

**NAESB Subcommittee on  
Smart Grid Standards for Demand Response  
Wholesale Use Cases**

***Draft Version 2009-11-12***

## Table of Contents

Overview .....	3
Actors .....	3
Assumptions.....	5
Document Conventions .....	5
Use Cases .....	5
Activity Diagrams & Data Flow .....	7
Enrollment and Qualification.....	8
Scheduling and Award Notification - Economic .....	10
Scheduling and Award Notification - Reliability .....	12
Deployment and Real-Time Communications - Economic .....	14
Deployment and Real-Time Communications - Reliability .....	16
Measurement and Performance - Baseline.....	19
Measurement and Performance - All Others .....	21
Appendix A: Use Case Combinations.....	23
Appendix B: Glossary .....	25

## Tables

Table 1 - Actor Roles .....	3
Table 2 - Use Case Dimensions .....	6
Table 3 - Sample Use Case List.....	6

## Figures

Figure 1 - Wholesale Entity-Relationship Model .....	4
Figure 2 - Demand Response .....	7
Figure 3 - Enrollment and Qualification.....	9
Figure 4 - Scheduling and Award Notification - Economic .....	11
Figure 5 - Scheduling and Award Notification - Reliability .....	13
Figure 6 - Deployment and Real-Time Communications - Economic .....	15
Figure 7 - Deployment and Real-Time Communications - Reliability .....	18
Figure 8 - Measurement and Performance - Baseline.....	20
Figure 9 - Measurement and Performance - All Others .....	22

## Overview

This document describes the End-to-End business process flows relating to the wholesale market 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; all use cases are defined in Appendix A. This introduction describes the actors, scope, conventions and use case dimensions used throughout these use cases. A glossary of terms is provided in Appendix B.

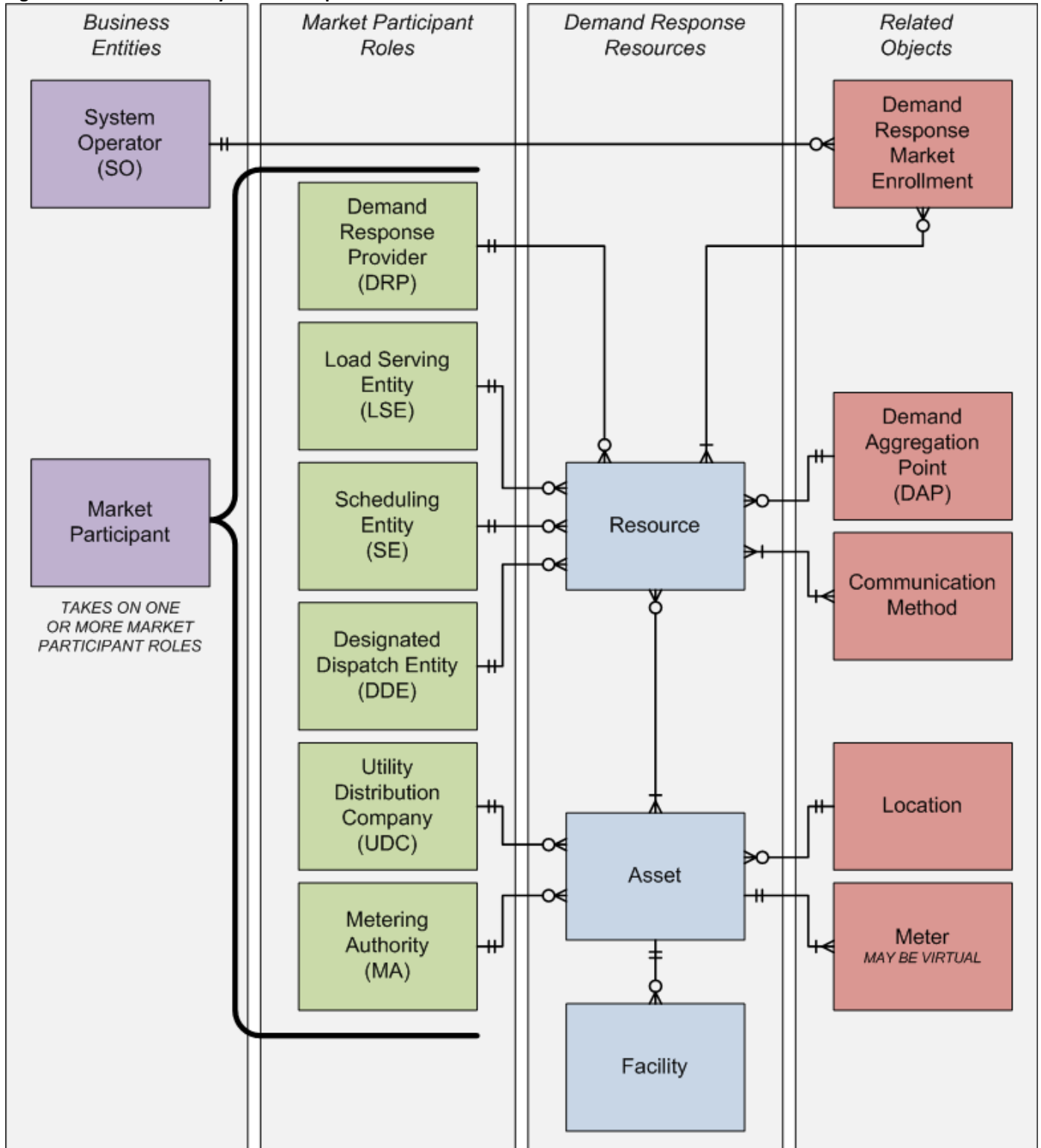
## Actors

The actors for the wholesale use cases are role-based, with the registered Market Participant business entity therefore taking on one or more roles. It is possible that a single Market Participant may take on all six Market Participant roles, six Market Participants take on one role each, or any combination in-between. Rules for how Market Participants qualify for various roles are specific to market rules and regional reliability requirements. The System Operator role is unique and must be taken by the System Operator business entity.

Table 1 - Actor Roles

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

Figure 1 - Wholesale Entity-Relationship Model



## Scope

1. Demand Response practices are consistent with NERC and applicable regional reliability authority requirements.
2. All involved entities are registered through the applicable ISO/RTO market participant registration process, including credit checks; the specific related business processes associated with registration are not documented in these standards.
3. Settlement input parameters are defined as an output to the Measurement & Performance business process; however specific business processes associated with settlements are not documented in these standards.
4. Intra-system operator information exchanges and specific system operators market rules, calculations, algorithms, and Performance Evaluation models are excluded from the scope of this effort.
5. Planning functions are not documented in these standards, including long-term load forecasting and transmission planning.
6. Capacity auctions, awards processes, and resource certification are not documented in these standards.

## Assumptions

1. The standards shall not prescribe a specific implementation technology.
2. Information Technology security is explicit in the information model but is implicit in the business process models.
3. Outputs from one process flows are considered inputs to subsequent following flows.
4. A single entity may have multiple roles (e.g., a participant can function in the roles of DDE and MA).
5. 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.
2. Implementation does not require every communication flow shown in the process flows.

## Use Cases

The use cases presented in this document represent a combination of three dimensions of demand response participation in wholesale markets: product, deployment, and performance evaluation method. As shown in the table below, product and deployment dimensions are identified by a single alphabetic character and performance evaluation methods are indicated by a numeric identifier; each character is separated by a dash (-). For example, use case E-R-1 refers to the use case for the Energy (Economic) product with a Resource-specific deployment and performance evaluated using a Baseline.

**Table 2 - Use Case Dimensions**

<b>Product</b>	
Energy (Economic)	E
Energy (Reliability)	R
Capacity	C
Reserve	V
Regulation	G
<b>Deployment</b>	
Bulk	B
Resource	R
Self	S
<b>Performance Evaluation</b>	
Baseline	1
MB/MA	2
MBL	3
MGO	4

A sample of the use case list is shown in the table below. Appendix A contains the complete list of use case combinations.

**Table 3 - Sample Use Case List**

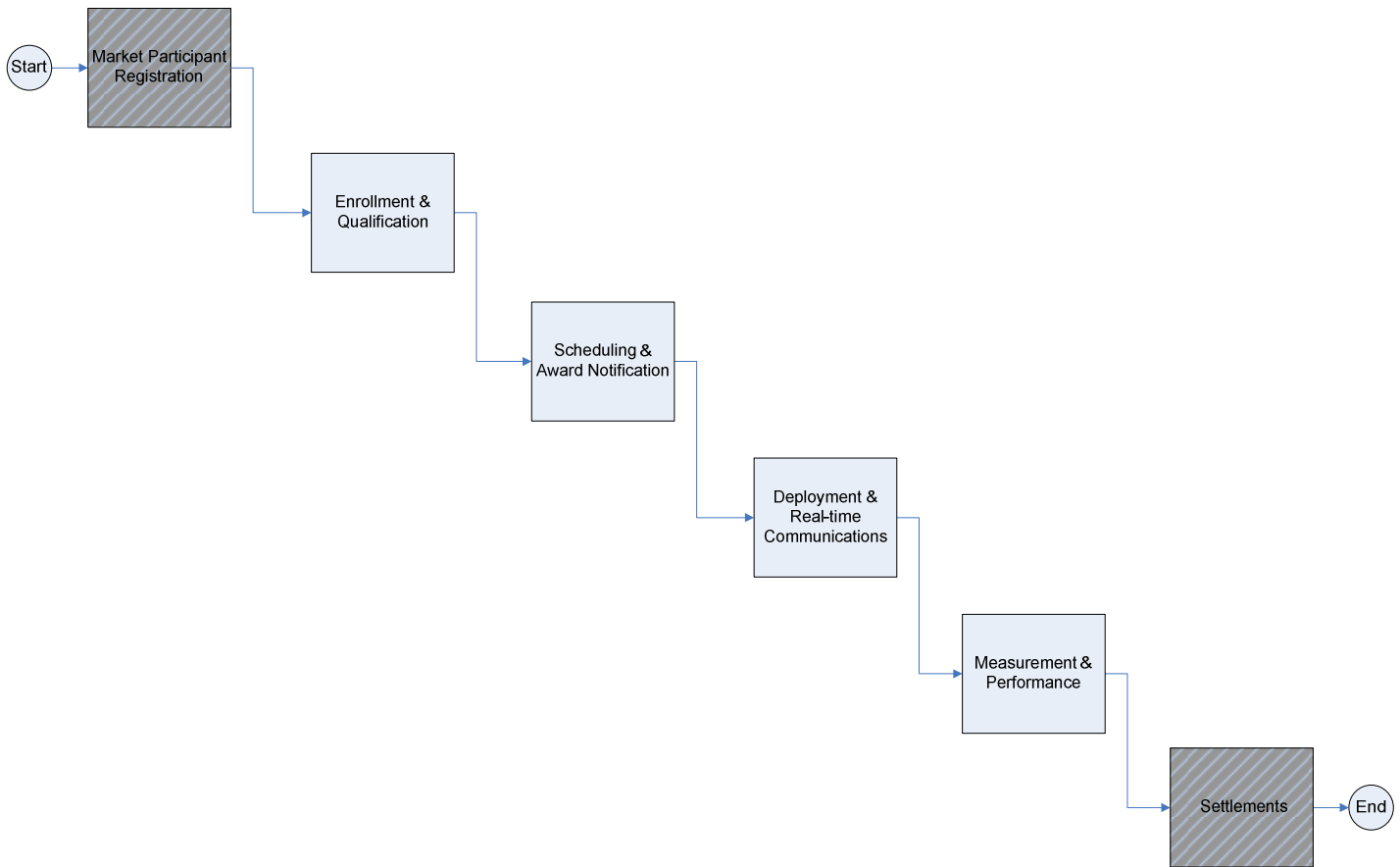
<b>Use Case</b>	<b>Product</b>	<b>Deployment</b>	<b>Performance Evaluation</b>
<b>E-R-1</b>	Energy (Economic)	Resource	Baseline
<b>E-R-2</b>	Energy (Economic)	Resource	MB/MA
<b>E-R-3</b>	Energy (Economic)	Resource	MBL
<b>E-R-4</b>	Energy (Economic)	Resource	MGO
<b>E-S-1</b>	Energy (Economic)	Self	Baseline
<b>E-S-2</b>	Energy (Economic)	Self	MB/MA
<b>E-S-3</b>	Energy (Economic)	Self	MBL
<b>E-S-4</b>	Energy (Economic)	Self	MGO

This document illustrates the process flows for use cases combinations that are considered to be representative of the types of demand response in wholesale electricity markets today. Each process flow description includes a table of the use cases to which the process flow applies.

### Activity Diagrams & Data Flow

The wholesale 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: Enrollment & Qualification, Scheduling & Award Notification, Deployment & Real-Time Communications, and Measurement & 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 2 - Demand Response



## Enrollment and Qualification

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

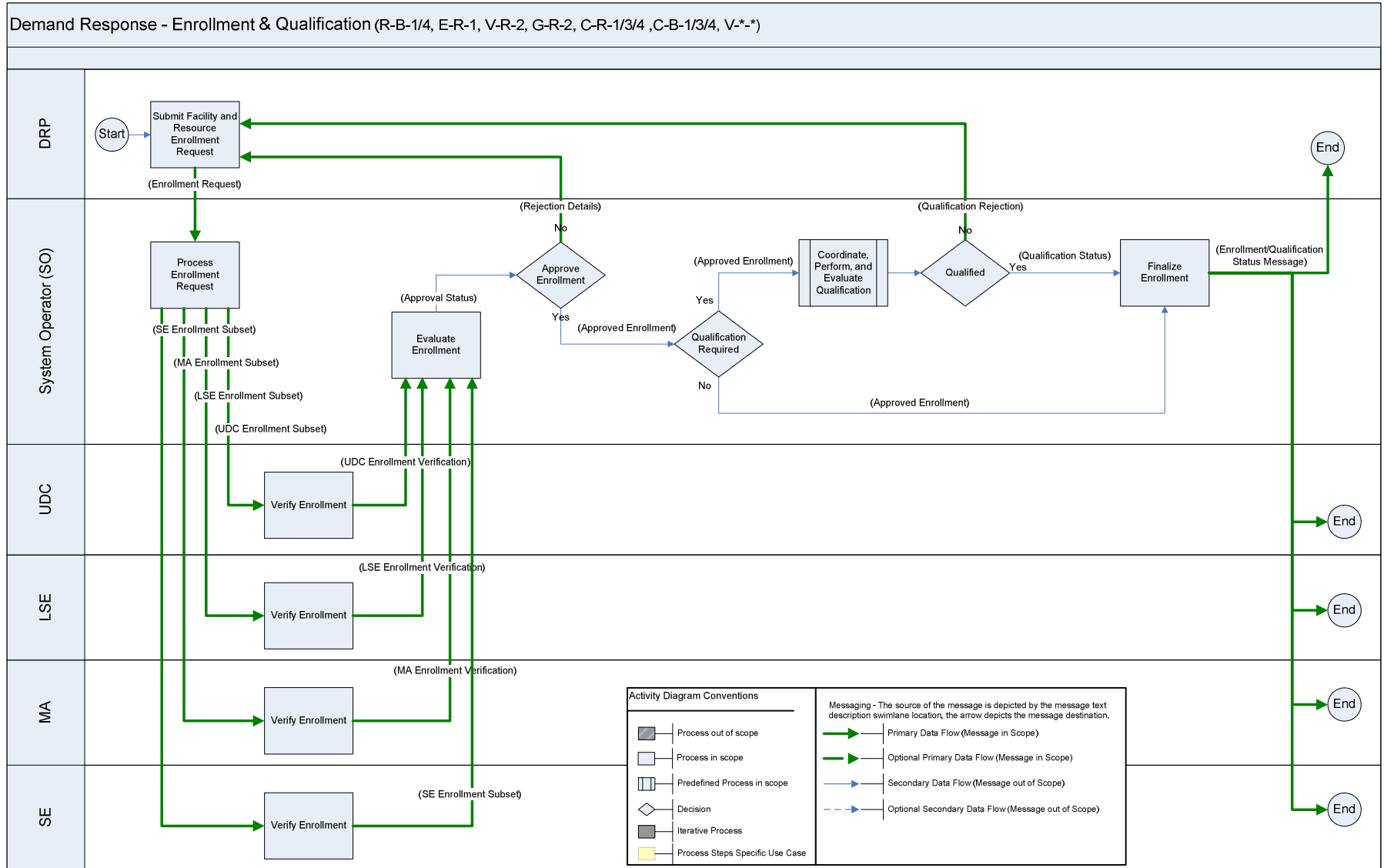
Use Cases: All valid Use Cases defined in this document

- 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, MA** and/or **SE**.
- The **SO** evaluates the enrollment request, which may include verification information from the **UDC, LSE, MA** and/or **SE**.
- 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 **asset's, 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 **asset, facility, or resource** has failed to qualify, the **SO** sends information to the **DRP**, indicating the qualification rejection details.
      - If the **asset, facility, or resource** achieves qualification, the **SO** sends information to the **DRP** and enrollment is finalized.
- At the end of the Enrollment and Qualification process, the **SO** finalizes enrollment, notifies the **DRP** and may also notify the **UDC, LSE, MA** and/or **SE**.

# Smart Grid Standards for Demand Response: Wholesale Use Cases

Activity Diagram and Data Flow:

Figure 3 - Enrollment and Qualification



### Scheduling and Award Notification - Economic

Overview: The Scheduling and Award Notification process describes the process from offer submission to 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 of a possible reliability deployment.

Use Cases:

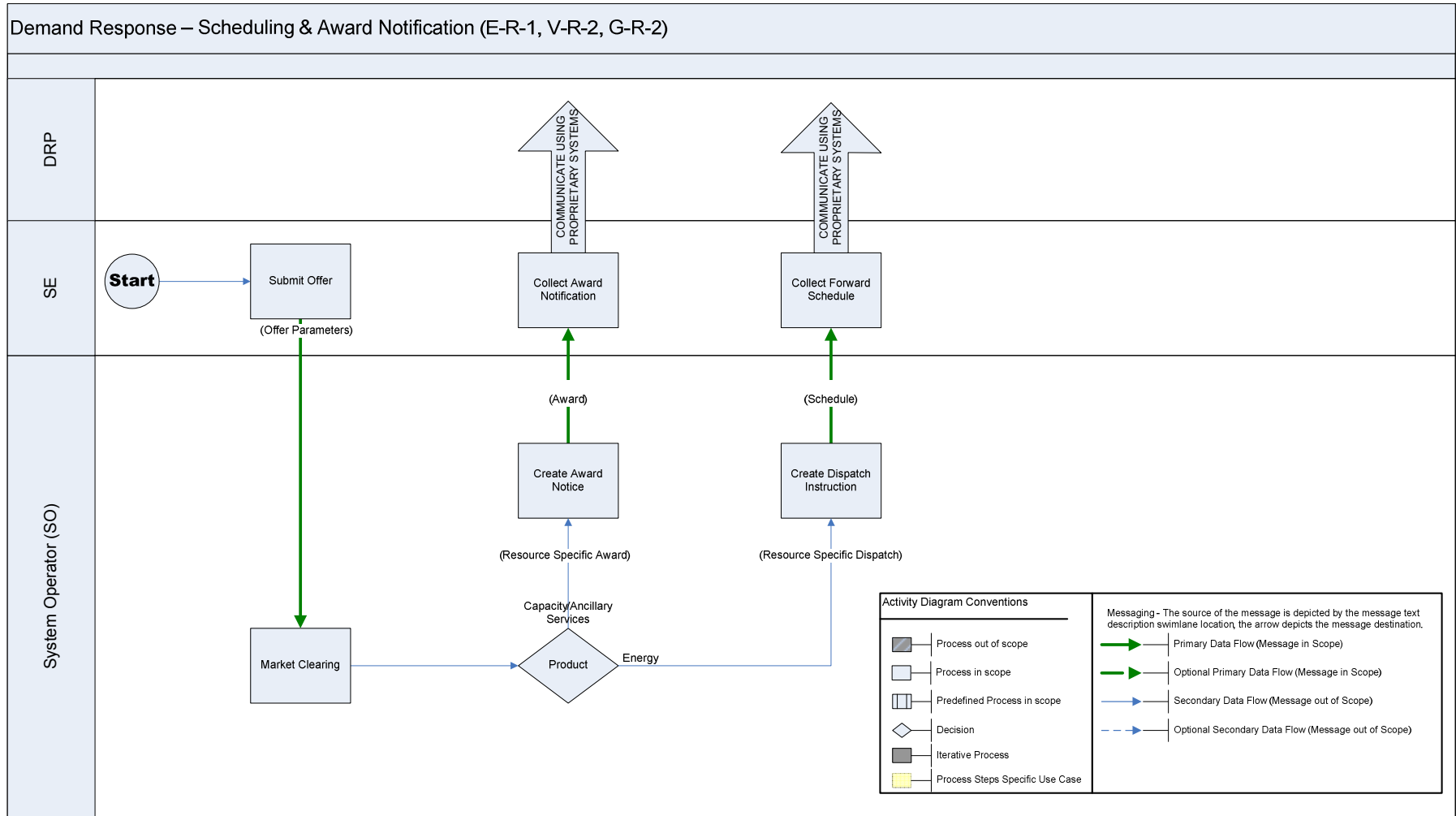
Use Case	Product	Deployment	Performance Evaluation
C-R-1	Capacity	Resource	Baseline
C-R-2	Capacity	Resource	MB/MA
C-R-3	Capacity	Resource	MBL
C-R-4	Capacity	Resource	MGO
E-R-1	Energy (Economic)	Resource	Baseline
E-R-2	Energy (Economic)	Resource	MB/MA
E-R-3	Energy (Economic)	Resource	MBL
E-R-4	Energy (Economic)	Resource	MGO
G-R-1	Regulation	Resource	Baseline
G-R-2	Regulation	Resource	MB/MA
G-R-3	Regulation	Resource	MBL
G-R-4	Regulation	Resource	MGO
V-R-1	Reserve	Resource	Baseline
V-R-2	Reserve	Resource	MB/MA
V-R-3	Reserve	Resource	MBL
V-R-4	Reserve	Resource	MGO

- The process begins when the **SE** submits a supply offer to the **SO**.
- The **SO** evaluates the offer through its market clearing process.
- The resulting resource-specific dispatch information is transformed into dispatch instructions by the **SO**.
- The **SO** makes the schedule available.
- The **SE** collects the forward schedule.

# Smart Grid Standards for Demand Response: Wholesale Use Cases

## Activity Diagram and Data Flow:

**Figure 4 - Scheduling and Award Notification - Economic**



### Scheduling and Award Notification - Reliability

Overview: The Scheduling and Award Notification process describes the process from offer submission to 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 of a possible reliability deployment.

Use Cases:

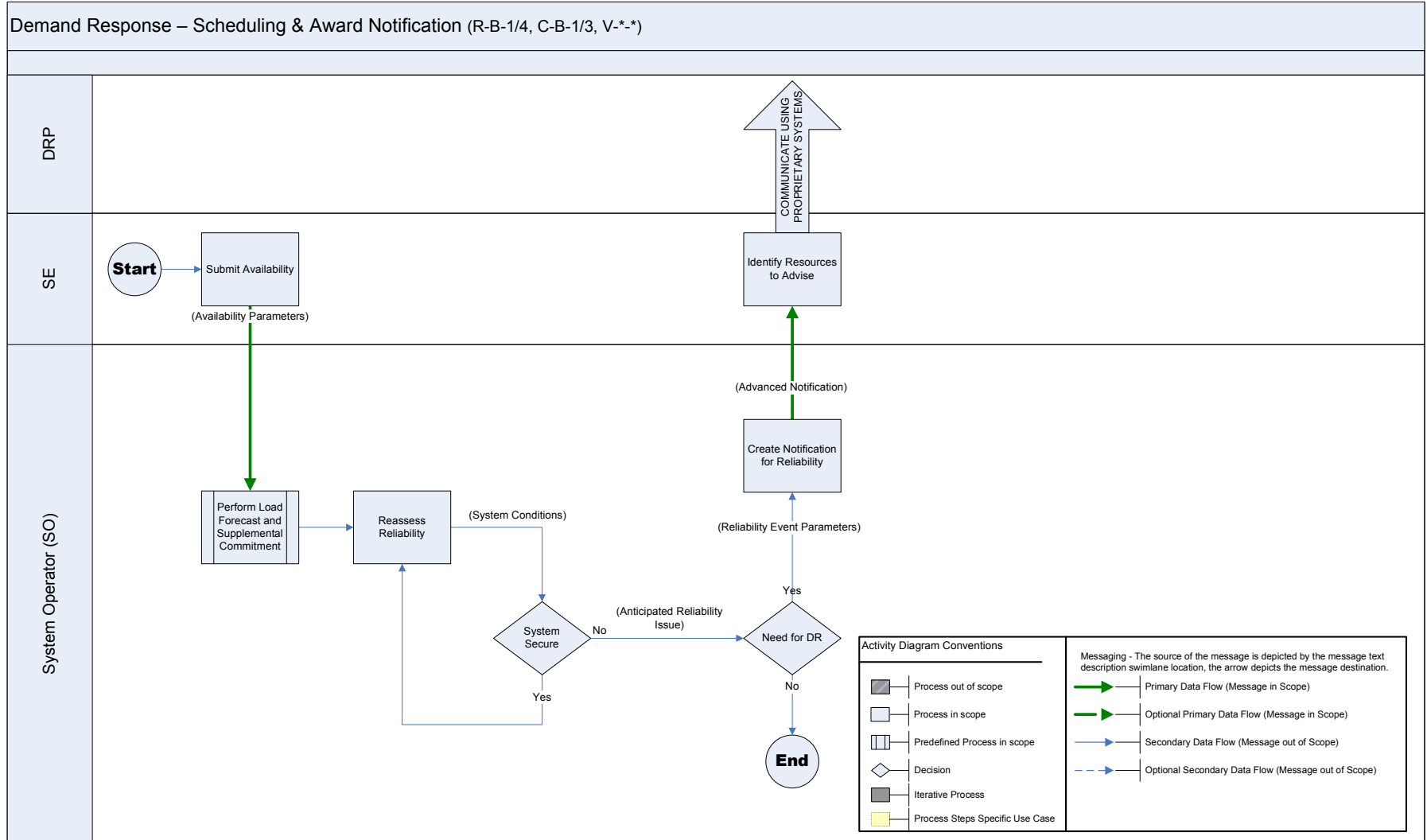
Use Case	Product	Deployment	Performance Evaluation
R-B-1	Energy (Reliability)	Bulk	Baseline
R-B-3	Energy (Reliability)	Bulk	MBL
R-B-2	Energy (Reliability)	Bulk	MB/MA
R-B-4	Energy (Reliability)	Bulk	MGO
C-B-1	Capacity	Bulk	Baseline
C-B-3	Capacity	Bulk	MBL
C-B-2	Capacity	Bulk	MB/MA
C-B-4	Capacity	Bulk	MGO
V-B-1	Reserve	Bulk	Baseline
V-B-3	Reserve	Bulk	MBL
V-B-2	Reserve	Bulk	MB/MA
V-B-4	Reserve	Bulk	MGO
V-R-1	Reserve	Resource	Baseline
V-R-3	Reserve	Resource	MBL
V-R-2	Reserve	Resource	MB/MA
V-R-4	Reserve	Resource	MGO

- The process begins when the **SE** submits availability to the **SO**.
- The **SO** performs the Load Forecast and Supplemental Commitment process after the 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** anticipates that a reliability issue is expected, the **SO** decides whether demand response is needed for reliability.
    - If demand response will not be needed, 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 **SE**.
      - The **SE** identifies the demand resources to notify and relays the message to **DRPs** through the proprietary communication system of the **SE**.

# Smart Grid Standards for Demand Response: Wholesale Use Cases

## Activity Diagram and Data Flow:

Figure 5 - Scheduling and Award Notification - Reliability



## Deployment and Real-Time Communications - Economic

**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 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 simultaneously scans and updates in the same step.

**Use Cases:**

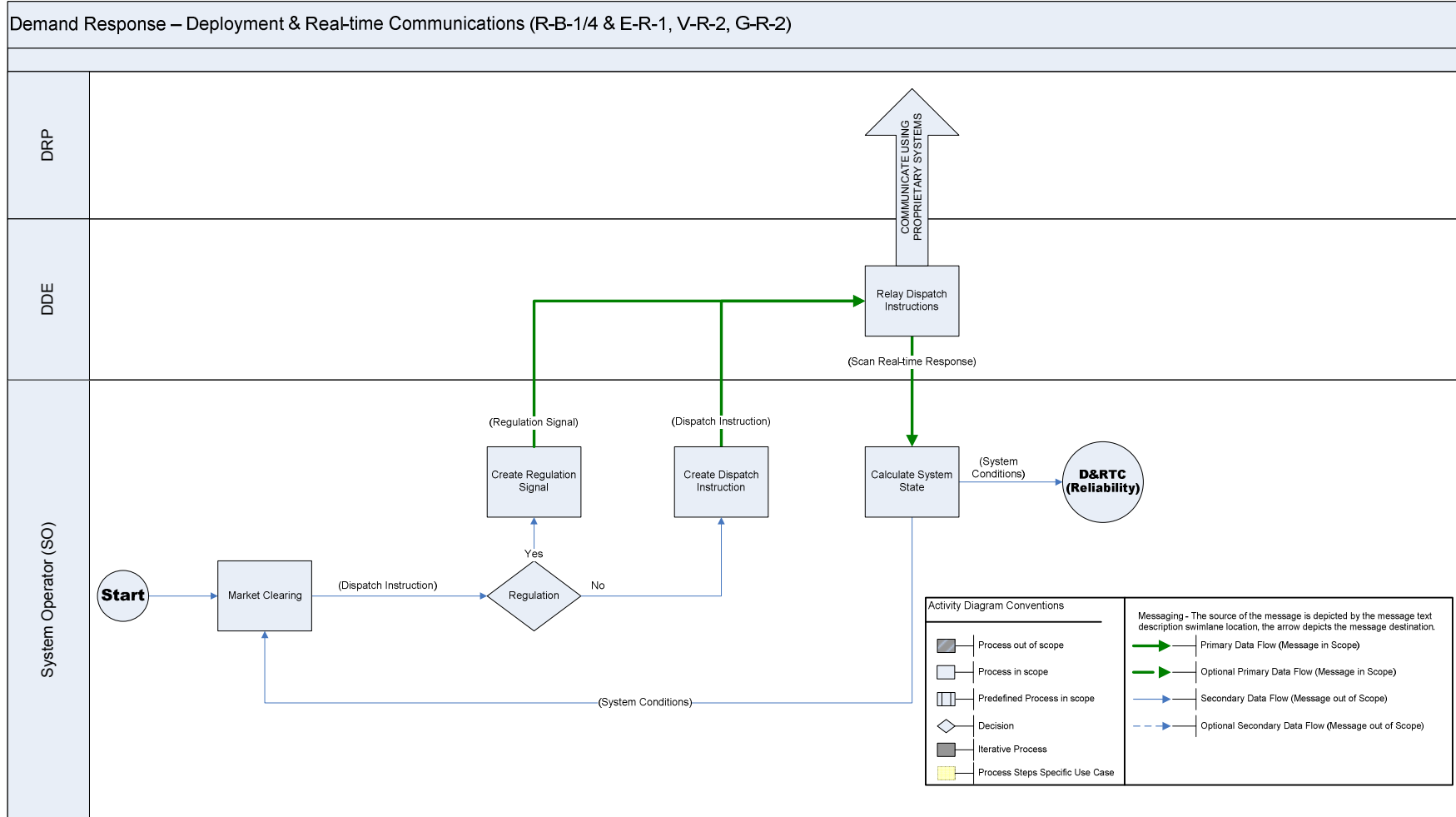
Use Case	Product	Deployment	Performance Evaluation
<b>E-R-1</b>	Energy (Economic)	Resource	Baseline
<b>R-B-1</b>	Energy (Reliability)	Bulk	Baseline
<b>R-B-4</b>	Energy (Reliability)	Bulk	MGO
<b>V-R-2</b>	Reserve	Resource	MB/MA
<b>G-R-2</b>	Regulation	Resource	MB/MA

- The process begins when the **SO** evaluates real-time system conditions through its market clearing process.
- The resulting resource-specific real-time dispatch information is transformed into dispatch instructions by the **SO**.
  - If the dispatch instruction is for Regulation, the **SO** sends the Regulation signal to the **DDE**.
  - If the dispatch is not for Regulation, the **SO** sends the dispatch instruction to the **DDE**.
- The **DDE** communicates with the **DRP** through the proprietary communication system of the **DDE**.
- The **SO** collects real-time response from the **DDE** for evaluating the next interval and uses the information to calculate the system state.
- System conditions are made available to the market clearing process for the next interval and to **Deployment and Real-Time Communications – Reliability**.

# Smart Grid Standards for Demand Response: Wholesale Use Cases

## Activity Diagram and Data Flow:

**Figure 6 - Deployment and Real-Time Communications - Economic**



### Deployment and Real-Time Communications - Reliability

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 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 simultaneously scans and updates in the same step.

Use Cases:

Use Case	Product	Deployment	Performance Evaluation
C-B-1	Capacity	Bulk	Baseline
C-B-3	Capacity	Bulk	MBL
E-B-1	Energy (Economic)	Bulk	Baseline
E-B-4	Energy (Economic)	Bulk	MGO
E-R-1	Energy (Economic)	Resource	Baseline
V-B-1	Reserve	Bulk	Baseline
V-B-2	Reserve	Bulk	MB/MA
V-B-3	Reserve	Bulk	MBL
V-B-4	Reserve	Bulk	MGO
V-R-1	Reserve	Resource	Baseline
V-R-2	Reserve	Resource	MB/MA
V-R-3	Reserve	Resource	MBL
V-R-4	Reserve	Resource	MGO
V-S-1	Reserve	Self	Baseline
V-S-2	Reserve	Self	MB/MA
V-S-3	Reserve	Self	MBL
V-S-4	Reserve	Self	MGO

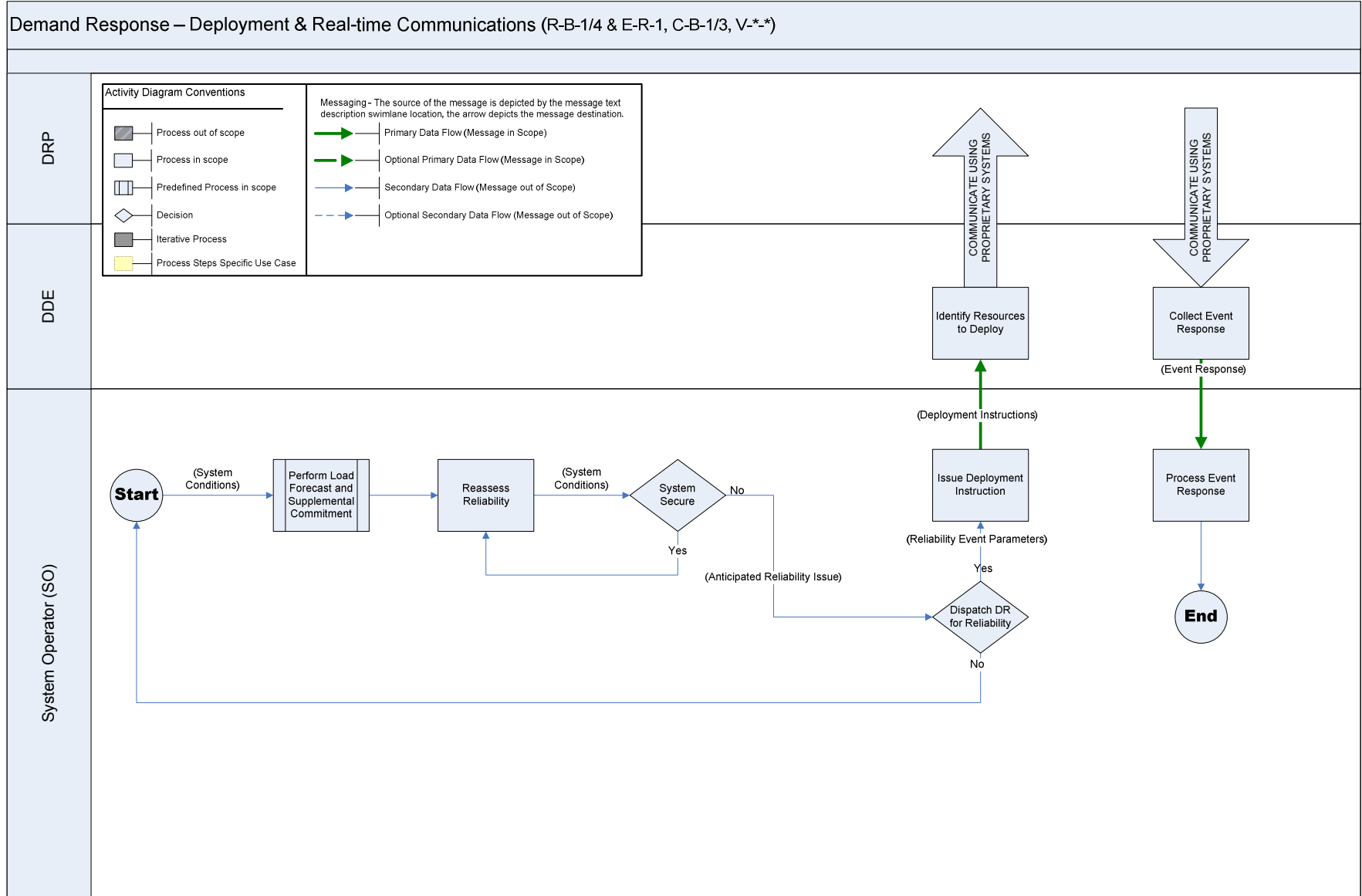
- The **SO** performs the Load Forecast and Supplemental Commitment process after the interval has been dispatched. Reliability is reassessed by the **SO** to determine whether the system is secure (sufficient supply to meet forecasted load conditions).
  - If **SO** determines that the system is secure, no demand response deployment is required and reliability is assessed by the **SO** at the next interval.
  - If **SO** anticipates that a reliability issue is expected, the **SO** decides whether demand response is needed for reliability.
    - If demand response will not be needed, the process ends.
    - If the **SO** determines that demand response will be deployed, the reliability event parameters are prepared by the **SO** to create a reliability event notification.
      - The deployment instruction is sent to the **DDE**.

## Smart Grid Standards for Demand Response: Wholesale Use Cases

- The **DDE** identifies the demand resources to notify and relays the message to **DRPs** through the proprietary communication system of the **DDE**.
- Real-time or near real-time response data is collected by **DDE** using the proprietary communication system of the **DDE**.
- The **DDE** sends the event response information to the **SO**.

Activity Diagram and Data Flow:

Figure 7 - Deployment and Real-Time Communications - Reliability



## Measurement and Performance - Baseline

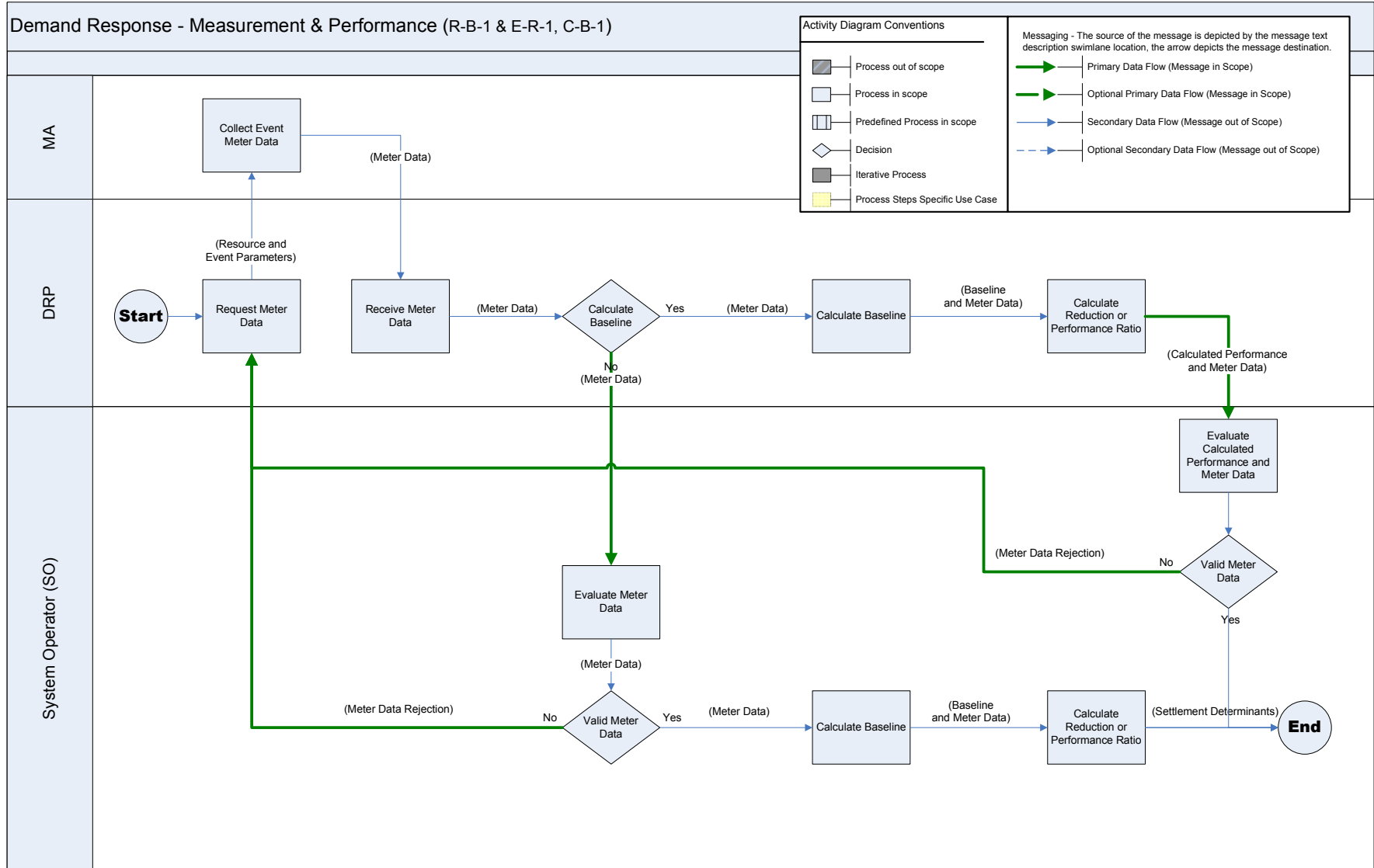
Overview: The Measurement and Performance process documents the steps to collect demand resource meter data and prepare the determinants for settlement.

Use Cases: All use cases where **Baseline** applies.

- 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 8 - Measurement and Performance - Baseline



## Measurement and Performance - All Others

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

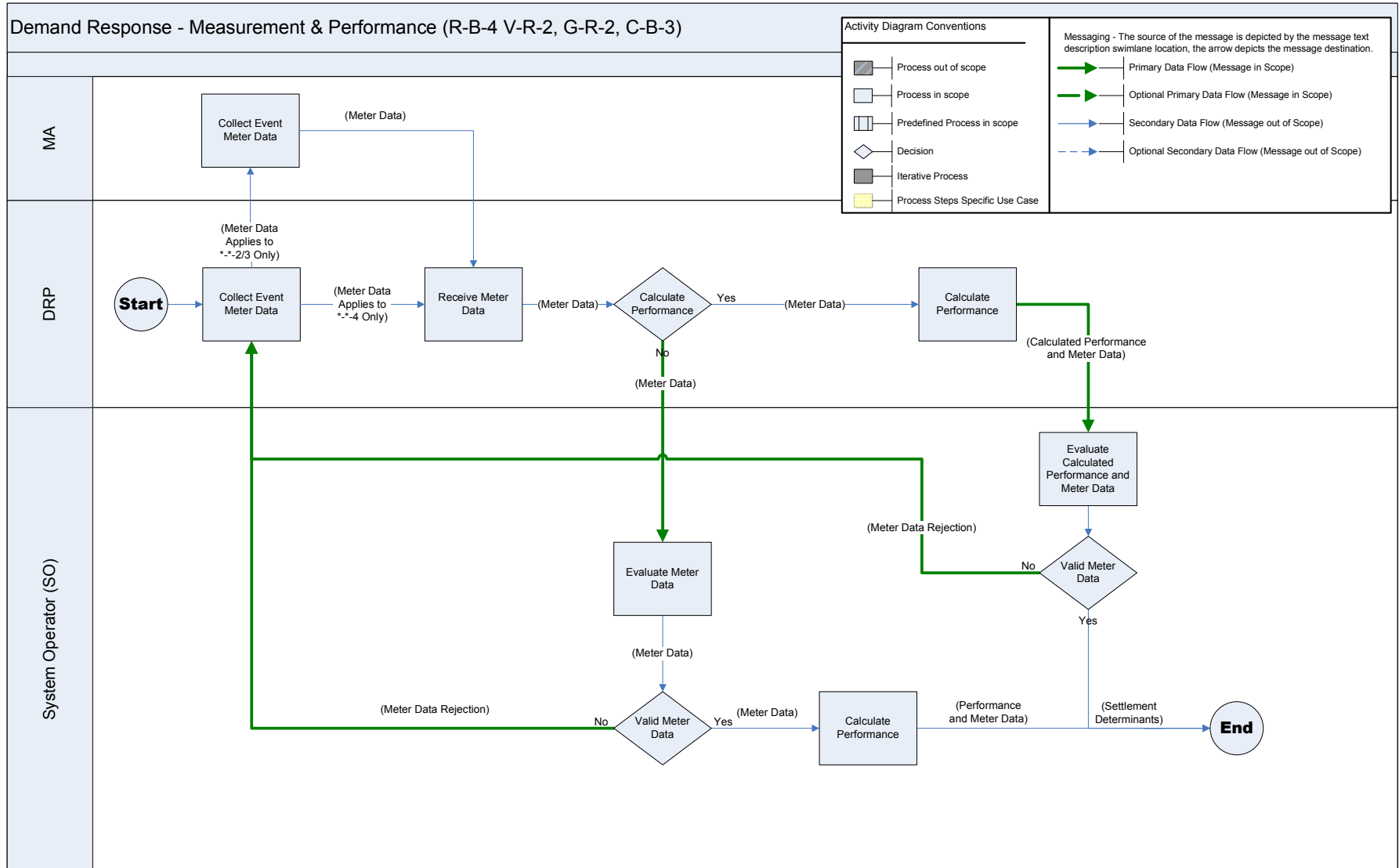
Use Cases: All use cases where ***Meter Before/Meter After, Maximum Base Load, or Meter Generator Output*** applies.

- The process begins when the **DRP** collects event meter data from the **MA** for the specified performance evaluation method.
  - If the performance evaluation method is ***Meter Before/Meter After*** or ***Maximum Base Load***, the **MA** sends the event meter data to the **DRP**.
  - If the performance evaluation method is ***Meter Generator Output***, the **DRP** uses the data from the meter on the generator.
- If the **DRP** is required to calculate performance, the **DRP** uses the event meter data to calculate performance.
  - The **DRP** uses the 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 performance, the **DRP** sends the meter data to the **SO**.
  - If the event meter data are complete, the **SO** uses the event meter data to calculate performance.
    - The **SO** uses the 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**.

# Smart Grid Standards for Demand Response: Wholesale Use Cases

## Activity Diagram and Data Flow:

Figure 9 - Measurement and Performance - All Others



**Appendix A: Use Case Combinations**

Use Case	Product	Deployment	Performance Evaluation
E-B-1	Energy (Economic)	Bulk	Baseline
E-B-2	Energy (Economic)	Bulk	MB/MA
E-B-3	Energy (Economic)	Bulk	MBL
E-B-4	Energy (Economic)	Bulk	MGO
E-R-1	Energy (Economic)	Resource	Baseline
E-R-2	Energy (Economic)	Resource	MB/MA
E-R-3	Energy (Economic)	Resource	MBL
E-R-4	Energy (Economic)	Resource	MGO
E-S-1	Energy (Economic)	Self	Baseline
E-S-2	Energy (Economic)	Self	MB/MA
E-S-3	Energy (Economic)	Self	MBL
E-S-4	Energy (Economic)	Self	MGO
R-B-1	Energy (Reliability)	Bulk	Baseline
R-B-2	Energy (Reliability)	Bulk	MB/MA
R-B-3	Energy (Reliability)	Bulk	MBL
R-B-4	Energy (Reliability)	Bulk	MGO
R-R-1	Energy (Reliability)	Resource	Baseline
R-R-2	Energy (Reliability)	Resource	MB/MA
R-R-3	Energy (Reliability)	Resource	MBL
R-R-4	Energy (Reliability)	Resource	MGO
R-S-1	Energy (Reliability)	Self	Baseline
R-S-2	Energy (Reliability)	Self	MB/MA
R-S-3	Energy (Reliability)	Self	MBL
R-S-4	Energy (Reliability)	Self	MGO

## Smart Grid Standards for Wholesale Demand Response

Use Case	Product	Deployment	Performance Evaluation
C-B-1	Capacity	Bulk	Baseline
C-B-2	Capacity	Bulk	MB/MA
C-B-3	Capacity	Bulk	MBL
C-B-4	Capacity	Bulk	MGO
C-R-1	Capacity	Resource	Baseline
C-R-2	Capacity	Resource	MB/MA
C-R-3	Capacity	Resource	MBL
C-R-4	Capacity	Resource	MGO
C-S-1	Capacity	Self	Baseline
C-S-2	Capacity	Self	MB/MA
C-S-3	Capacity	Self	MBL
C-S-4	Capacity	Self	MGO
G-B-1	Regulation	Bulk	Baseline
G-B-2	Regulation	Bulk	MB/MA
G-B-3	Regulation	Bulk	MBL
G-B-4	Regulation	Bulk	MGO
G-R-1	Regulation	Resource	Baseline
G-R-2	Regulation	Resource	MB/MA
G-R-3	Regulation	Resource	MBL
G-R-4	Regulation	Resource	MGO
G-S-1	Regulation	Self	Baseline
G-S-2	Regulation	Self	MB/MA
G-S-3	Regulation	Self	MBL
G-S-4	Regulation	Self	MGO
V-B-1	Reserve	Bulk	Baseline
V-B-2	Reserve	Bulk	MB/MA
V-B-3	Reserve	Bulk	MBL
V-B-4	Reserve	Bulk	MGO
V-R-1	Reserve	Resource	Baseline
V-R-2	Reserve	Resource	MB/MA
V-R-3	Reserve	Resource	MBL
V-R-4	Reserve	Resource	MGO
V-S-1	Reserve	Self	Baseline
V-S-2	Reserve	Self	MB/MA
V-S-3	Reserve	Self	MBL
V-S-4	Reserve	Self	MGO

**Appendix B: Glossary**

The glossary below covers the terms used in this document. It is recommended that this glossary be incorporated into the NAESB Smart Grid Framework document in the future.

Term	Acronym	Source	Definition
<b>Aggregation of Retail Customers</b>	<b>ARC</b>	FERC	See <i>Resource</i> .
<b>Asset</b>	-	(NEW)	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.
<b>Demand Aggregation Point</b>	<b>DAP</b>	(NEW)	A market-dependent aggregation of <i>Resources</i> that may extend across multiple <i>Locations</i> , e.g. a demand response zone.
<b>Demand Response Asset</b>	-	(NEW)	<i>See Asset</i> .
<b>Demand Response Provider</b>	<b>DRP</b>	(NEW)	A role which carries the responsibility of coordinating <i>Resources</i> to deliver demand response services.
<b>Demand Response Resource</b>	-	(NEW)	See <i>Resource</i> .
<b>Designated Dispatch Entity</b>	<b>DDE</b>	(NEW)	A role which carries the responsibility of receiving and processing demand resource dispatch instructions or market information and (optionally) providing response information.
<b>Facility</b>		(NEW)	A sub-Asset component of a demand <i>Resource</i> .
<b>Load Serving Entity</b>	<b>LSE</b>	(NEW)	A role which carries the responsibility of serving end-users and selling electric energy to end-users.

## Smart Grid Standards for Wholesale Demand Response

Term	Acronym	Source	Definition
<b>Location</b>	-	CIM	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.
<b>Market Participant</b>	<b>MP</b>	(NEW)	An organization registered with the <b>System Operator</b> that may take on roles such as <b>DRP, LSE, UDC, DDE, SE,</b> and/or <b>MA</b> in accordance with the <b>System Operator's</b> market rules.
<b>Metering Authority</b>	<b>MA</b>	(NEW)	A role which carries the responsibility of providing data necessary to determine the performance of a <b>Resource</b> .
<b>Resource</b>	-	(NEW)	A market-dependent aggregation of <b>Facilities</b> that represents a dispatchable entity.
<b>Scheduling Entity</b>	<b>SE</b>	(NEW)	A role which carries the responsibility of submitting bids/offers and receives <b>Schedules</b> and <b>Awards</b> .
<b>System Operator</b>	<b>SO</b>	(NEW)	A role which carries the responsibility of administering the wholesale demand response process.
<b>Utility Distribution Company</b>	<b>UDC</b>	(NEW)	A role which carries the responsibility of operating an electricity distribution system.

### Wholesale-Specific Terms:

Term	Acronym	Source	Definition
<b>Advance Notification(s)</b>		NAESB M&V	One or more communications from the System Operator-or Curtailment Service Provider <b>Demand Response Provider</b> to Demand <b>Resources</b> of an impending <b>Demand Response Event</b> in advance of the actual event.
<b>Audit</b>		(NEW)	A required step for certain Demand Response Programs after the <b>Registration</b> process, during which the System Operator monitors a Resource through the appropriate steps within <b>Forward Scheduling &amp; Award Notification, Deployment &amp; Real-Time Communications,</b> and <b>Measurement &amp; Performance Evaluation</b> .

## Smart Grid Standards for Wholesale Demand Response

Term	Acronym	Source	Definition
<b>Award</b>	-	(NEW)	The selection of a <b>Resource</b> to provide ancillary services or capacity for a future time period.
<b>Base Point</b>	-	CIM (baseP)	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.
<b>Bulk Deployment</b>	-	IRC M&V Matrix <sup>1</sup>	The <b>System Operator</b> issues dispatch instructions via established <b>Communication Methods</b> to a group or block of <b>Resources</b> designated to provide the demand response service.
<b>Capacity Service</b>	-	NAESB M&V	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.
<b>Communication Method</b>	<b>CM</b>	(NEW)	The mechanism, device, system, tool, and/or protocol used to communicate <b>Dispatch</b> instructions to and optionally receive response information from a <b>Resource</b> .
<b>Demand Response Event</b>	-	NAESB M&V	<b>Demand Response Events</b> 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 <b>System Operator</b> .
<b>Deployment</b>	-	NAESB M&V	The time at which a Demand Resource begins reducing Demand on the system in response to an instruction from the System Operator or <del>Curtailment Service Provider</del> <b>Demand Response Provider</b> .
<b>Deployment Period</b>	-	NAESB M&V	The time in a <b>Demand Response Event</b> beginning with the <b>Deployment</b> instruction and ending with the <b>Release/Recall</b> instruction.
<b>Dispatch</b>	-	(NEW)	A real-time instruction to a <b>Resource</b> to move to a <b>Base Point</b> at a specific time ( <b>Resource-Specific Deployment</b> ); alternately, a set of real-time instructions to multiple <b>Resources</b> ( <b>Bulk Deployment</b> )

<sup>1</sup> **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](http://www.isorto.org/atf/cf/%7B5B4E85C6-7EAC-40A0-8DC3-003829518EBD%7D/IRC%20DR%20M&V%20Standards%20Implementation%20Comparison%20(2009-04-28).xls)

## Smart Grid Standards for Wholesale Demand Response

Term	Acronym	Source	Definition
<b>Energy Service</b>	-	NAESB M&V	A type of Demand Response service in which Demand Resources are compensated based on Demand reduction performance.
<b>Estimated Baseline Type-I</b>	-	NAESB M&V	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.
<b>Estimated Baseline Type-II</b>	-	NAESB M&V	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.
<b>Maximum Base Load</b>	<b>MBL</b>	NAESB M&V	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.
<b>Meter Before / Meter After</b>	<b>MB/MA</b>	NAESB M&V	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.
<b>Metering Generator Output</b>	<b>MGO</b>	NAESB M&V	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.
<b>Normal Operations</b>	-	NAESB M&V	The time following <b>Release/Recall</b> 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 <b>Deployment</b> .
<b>Notification</b>	-	(NEW)	The transmittal of <b>Schedule</b> or <b>Award</b> .
<b>Qualification</b>	-	(NEW)	A required step for certain Demand Response Programs within the <b>Registration</b> process, during which the <b>System Operator</b> monitors a Resource through the appropriate steps within <b>Forward Scheduling &amp; Award Notification, Deployment &amp; Real-Time Communications, and Measurement &amp; Performance Evaluation</b> .
<b>Ramp Period</b>	-	NAESB M&V	The time between <b>Deployment</b> and <b>Reduction Deadline</b> , representing the period of time over which a Demand Resource must achieve its change in Load.

## Smart Grid Standards for Wholesale Demand Response

Term	Acronym	Source	Definition
<b>Recovery Period</b>	-	NAESB M&V	The time between <b>Release/Recall</b> and <b>Normal Operations</b> , representing the window over which <b>Demand Resources</b> may be required to return to their normal Load levels.
<b>Reduction Deadline</b>	-	NAESB M&V	The time at the end of the <b>Ramp Period</b> when a <b>Demand Resource</b> is required to have met its <b>Demand Reduction Value</b> obligation.
<b>Regulation Service</b>	-	NAESB M&V	A type of Demand Response service in which Demand Resources increase and decrease Load in response to real-time signals from the System Operator.
<b>Release/Recall</b>	-	NAESB M&V	The time when a System Operator or <del>Curtailment Service Provider</del> <b>Demand Response Provider</b> notifies a <del>Demand Resource</del> <b>Demand Resource</b> that the <b>Deployment Period</b> has ended or will end.
<b>Reserve Service</b>	-	NAESB M&V	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.
<b>Resource-Specific Deployment</b>	-	IRC M&V Matrix	The <b>System Operator</b> issues dispatch instructions via an established <b>Communication Method</b> to one or more discrete/unique <b>Resources</b> designated to provide the demand response service.
<b>Schedule</b>	-	(NEW)	An energy profile for a <b>Resource</b> for a future time period, broken down by scheduling interval (typically hourly).
<b>Self Deployment</b>	-	IRC M&V Matrix	<b>Deployment of Resources</b> is automatic or initiated by the <b>Resource</b> or <b>Demand Response Provider</b> , and not initiated by the System Operator via a defined communication channel. Rather, the <b>Resource</b> responds to signals such as real-time electrical system conditions, real-time economic conditions, or market outcomes.
<b>Sustained Response Period</b>	-	NAESB M&V	The time between <b>Reduction Deadline</b> and <b>Release/Recall</b> , representing the window over which a <b>Demand Resource</b> is required to maintain its reduced net consumption of electricity.