SO*** to create a reliability event notification.
            - The advance notification message is sent to the ***DDE***.
            - The ***DDE*** identifies the demand resources to notify and relays the message to ***DRP***s through the proprietary communication system of the ***DDE***.

Activity Diagram and Data Flow:

Figure 3 - Day-Ahead/Hour-Ahead Scheduling and Award Notification



Deployment and Real-Time Communications

Overview: The Deployment and Real-Time Communication process describes the process for real-time communications to demand resources providing market-based services on a real-time basis and day-of dispatch for reliability-based (emergency) demand response programs. The process flows and descriptions below reflect a sequential nature to the real-time process solely for the purposes of describing the process of the real-time data flow; the real-time communication process for Use Case 11 simultaneously scans and updates in the same step.

Use Cases: The process flow outside of the highlighted box applies to Use Case 11. The process flow within the highlighted box applies to Use Case 6.

Use Case 11: Economic Energy Process

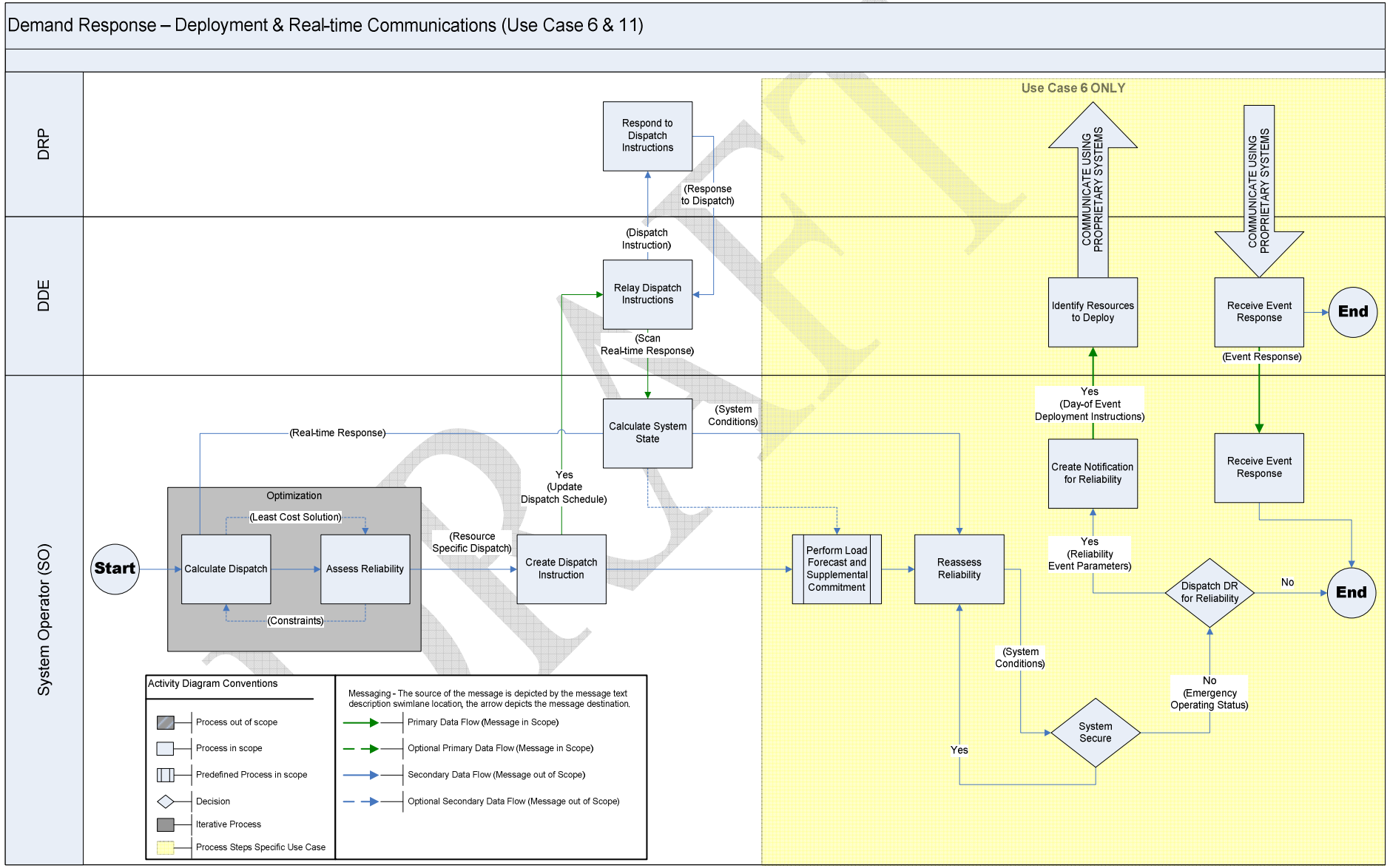
- The process for Use Case 11 begins when the ***SO*** evaluates real-time system conditions through its optimization process.
- The resulting resource-specific real-time dispatch information is transformed into dispatch instructions by the ***SO***.
- The ***SO*** sends the dispatch schedule to the ***DDE.***
- The ***DDE*** relays the real-time dispatch instruction to the ***DRP***.
- The ***DRP*** sends response information to the ***DDE***.
- The ***SO*** collects real-time response from the ***DDE*** for evaluating the next interval.

Use Case 6: Reliability Event Process

- The process for Use Case 6 begins after resource-specific dispatch instructions have been created by the ***SO*** through the normal supply resource dispatch process.
- The ***SO*** performs the Load Forecast and Supplemental Commitment process after the interval has been dispatched. Reliability is reassessed by the ***SO*** to determine whether the system is secure (sufficient supply to meet forecasted load conditions).
    - If ***SO*** determines that the system is secure, no demand response advance notification is required and reliability is assessed by the ***SO*** at the next interval.
    - If ***SO*** determines that an emergency operating condition is expected, the ***SO*** decides whether to dispatch demand response for reliability.
        - If demand response will not be dispatched, the process ends.
        - If the ***SO*** determines that demand response should be dispatched, the reliability event parameters are prepared by the ***SO*** to create a reliability event notification.
            - The deployment instructions are sent to the ***DDE***.
            - The ***DDE*** identifies the demand resources to ploy and relays the message to ***DRP***s through the proprietary communication system of the ***DDE***.
        - Real-time or near real-time response data may be provided to the ***DDE*** from the ***DRP*** using the proprietary communication system of the ***DDE***.
            - The ***DDE*** may receive the event response data, but the ***DDE*** may or may not send it to the ***SO*** in real-time or near real-time.

Activity Diagram and Data Flow:

Figure 4 - Deployment and Real-Time Communications



Measurement and Performance

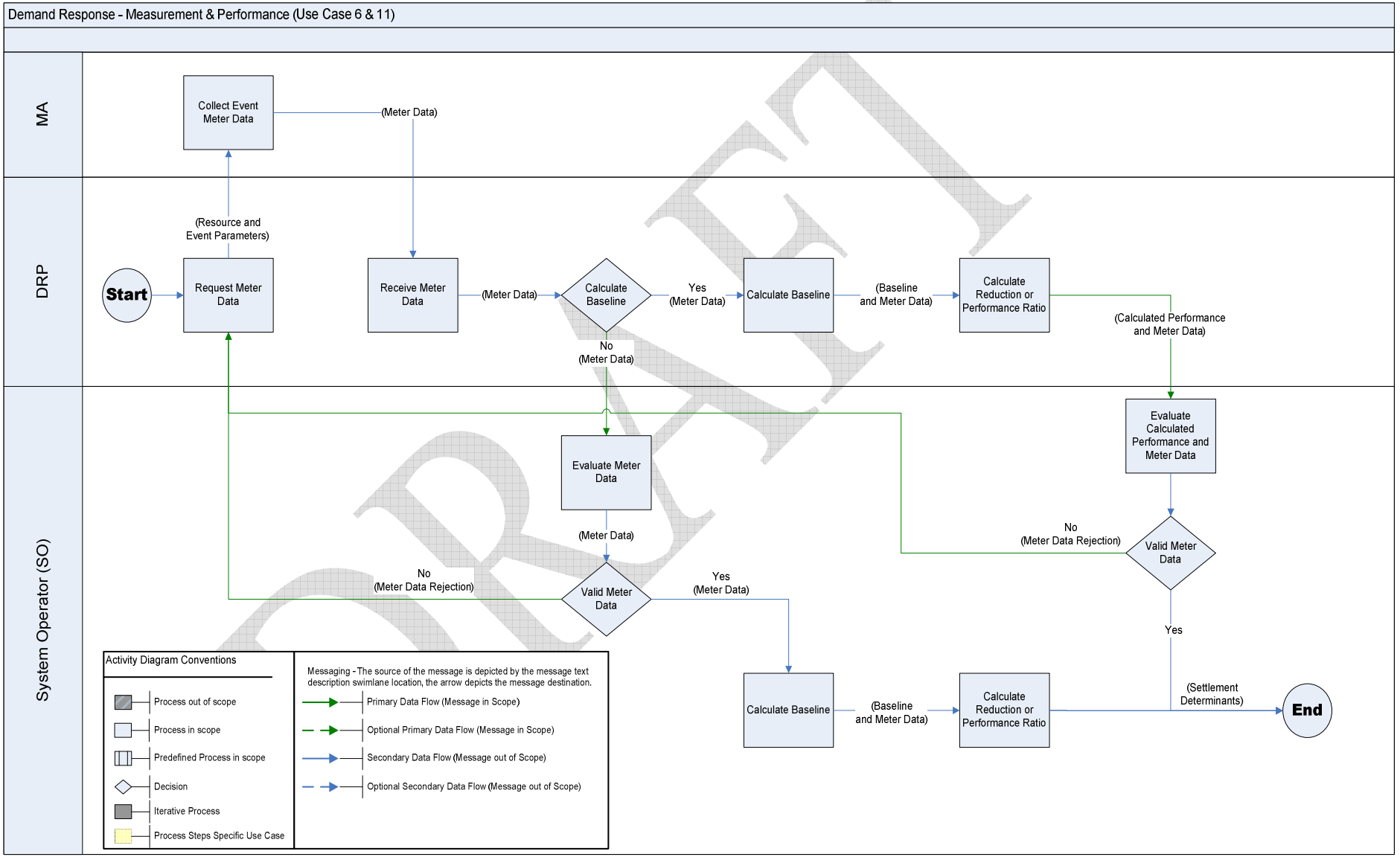
Overview: The Measurement and Performance process documents the steps to collect demand resource meter data and prepare the determinants for settlement.

Use Cases: The entire process described below applies to both Use Case 6 and Use Case 11.

- The process begins when the ***DRP*** requests event meter data from the ***MA***.
- The ***MA*** sends the event meter data to the ***DRP***.
- If the **DRP** is required to calculate the baseline, the **DRP** uses the event meter data to calculate the baseline.
    - The ***DRP*** uses the baseline and event meter data to calculate the event reduction amount or event performance ratio.
    - The ***DRP*** sends the calculated event performance and meter data to the ***SO***.
    - The ***SO*** evaluates the calculated event performance and meter data.
        - If the calculated event performance data are complete, the ***SO*** uses the settlement determinants in the Settlements process.
        - If the calculated event performance data are incomplete, the ***SO*** sends an event data rejection to the ***DRP***.
- If the ***SO*** calculates the baseline, the ***DRP*** sends the event meter data to the ***SO***.
    - If the event meter data are complete, the ***SO*** uses the event meter data to calculate the baseline.
        - The ***SO*** uses the baseline and event meter data to calculate the event reduction amount or event performance ratio.
        - The ***SO*** uses the settlement determinants in the Settlements process.
    - If the event meter data are incomplete, the ***SO*** sends an event data rejection to the ***DRP***

Activity Diagram and Data Flow:

Figure 5 - Measurement and Performance



Appendix A: Glossary of Terms

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Term	Acronym	Definition	Category	Source
Advance Notification(s)		One or more communications from the System Operator-or ~~Curtailment Service Provider~~ ***Demand Response Provider*** to ~~Demand~~ ***Resources*** of an impending ***Demand Response Event*** in advance of the actual event.	Demand Response Event Timing	NAESB M&V[1]
Aggregation of Retail Customers	**ARC**	See ***Resource.***	Resource Terms	(NEW)
Audit		A required step for certain Demand Response Programs after the ***Registration*** process, during which the System Operator monitors a Resource through the appropriate steps within ***Forward Scheduling & Award Notification***, ***Deployment & Real-Time Communications***, and ***Measurement & Performance Evaluation***.	Registration & Qualification	(NEW)
Award		The selection of a ***Resource*** to provide ancillary services or capacity for a future time period.	Forward Scheduling & Award Notification	(NEW)
Base Point		The economic active power base point, for units that are not dispatchable, this value represents the fixed generation value. The value must be between the operating low and high limits.	Deployment & Real-Time Communication	CIM (baseP)
Bulk Deployment		The ***System Operator*** issues dispatch instructions via established ***Communication Methods*** to a group or block of ***Resources*** designated to provide the demand response service.	Deployment Models	IRC M&V Matrix[2]

[1] ***NAESB M&V*** refers to the "**Business Practices for Measurement and Verification of Wholesale Electricity Demand Response**" ratified by the NAESB Executive Committee on March 16, 2009, available to NAESB members at http://www.naesb.org/member_login_form.asp?doc=fa_weq_2008_api5a.doc

[2] ***IRC M&V Matrix*** refers to the "**North American Wholesale Electricity Demand Response Program Comparison**"available at http://www.isorto.org/atf/cf/%7B5B4E85C6-7EAC-40A0-8DC3-003829518EBD%7D/IRC%20DR%20M&V%20Standards%20Implementation%20Comparison%20(2009-04-28).xls

Term	Acronym	Definition	Category	Source
Capacity Service		A type of Demand Response service in which Demand Resources are obligated over a defined period of time to be available to provide Demand Response upon deployment by the System Operator.	Demand Resource Services	NAESB M&V
Communication Method	**CM**	The mechanism, device, system, tool, and/or protocol used to communicate ***Dispatch*** instructions to a ***Resource*** and optionally receive response information from a ***Resource***.	Deployment & Real-Time Communication	(NEW)
Demand Aggregation Point	**DAP**	A market-dependent aggregation of ***Resources*** that may extend across multiple ***Locations,*** e.g. a demand response zone.	Resource Terms	(NEW)
Demand Response Event		***Demand Response Events*** shall be described using the terminology illustrated in Figure 1. The terminology used to describe the time periods and transitions in Figure 1 and the durations and applicability are optional unless otherwise specified by the ~~System Operator~~ ***System Operator***.	Demand Response Event Timing	NAESB M&V
Demand Response Facility	**DRF**	***See Facility.***	Resource Terms	(NEW)
Demand Response Provider	**DRP**	A role which carries the responsibility of coordinating ***Resources*** to deliver demand response services.	Entity Roles	(NEW)
Demand Response Resource	**DRR**	See ***Resource***.	Resource Terms	(NEW)
Deployment		The time at which a Demand Resource begins reducing Demand on the system in response to an instruction from the System Operator or ~~Curtailment Service Provider~~ ***Demand Response Provider***.	Demand Response Event Timing	NAESB M&V
Deployment Period		The time in a ***Demand Response Event*** beginning with the ***Deployment*** instruction and ending with the ***Release/Recall*** instruction.	Demand Response Event Timing	NAESB M&V

Term	Acronym	Definition	Category	Source
Dispatch		A real-time instruction to a ***Resource*** to move to a ***Base Point*** at a specific time (***Resource-Specific Deployment***); alternately, a set of real-time instructions to multiple ***Resources*** (***Bulk Deployment***)	Deployment & Real-Time Communication	(NEW)
Designated Dispatch Entity	**DDE**	A role which carries the responsibility of receiving and processing demand resource dispatch instructions or market information and (optionally) providing response information.	Entity Roles	(NEW)
Energy Service		A type of Demand Response service in which Demand Resources are compensated based on Demand reduction performance.	Demand Resource Services	NAESB M&V
Estimated Baseline Type-I		A Baseline Performance Evaluation methodology based on a Demand Resource's historical interval meter data which may also include other variables such as weather and calendar data.	Demand Resource Services	NAESB M&V
Estimated Baseline Type-II		A Baseline Performance Evaluation methodology that uses statistical sampling to estimate the electricity consumption of an Aggregated Demand Resource where interval metering is not available on the entire population.	Demand Resource Services	NAESB M&V
Facility		A logical entity that has a reportable interval level consumption, e.g. a site may also be a physical entity that may have its own meter, a neighborhood of homes that has a net meter, or an estimate of consumption of an aggregation of retail customers.	Resource Terms	(NEW)
Load Serving Entity	**LSE**	A role which carries the responsibility of serving end-users and selling electric energy to end-users.	Entity Roles	(NEW)
Location		Location of an individual service delivery point. For residential or most businesses, it is typically the location of a meter on the utility customer's premises. For transmission, it is the point(s) of interconnection on the transmission provider's transmission system where capacity and/or energy transmitted by the transmission provider is made available to the receiving party. The point(s) of delivery is specified in the Service Agreement.	Resource Terms	CIM (SDPLocation)

Term	Acronym	Definition	Category	Source
Market Participant	**MP**	An organization registered with the ***System Operator*** that may take on roles such as ***DRP, LSE, UDC, DDE, SE,*** and/or ***MA*** in accordance with the ***System Operator's*** market rules.	Entity Roles	(NEW)
Maximum Base Load	**MBL**	A performance evaluation methodology based solely on a Demand Resource's ability to reduce to a specified level of electricity consumption or demand , regardless of its electricity consumption or demand at Deployment.	Demand Resource Services	NAESB M&V
Meter Before / Meter After	**MB/MA**	Metering Before Deployment vs. Metering After Reduction Deadline: a performance evaluation methodology where electricity consumption or demand over a prescribed period of time prior to Deployment is compared to similar readings during the Sustained Response Period.	Demand Resource Services	NAESB M&V
Metering Authority	**MA**	A role which carries the responsibility of providing data necessary to determine the performance of a ***Resource.***	Entity Roles	(NEW)
Metering Generator Output	**MGO**	A performance evaluation methodology, used when a generation asset is located behind the Demand Resource's revenue meter, in which the Demand Reduction Value is based on the output of the generation asset.	Demand Resource Services	NAESB M&V
Normal Operations		The time following ***Release/Recall*** at which a System Operator may require a ~~Demand~~ ***Resource*** to have returned its Load consumption to normal levels, and to be available again for ***Deployment.***	Demand Response Event Timing	NAESB M&V
Notification		The transmittal of ***Schedule*** or ***Award***.	Forward Scheduling & Award Notification	(NEW)
Qualification		A required step for certain Demand Response Programs within the ***Registration*** process, during which the ***System Operator*** monitors a Resource through the appropriate steps within ***Forward Scheduling & Award Notification***, ***Deployment & Real-Time Communications***, and ***Measurement & Performance Evaluation***.	Registration & Qualification	(NEW)

Term	Acronym	Definition	Category	Source
Ramp Period		The time between ***Deployment*** and ***Reduction Deadline***, representing the period of time over which a ~~Demand~~ ***Resource*** must achieve its change in Load.	Demand Response Event Timing	NAESB M&V
Recovery Period		The time between ***Release/Recall*** and ***Normal Operations***, representing the window over which ~~Demand~~ ***Resources*** may be required to return to their normal Load levels.	Demand Response Event Timing	NAESB M&V
Reduction Deadline		The time at the end of the ***Ramp Period*** when a ~~Demand~~ ***Resource*** is required to have met its ***Demand Reduction Value*** obligation.	Demand Response Event Timing	NAESB M&V
Regulation Service		A type of Demand Response service in which Demand Resources increase and decrease Load in response to real-time signals from the System Operator.	Demand Resource Services	NAESB M&V
Release/Recall		The time when a System Operator-or ~~Curtailment Service Provider~~ ***Demand Response Provider*** notifies a ~~Demand~~ ***Resource*** that the ***Deployment Period*** has ended or will end.	Demand Response Event Timing	NAESB M&V
Reserve Service		A type of Demand Response service in which Demand Resources are obligated to be available to provide Demand reduction upon deployment by the System Operator, based on reserve capacity requirements that are established to meet applicable reliability standards. Reserve Services are defined by short term response rates (Ramp Period), and synchronization with the electricity grid, e.g. non-spinning and spinning reserves.	Demand Resource Services	NAESB M&V
Resource		A market-dependent aggregation of ***Facilities*** that represents a dispatchable entity.	Resource Terms	(NEW)
Resource-Specific Deployment		The ***System Operator*** issues dispatch instructions via an established ***Communication Method*** to one or more discrete/unique ***Resources*** designated to provide the demand response service.	Deployment Models	IRC M&V Matrix

Term	Acronym	Definition	Category	Source
Schedule		An energy profile for a ***Resource*** for a future time period, broken down by scheduling interval (typically hourly).	Forward Scheduling & Award Notification	(NEW)
Scheduling Entity	**SE**	A role which carries the responsibility of submitting bids/offers and receives ***Schedules*** and ***Awards***.	Entity Roles	(NEW)
Self Deployment		***Deployment*** of ***Resources*** is automatic or initiated by the ***Resource*** or ***Demand Response Provider***, and not initiated by the System Operator via a defined communication channel. Rather, the ***Resource*** responds to signals such as real-time electrical system conditions, real-time economic conditions, or market outcomes.	Deployment Models	IRC M&V Matrix
Sustained Response Period		The time between ***Reduction Deadline*** and ***Release/Recall***, representing the window over which a ~~Demand~~ ***Resource*** is required to maintain its reduced net consumption of electricity.	Demand Response Event Timing	NAESB M&V
System Operator	**SO**	A role which carries the responsibility of administering the demand response process, from ***Resource*** enrollment to performance evaluation.	Entity Roles	NAESB M&V (Edited)
Utility Distribution Company	**UDC**	A role which carries the responsibility of operating an electricity distribution system.	Entity Roles	(NEW)

Appendix B: Use Case Combinations

Use Cases 6 and 11, the Base Cases, are highlighted in orange.

Use Cases

The use cases in this appendix represent a combination of four dimensions of demand response participation in wholesale markets: product, dispatch type, deployment, performance evaluation method as shown in the table below.

Table 3 - Use Case Dimensions

Product	Dispatch	Deployment	Performance Evaluation Method
Energy	Reliability	Resource	Baseline
Reserve	Economic	Self	Maximum Base Load (MBL)
Regulation		Bulk	Meter Before/Meter After (MB/MA)
Capacity			Meter Generation Output (MGO)

Use Case Number	Product	Dispatch	Deployment	Performance Evaluation
1	Energy	Economic	Bulk	Baseline
2	Energy	Economic	Bulk	MBL
3	Energy	Economic	Bulk	MB/MA
4	Energy	Economic	Bulk	MGO
5	Energy	Reliability	Bulk	MBL
6	Energy	Reliability	Bulk	Baseline
7	Energy	Reliability	Bulk	MB/MA
8	Energy	Reliability	Bulk	MGO
9	Energy	Economic	Resource	MBL
10	Energy	Economic	Resource	MB/MA
11	Energy	Economic	Resource	Baseline
12	Energy	Economic	Resource	MGO
13	Energy	Reliability	Resource	Baseline
14	Energy	Reliability	Resource	MBL
15	Energy	Reliability	Resource	MB/MA
16	Energy	Reliability	Resource	MGO
17	Energy	Economic	Self	Baseline
18	Energy	Economic	Self	MBL
19	Energy	Economic	Self	MB/MA
20	Energy	Economic	Self	MGO
21	Energy	Reliability	Self	Baseline
22	Energy	Reliability	Self	MBL
23	Energy	Reliability	Self	MB/MA
24	Energy	Reliability	Self	MGO
25	Capacity	Economic	Bulk	Baseline
26	Capacity	Economic	Bulk	MBL
27	Capacity	Economic	Bulk	MB/MA
28	Capacity	Economic	Bulk	MGO
29	Capacity	Reliability	Bulk	Baseline
30	Capacity	Reliability	Bulk	MBL
31	Capacity	Reliability	Bulk	MB/MA
32	Capacity	Reliability	Bulk	MGO
33	Capacity	Economic	Resource	Baseline
34	Capacity	Economic	Resource	MBL
35	Capacity	Economic	Resource	MB/MA
36	Capacity	Economic	Resource	MGO
37	Capacity	Reliability	Resource	Baseline
38	Capacity	Reliability	Resource	MBL
39	Capacity	Reliability	Resource	MB/MA
40	Capacity	Reliability	Resource	MGO
41	Capacity	Economic	Self	Baseline
42	Capacity	Economic	Self	MBL
43	Capacity	Economic	Self	MB/MA
44	Capacity	Economic	Self	MGO
45	Capacity	Reliability	Self	Baseline
46	Capacity	Reliability	Self	MBL
47	Capacity	Reliability	Self	MB/MA
48	Capacity	Reliability	Self	MGO

Use Case Number	Product	Dispatch	Deployment	Performance Evaluation
49	Reserves	Economic	Bulk	Baseline
50	Reserves	Economic	Bulk	MBL
51	Reserves	Economic	Bulk	MB/MA
52	Reserves	Economic	Bulk	MGO
53	Reserves	Reliability	Bulk	Baseline
54	Reserves	Reliability	Bulk	MBL
55	Reserves	Reliability	Bulk	MB/MA
56	Reserves	Reliability	Bulk	MGO
57	Reserves	Economic	Resource	Baseline
58	Reserves	Economic	Resource	MBL
59	Reserves	Economic	Resource	MB/MA
60	Reserves	Economic	Resource	MGO
61	Reserves	Reliability	Resource	Baseline
62	Reserves	Reliability	Resource	MBL
63	Reserves	Reliability	Resource	MB/MA
64	Reserves	Reliability	Resource	MGO
65	Reserves	Economic	Self	Baseline
66	Reserves	Economic	Self	MBL
67	Reserves	Economic	Self	MB/MA
68	Reserves	Economic	Self	MGO
69	Reserves	Reliability	Self	Baseline
70	Reserves	Reliability	Self	MBL
71	Reserves	Reliability	Self	MB/MA
72	Reserves	Reliability	Self	MGO
73	Regulation	Economic	Bulk	Baseline
74	Regulation	Economic	Bulk	MBL
75	Regulation	Economic	Bulk	MB/MA
76	Regulation	Economic	Bulk	MGO
77	Regulation	Reliability	Bulk	Baseline
78	Regulation	Reliability	Bulk	MBL
79	Regulation	Reliability	Bulk	MB/MA
80	Regulation	Reliability	Bulk	MGO
81	Regulation	Economic	Resource	Baseline
82	Regulation	Economic	Resource	MBL
83	Regulation	Economic	Resource	MB/MA
84	Regulation	Economic	Resource	MGO
85	Regulation	Reliability	Resource	Baseline
86	Regulation	Reliability	Resource	MBL
87	Regulation	Reliability	Resource	MB/MA
88	Regulation	Reliability	Resource	MGO
89	Regulation	Economic	Self	Baseline
90	Regulation	Economic	Self	MBL
91	Regulation	Economic	Self	MB/MA
92	Regulation	Economic	Self	MGO
93	Regulation	Reliability	Self	Baseline
94	Regulation	Reliability	Self	MBL
95	Regulation	Reliability	Self	MB/MA
96	Regulation	Reliability	Self	MGO