NERC

NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Demand Response Data Availability System (DADS) Preliminary Report

Phase I & II

to ensure the reliability of the bulk power system

DRAFT – June 3rd, 2009

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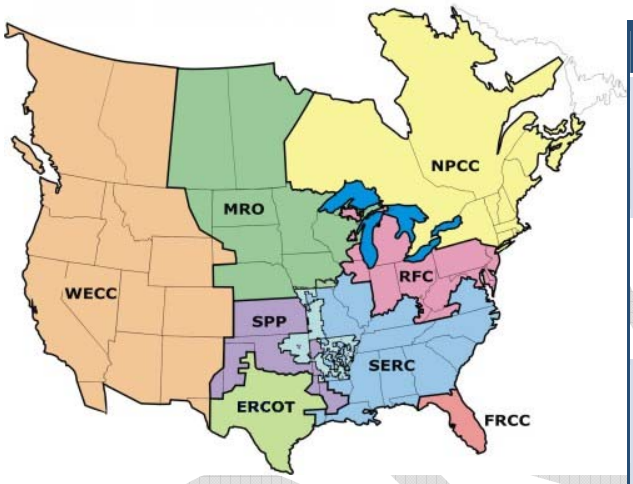
NERC's Mission

The North American Electric Reliability Corporation (NERC) is an international regulatory authority for reliability of the bulk power system in North America. NERC develops and enforces Reliability Standards; assesses adequacy annually via a 10-year forecast and winter and summer forecasts; monitors the bulk power system; and educates, trains, and certifies industry personnel. NERC is a self-regulatory organization, subject to oversight by the U.S. Federal Energy Regulatory Commission (FERC) and governmental authorities in Canada.[1]

NERC assesses and reports[2] on the reliability and adequacy of the North American bulk power system divided into the eight Regional Areas as shown on the map below (See Table A).[3] The users, owners, and operators of the bulk power system within these areas account for virtually all the electricity supplied in the U.S., Canada, and a portion of Baja California Norte, México.



Note: *The highlighted area between SPP and SERC denotes overlapping Regional area boundaries: For example, some load serving entities participate in one Region and their associated transmission owner/operators in another.*

Table A: NERC Regional Entities

ERCOT Electric Reliability Council of Texas	**RFC** Reliability*First* Corporation
FRCC Florida Reliability Coordinating Council	**SERC** SERC Reliability Corporation
MRO Midwest Reliability Organization	**SPP** Southwest Power Pool, Incorporated
NPCC Northeast Power Coordinating Council, Inc.	**WECC** Western Electricity Coordinating Council

[1] As of June 18, 2007, the U.S. Federal Energy Regulatory Commission (FERC) granted NERC the legal authority to enforce Reliability Standards with all U.S. users, owners, and operators of the bulk power system, and made compliance with those standards mandatory and enforceable. Reliability Standards are also mandatory and enforceable in Ontario and New Brunswick, and NERC is seeking to achieve comparable results in the other Canadian provinces. NERC will seek recognition in Mexico once necessary legislation is adopted.

[2] Readers may refer to the *Definitions of Terms Used in This Report* Section for more information on NERC's reporting definitions and methods.

[3] Note ERCOT and SPP are tasked with performing reliability self-assessments as they are Regional planning and operating organizations. SPP-RE (SPP – Regional Entity) and TRE (Texas Regional Entity) are functional entities to whom NERC delegates certain compliance monitoring and enforcement authorities.

Executive Summary

Demand response is an important component in the overall portfolio of resources required to meet the increasing demand for electricity in North America. In addition to providing capacity for resource adequacy and planning purposes, demand response can offer significant benefits to operating reliability by increasing the flexibility of the system. So that NERC and stakeholders may understand the benefits of demand response and its impact on reliability, we must measure how well it performs. This practice will also help develop industry confidence in demand response use.

The Demand Response Data Task Force (DRDTF) was formed following a recommendation from the Demand-Side Management Task Force (DSMTF), to develop a systematic approach for collecting and disseminating demand response data. In its final report, *Data Collection for Demand-Side Management for Quantifying its Influence on Reliability*,[4] the DSMTF concluded that a data collection system should be developed to collect historic demand response data. This task force developed a system to do this and it is referred to as the Demand Response Availability Data System (DADS). Furthermore, the task force has established metrics and useful statistics to quantify and support data analysis.

The goal of the DADS is to collect demand response event information to measure the ongoing influence of demand response on reliability and provide a basis for projecting both dispatchable and non-dispatchable (price-driven) demand response towards planning (demand reduction) and operational reliability. This demand response data collection proposal provides a basis for counting and validating demand response resources toward meeting operational and resource adequacy requirements. In addition, DADS will provide the mechanism needed to fulfill the NERC MOD Standard 16-1.1, Requirement R1(c).[5] DADS will provide a framework for entities to report data on a consistent and timely basis.

The task force members represented many of the NERC Regions and both wholesale and retail electricity organizations. We researched current industry practices and debated the many facets of our goals, carefully comparing the burden of collecting each "piece" of information against the benefit and usefulness of that information. In addition, this task force coordinated with the NAESB DSM-EE Subcommittee effort to develop measurement and verification for demand response Business Practice Standards. We recognize that the initial structure proposed in this report will be enhanced and improved over time as the industry gains experience. Some information that we have specified may not turn out to be as useful as we expected, while other information, not felt to be exceptionally important at this stage, and may be supplemented as DADS evolves. We did not lose sight of the fact that collecting data is done so for the overriding purpose of providing the industry with the information to support decisions with respect to improving reliability and performance.

[4] http://www.nerc.com/docs/pc/drdtf/NERC_DSMTF_Report_040308.pdf
[5] http://www.nerc.com/files/MOD-016-1_1.pdf

The DRDTF is proposing to implement DADS in a multi-phase approach. DADS Phase I and Phase II support the collection of dispatchable and controllable demand response event data. For Phase I, a voluntary reporting requirement will be instated to receive submittals through a beta-system data collection system. The pilot program, to be launched in 2010, will be the testing period for voluntarily submitted data. Phase II involves the same framework as Phase I and requires mandatory data submittals. Phase II has already begun and is currently in the process of coordinating with the Data Coordination Subcommittee (DCS) in developing an implementation plan for a *Section 1600: Request for Information or Data* to support mandatory data submission, beginning 2011. High level specifications are outlined in Table B.

Table B: DADS Phase I & II

Phase	Implementation Year	Reporting Parties	Reporting Requirement	Demand Response Product(s)	Reporting Frequency	System Design
I	2010	BA, LSE, DP, PSE	Voluntary	Dispatchable, Controllable	Quarterly	In-house development
II	2011	BA, LSE, DP, PSE	Mandatory	Dispatchable, Controllable	Quarterly	RFP w/software developer

Because Phase I is a voluntary data collection, no formal request will need to be produced. Phase I and Phase II milestones are provided in Table C.

Table C: DRDTF and DADS Phase I & II Milestones for Implementation

Date	Action
September 2009	PC approval of Final Report (Phase I & II) in September 2009
September 2009	Send data request letter to Reporting Parties for Phase I
September 2009	DADS Technical Workshop with Reporting Parties for Phase I & II
September 2009	Submit preliminary request for mandatory data collection through a *Section 1600* (in Draft Report)*: Request for Information or Data*
September 17th - October 8th, 2009	File Section 1600 with FERC: 21 Day Comment Period
October 9th - November 23rd, 2009	Post data request for a 45-day public comment period
November – December, 2009	Incorporate comments received, and include comment matrix with responses in the Final Report
December 2009	PC for final approval (Contingent on any changes to the report received from comments)
January 2010	Submit Final DADS Report: Phase I & II for Board approval
January 2010	Implement the DADS Phase I with voluntary data submittals
June 1st, 2010	DADS Phase I Q1 data due to NERC

Once Phase I is fully implemented and data is submitted to NERC, preliminary DADS analysis can be done. Results from DADS analysis will be issued in quarterly summary reports and an annual report. Table D describes the deliverables for each year during each phase of DADS. The DRDTF will seek appropriate approvals for published documents.

Table D: Annual DADS Deliverables

Date	Action
June 1st	Q1 DADS data due to NERC
July 1st	DADS Q1 Summary Report published
September 1st	Q2 DADS data due to NERC
October 1st	DADS Q2 Summary Report published
December 1st	Q3 DADS data due to NERC
January 1st	DADS Q3 Summary Report published
March 1st	Q4 DADS data due to NERC
April 1st	DADS Q4 Summary Report published
May 1st	DADS Annual Report published

Chapter 1—Introduction

1.1 Demand Response Data Task Force

The Demand Response Data Task Force (DRDTF) was initiated by the NERC Planning Committee (PC) in December of 2007 based on recommendations from the Demand-Side Management Task Force. The DRDTF[6] reports directly to the Data Coordination Subcommittee.

Based on the premise that demand response availability data is needed to help address and quantify resource performance and reliability, this task force was formed to pursue the following objectives:

1. Identify how the Demand Response (DR) resource data will be used by NERC
   - Quarterly Summary and Annual Reports on Demand Response Performance
   - Support of NERC's Independent Reliability Assessments
2. Agree upon a set of DR definitions.
3. Coordinate with North American Energy Standards Board (NAESB) to develop Demand Response Measurement & Verification Business Practice Standards
4. Review current NERC Modeling and Data (MOD) Standards for demand response reporting applicability.
   - Resolve duplicative reporting requirements.
   - Determine which standard requirements a proposed data system will satisfy.
5. Agree upon the metrics NERC will calculate to satisfy its objectives.
6. Agree upon the data to support the metrics.
7. Design a data collection system.
8. Begin data collection.

To accomplish objectives set forth, this task force took the following approach:

1. Cataloged the demand response data currently being recommended and/or collected by NERC members and other industry groups as well as the uses of the data.
2. Recommended a common data reporting framework or protocol.
3. Provided NERC with a mechanism for reporting historic demand response event data.
4. Developed common availability statistics and metrics to be computed from the data.
5. Recommend guidelines for sharing and release of the data.

In its final product, this group will develop and specify the functional requirements of the Demand Response Data Availability System (DADS) and outline the systematic approach for implementation.

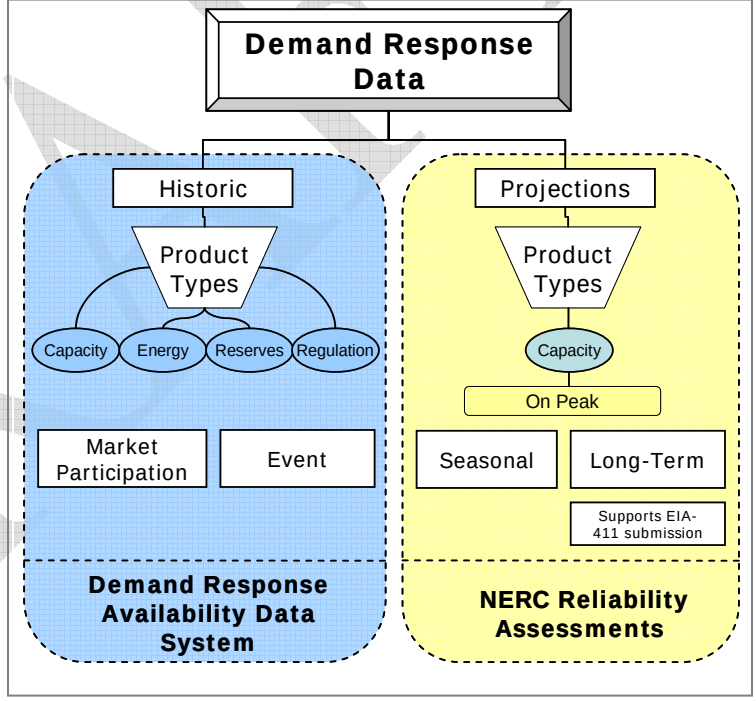
1.2 NERC's Role in Assessing Demand Response Performance

Demand-response is an important component in the overall portfolio of resources required to meet the increasing demands for electricity in North America. In order for NERC to understand the benefits of demand response and its influence on reliability, its performance must be measured to develop industry confidence.

[6] Approved scope and additional task force information is included in Appendix I.

The electric industry is increasingly deploying demand response programs as a way to maintain bulk power system reliability. As demand response becomes an important resource for planners and operators, measuring its performance ultimately supports NERC's independent Reliability Assessments. As part of its Seasonal and Long-Term Reliability Assessment data collection, NERC collects demand response peak projections from Regional Entities.[7] The data is aggregated from the members within each Region and is the expected reduction at time of peak. This data provides NERC with limited visibility as only seasonal peak-reducing dispatchable, controllable, capacity demand response data is submitted as shown in Figure 1. Additionally, demand response used for ancillary services is also collected for NERC Reliability Assessments. However, this data is for information only and is not used to reduce peak demand, as the potential for double counting exists. For NERC to provide a comprehensive reliability assessment of demand response resources, more data and metrics will be needed. Further, the impact and performance of price-responsive demand response must be included to be fully understood.

Figure 1: Current and Proposed NERC Demand Response Data Collection



Similar to the characteristics of renewable resources, demand response resources are variable, susceptible to ramping, and are not always dispatchable or controllable by the system operator. That said, expected of performance can accurately project demand response for use in planning and operating the bulk power system with large amounts of demand response resources. Demand response availability can vary day-to-day according to the specific conditions of weather, customer load variability and other factors.

As participation in demand response programs grows in North America, the amount of data associated with demand response programs, products, and services will grow proportionately. It will also be increasingly important to fully characterize these programs by including their load impact, day-to-day variability, predictability and availability with frequent use. In addition, as it ultimately displaces supply-side resources, demand response resources will be deployed more frequently. Therefore, NERC is proposing to collect demand response event and market participation data towards development of performance metrics, as outlined by the Demand-Side Management Task Force (DSMTF) in their report *Data Collection for Demand-Side Management for Quantifying its Influence on Reliability.*[8] These resource performance metrics will improve demand response projections by providing

[7] NERC 2008 Long-Term Reliability Assessment: Pages 18-21 show the data that was collected in 2008 for a 10 year projection. Pages 270-271 define the terms of the demand response categories. http://www.nerc.com/files/LTRA_2008_v1.2.pdf

[8] http://www.nerc.com/docs/pc/drdtf/NERC_DSMTF_Report_040308.pdf

forecasters with concrete data along with increased confidence in demand response availability and reliability for resource planners.

1.3 Demand Response Availability Data System

The NERC Demand Response Availability Data System (DADS) will enable NERC to receive, manage, assess and disseminate data on demand response products and services administered by retail and wholesale entities throughout North America. The goal of the DADS is to collect demand response event information to measure the ongoing influence of demand response on reliability and provide a basis for projecting the impacts of both dispatchable and non-dispatchable (price-driven) demand response on planning (demand reduction) and operational reliability. This data collection proposal provides a basis for counting and validating demand response resources as part of meeting operational and resource adequacy requirements. Phase I (voluntary) and II (mandatory) of DADS will focus on dispatchable demand response resources. Phase III (voluntary non-dispatchable data) and IV (all data mandatory) will supplement Phase I and II DADS with non-dispatchable demand response data. The final product will be an integrated system, capable of assessing the current impact of demand response resources in North America.

In order for DADS to be a valuable tool for the industry, the task force agreed that the proposed data and metrics should be:

- Comprehensive
- Comparable
- Verifiable
- Attainable
- Easy to Understand
- Useful and Relevant to its users, including
    - Various professionals within the electric power industry
        - Demand response providers
        - Load Forecasters
        - Resource Planners
    - NERC (the Electric Reliability Organization)
    - Government and Regulatory Organizations (e.g., FERC, EIA)

The data collection forms are designed to collect demand response program information, registered or committed quantity of demand response, demand response event data for controlled load programs, and market participation demand response activity. The DADS data collection will focus on demand response programs that impact reliability. DADS will not collect data on all demand side management programs which impact demand. Specifically, DADS will not, at this time, collect data on pricing or energy efficiency programs or permanent load reductions (e.g., installation of load reducing equipment, implementation of load reducing operational procedures) as well as any financial data (e.g., capacity payments, non-performance penalties, or dynamic (interval) pricing data).

Most of the burden of data collections and system management will fall on NERC and the reporting entities. The primary responsibility of the reporting entities will be to comply with reporting requirements and intervals, provide updated data as it becomes available, and maintain transparency, traceability, and audit trails. The primary responsibility of NERC is to manage the DADS system, assess the availability and performance of these resources, and report the findings.

An optimal data collection design structure should balance tradeoffs in the level of data detail, the level of effort required to collect the data, and the value of the data.

Chapter 2—Issues & Challenges

2.1 Confidentiallity of Data

Data submitted by Reporting Parties that is classified as confidential shall be managed in accordance with NERC's treatment of confidential information as described in Section 1500 of the *Rules of Procedure*.[9] Confidential data will not be accessible by others except the Reporting Party that submitted that data and NERC staff, who will be responsible for its analysis; however, aggregate data may be used for metrics and presented to third parties as necessary or appropriate.

Program data may be classified as:

- Confidential Business and Market Information[10]
- Non-Confidential

DADS is intended to serve as a valuable tool, not only for reliability and resource adequacy analysis, but for research outside of NERC. Appropriate access will be granted upon approval from NERC staff, accommodating any confidentiality commitments.

2.2 NERC's Authority to Require DADS Data

NERC's authority to issue a mandatory data request in the U.S. is contained in FERC's rules. Volume 18 C.F.R. Section 39.2(d) states: "Each user, owner or operator of the Bulk-Power System within the United States (other than Alaska and Hawaii) shall provide the Commission, the Electric Reliability Organization and the applicable Regional Entity such information as is necessary to implement section 215 of the Federal Power Act as determined by the Commission and set out in the *Rules of Procedure* of the Electric Reliability Organization and each applicable Regional Entity." A data request of U.S. entities can be made based upon NERC's authority in this FERC rule. NERC has filed a *Section 1600: Request for Information or Data* approved by FERC included in its *Rules of Procedure*. This rule allows for a 45-day open comment period for data requests such as DADS, which then must be approved by the Board of Trustees. An appendix will be added to this report which will contain a summary of the comments received as well as our responses. Since DADS is a data request pursuant to Section 39.2(d) and not a reliability standard, NERC will not be issuing any fines for non-compliance. However, a non-compliant U.S. Reporting Party may be sanctioned by FERC since failure to provide required data a violation of FERC's rules.

A *Section 1600: Request for Information or Data* does not carry the same obligations to Canadian entities as it does with U.S. entities. NERC will request data from Canadian entities through voluntary submissions.

[9] http://www.nerc.com/files/NERC_Rules_of_Procedure_EFFECTIVE_20081219.pdf

[10] Rules of Procedure: Section 1501: any information that pertains to the interests of any entity, that was developed or acquired by that entity, and that is proprietary or competitively sensitive.

In addition to the provisions in the NERC *Rules of Procedure* to request information or data, NERC Reliability Standards mandate the reporting of actual demand-side management resources.

NERC Reliability Standard MOD-16-1-1,[11] Requirement 1 requires the reporting of Demand data, Net Energy for Load data, and controllable DSM data be reported for system modeling and reliability analyses. However, to date, there is no system or framework for this data to be reported in a consistent manner.

2.3 Gaps in the NERC Functional Model

The NERC Reliability Functional Model defines the set of functions that must be performed to ensure the reliability of the bulk electric system. It also explains the relationship between and among the entities responsible for performing the tasks within each function. The Model provides the foundation and framework upon which NERC develops and maintains its Reliability Standards. The current version of the NERC Functional Model[12] (Version 4) does not recognize a demand resource owner/operator as a function to bulk power system reliability. This gap creates an obstacle when requesting data from non-registered entities (e.g., demand response provider, curtailment service providers, load aggregators, etc.). In the future, NERC may identify these entities in the Function Model; however, at this time, other activities were identified that will satisfy DADS functional requirements.

While NERC's authority to obtain data remains limited to current functional entities, the DADS system will not suffer from insufficient or incomplete data. The framework developed by the DRDTF is founded on demand response programs. As such, demand response participants register into programs that are developed solely by wholesale and retail electricity providers, and not third-party demand response providers. Therefore, to provide a clear picture of demand response impacts on a system, this level of granularity is not required. To incorporate and count data from third-party demand response providers would, essentially, be double counting, and perhaps, triple counting resources.

2.4 Double-Counting Demand Response Resources

One of the challenges NERC will have in assessing the amount of demand response is the potential for double-counting of resources. The structure of the market or regulatory environment in which Responsible Entities operate and the requirement to submit data to DADS could result in unintentional double-counting of demand response resources and events when NERC generates metrics. There are two situations in which double-counting resources could occur:

1) When aggregation occurs up to a Balancing Authority, multiple enrollments for a given product category (Capacity, Reserves, Regulation or Energy) could occur, and
2) When resources are jointly enrolled in multiple product categories within a single entity.

Responsible entities required to report the data and the instructions for reporting the demand response resources must be carefully considered. Comprehensive data handling algorithms are needed to count resources once and only once while placing resources in correct categories. DADS will be able to mitigate potential double-counting issues by configuring "counting rules", or

[11] http://www.nerc.com/files/MOD-016-1_1.pdf
[12] http://www.nerc.com/files/Functional_Model_V4_CLEAN_2008Dec01.pdf

algorithms, that are predefined by the DRDTF and selected by the Reporting Party during data entry.

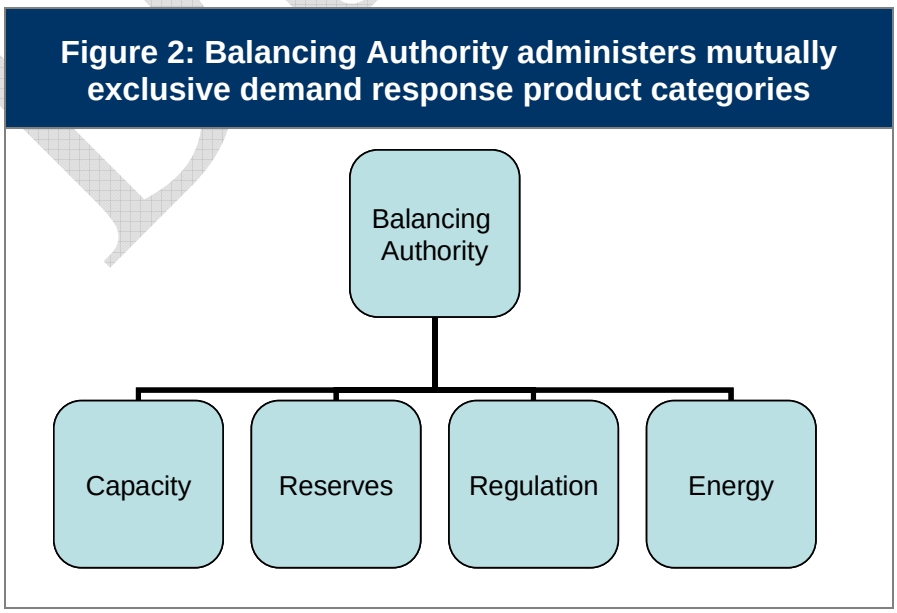
NERC has identified four Responsible Entity types that will be required to submit data to DADS: Balancing Authority, Distribution Provider, Load-Serving Entity and Purchasing-Selling Entity. In addition, the Functional Model Working Group has identified two potential new Responsible Entity types, *Demand Resource Operator* and *Demand Resource Owner*, that it may consider as working functions in the bulk power system and may require these entities to submit data to DADS once the Functional Model has been updated and approved. The definitions of these new types of Responsible Entities should clearly define the characteristics of these entities. Any overlap between these new Responsible Entities and other Responsible Entity types who will be required to report to DADS should be clearly described.

To ensure that NERC does not double-count resources when preparing any assessments of the capabilities of demand response in the bulk power system, NERC will need to construct a set of algorithms and rules for Responsible Entities that include the various types of market structures and regulatory environments. Within any NERC Region, multiple market structures and regulatory environments are likely to exist. Diagrams, such as Venn Diagrams or hierarchical relationship diagrams, such as organizational charts, could be used to depict the different market structures and/or regulatory environments. NERC could use these market structure/regulatory definition diagrams to construct "counting rules" for calculating the available demand resource capabilities for each product type. In addition, when a resource is jointly enrolled within a single Reporting Party, a hierarchical assignment of the demand resource's capability is recommended.

Responsible Entity Reporting: Market Structures and Regulatory Environments

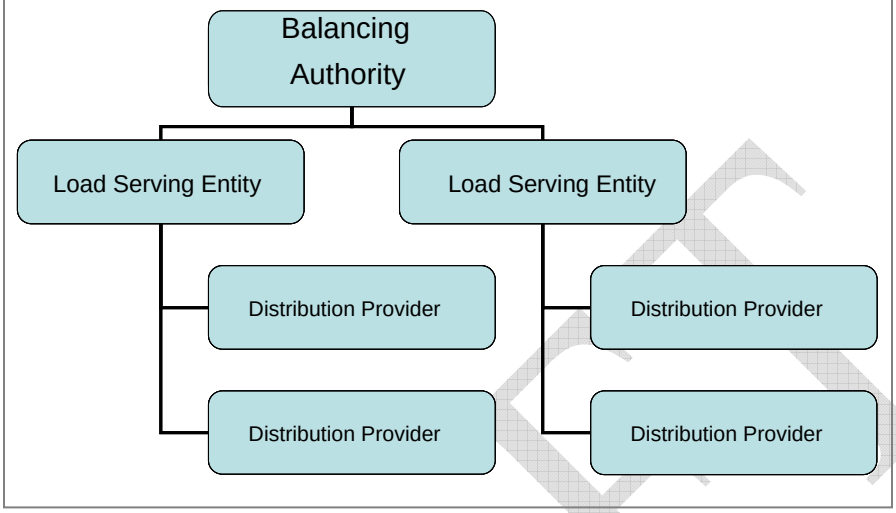
The following diagrams illustrate a few of the models/scenarios that Responsible Entities may be part. In areas where a single Responsible Entity type enrolls demand response resources in mutually exclusive product categories, the definition is simple, as shown in Figure 2. Each product category represents unique resources and MW.

Figure 2: Balancing Authority administers mutually exclusive demand response product categories



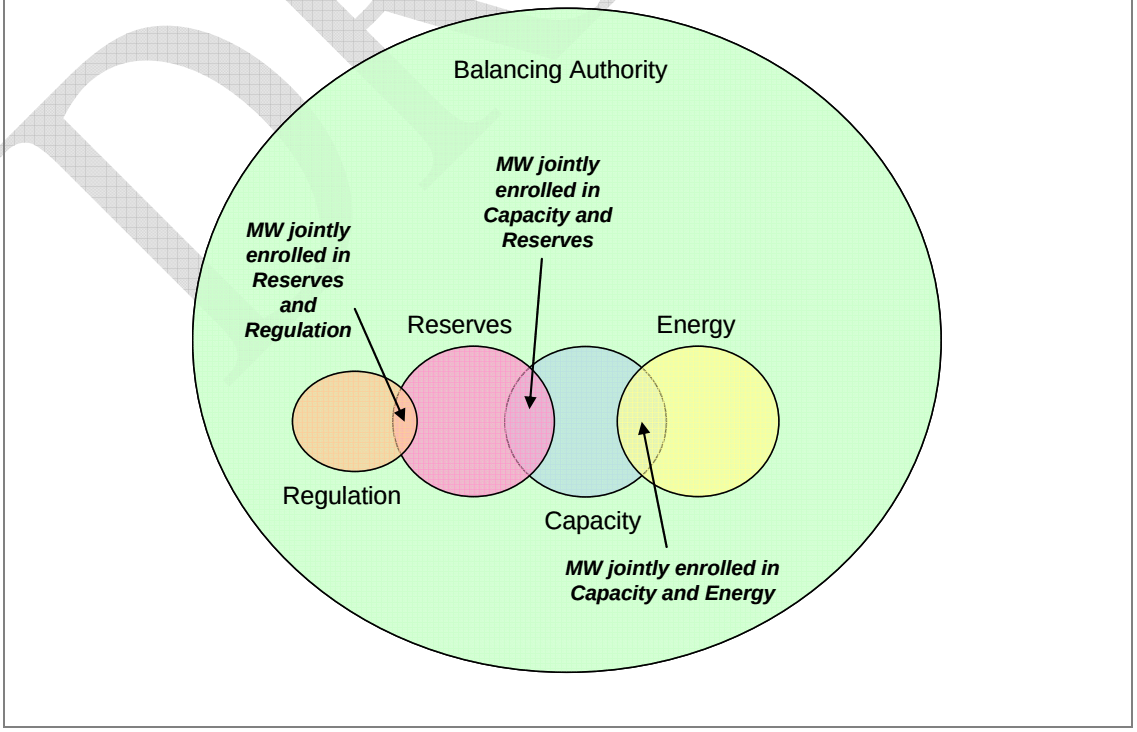
Similarly, a hierarchical market structure, Figure 3, would eliminate double-counting because the highest level authority would incorporate other Responsible Entities.

Figure 3: Hierarchical Market Structure



In the two previous scenarios, double-counting issues are not likely to arise. Scenarios similar to those in the next scenarios are where double-counting rules must be in place. In Figure 4, within a single Balancing Authority, demand response products are administered where joint enrollment is permitted. Unique or "coincident" mega-watts (MW) are identified separately from the jointly enrolled MW.

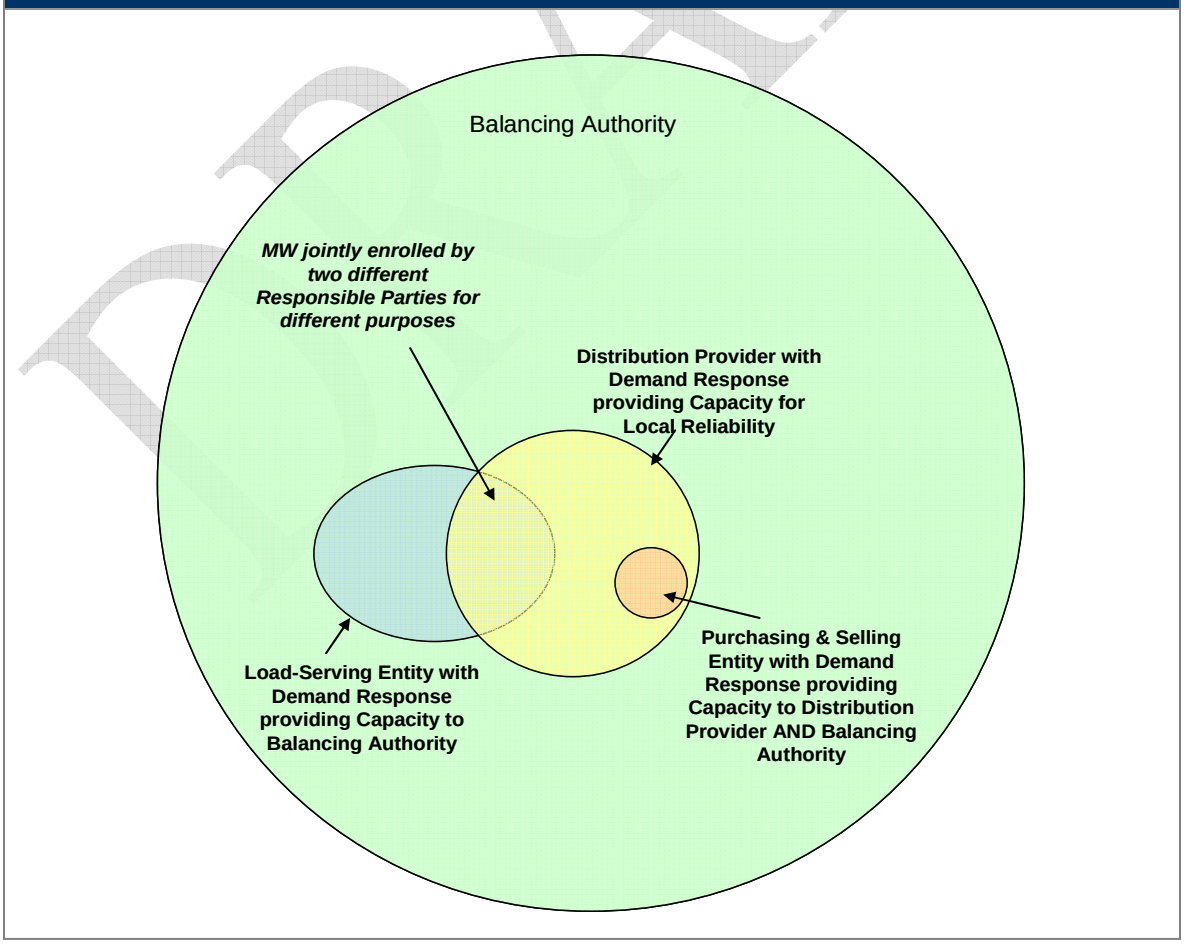
Figure 4: Balancing Authority administers demand response product categories where joint enrollment is permitted



When multiple types of Responsible Entities and/or layers of Responsible Entities are required to submit data for their resources increases the complexity. In many cases, each Responsible Entity is unaware of the demand resource's participation with the other Responsible Entity and there are no jurisdictional requirements that would cover the sharing of such information. In Figure 5, four different entities could report some portion of the same demand resource capability they have subscribed:

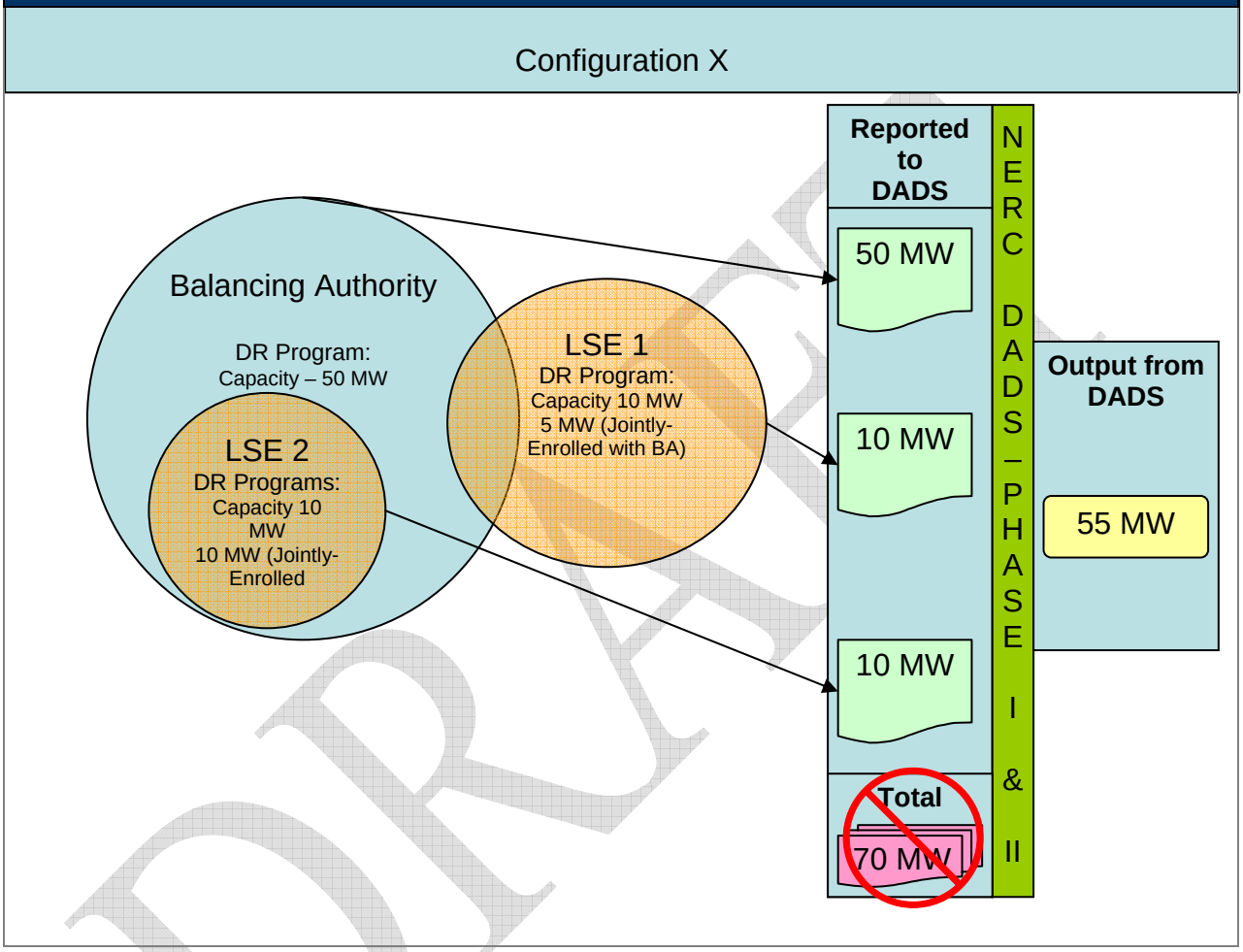
- Balancing Authority (green) reports for the capacity product category it administers (including MW reported by Load-Serving Entity – blue, and Purchasing & Selling entity – orange)
- Distribution Provider (yellow) reports capacity for local reliability which includes capacity also reported by Load-Serving Entity and Purchasing & Selling Entity
- Load Serving Entity reports capacity enrolled with Balancing Authority which includes some overlap of resources reported by Distribution Provider
- Purchasing & Selling Entity reports capacity that has also been reported by Distribution Provider and Balancing Authority

Figure 5: Multiple Responsible Entities reporting some of the same demand resource capacity



In Figure 6, a sample configuration or model that is pre-defined is shown. In the example, one can visualize how DADS will treat data based on relational structures. The example shows that without a double-counting mitigation scheme, 70 MW of demand response would be reported, and overstated.

Figure 6: Sample Configuration of a Responsible Entity – Treatment of DADS



Responsible Entity Reporting: Demand Resource Capability

When a Responsible Entity permits demand resources to provide more than one type of product, the Responsible Entity should identify how the resource is categorized for its deployment, based on the demand response product categories. Depending on market or tariff rules, a resource may be jointly enrolled in two or more product categories. By standardizing the hierarchy for reporting the product categories, NERC can isolate the unique and jointly enrolled MW to determine the appropriate values to report for each demand response product type.

Figure 7 offers Responsible Entities with a model that provides a method for distinguishing the jointly enrolled MW from the uniquely enrolled MW and offers a way to assess the maximum demand response capability available. Below, are some terms used in conjunction with this model:

- **Coincident** refers to the resources/MW that would be realized if all DR products were called simultaneously and all responded by curtailing their enrolled quantity.
- **Jointly enrolled** refers to resources/MW that are enrolled in two or more product categories. This value conveys diversity, but is not very meaningful by itself.
- **Coincident Aggregate** refers to the total available resources where there is no double counting, and therefore provides an equivalent to how generation resource availability is measured. Coincident Aggregate is the sum of the diagonals shown in the matrix below.
- **Coincident Category** refers the total resources available to respond for a single category. Coincident Category is the sum of each product column.

Figure 7: Distinguish Jointly Enrolled vs. Coincident Aggregate Data

		Capacity C	Reserves V	Regulation G	Energy E
Capacity	C	1	2	3	4
Reserves	V	5	6	7	8
Regulation	G	9	10	11	12
Energy	E	13	14	15	16
Coincident Category		17	18	19	20
				Coincident Aggregate	21
				Jointly Enrolled	22

Cell Number	Matrix Intersection	Description
1	***CC***	Unique Capacity Resources/MW
2	***CV***	The Resources/MW who provide both Capacity and Operating Reserves products
3	***CG***	The Resources/MW who provide both Capacity and Regulation products
4	***CE***	The Resources/MW who provide both Capacity and Energy products
5	**-**	Unused - Resources who provide both Capacity and Operating Reserves are shown in cell # 2
6	***VV***	Unique Operating Reserves Resources/MW
7	***VG***	The Resources/MW who provide both Operating Reserves and Regulation products
8	***VE***	The Resources/MW who provide both Operating Reserves and Energy products
9	**-**	Unused - Resources who provide Regulation and Capacity are shown in cell # 3
10	**-**	Unused - Resources who provide Operating Reserves and Regulation are shown in cell # 7
11	***GG***	Unique Regulation Resources/MW
12	***GE***	The Resources/MW who provide both Regulation and Energy products
13	**-**	Unused - Resources who provide Capacity and Energy are shown in cell # 4
14	**-**	Unused - Resources who provide Energy and Operating Reserves are shown in cell # 8
15	**-**	Unused - Resources who provide Energy and Regulation are shown in cell # 112
16	***EE***	Unique Energy Resources/MW
17	**-**	Total enrolled Capacity
18	**-**	Total enrolled Reserves
19	**-**	Total enrolled Regulation
20	**-**	Total enrolled Energy
21	**-**	Total Unique Resources/MW for all product categories
22	**-**	Total Jointly Enrolled Resources/MW for all product categories

The hierarchy presented above shows Capacity as being the highest priority product category for demand response, followed by Operating Reserves, then Regulation and finally Energy. This hierarchy could be modified to rearrange the product categories, if needed, and should be set prior to development of DADS.

The presentation of the data structure as a collection tool (Figure 7) simplifies the amount of instruction necessary for a Responsible Entity to complete the matrix. This data structure captures the coincident enrollments within a Responsible Entity. Additional "keys" could indicate the type of Responsible Entity reporting the data. If a Responsible Entity is the collection agent for other Responsible Entities, NERC may require collection agents to report the information by Responsible Entity type. By associating the Responsible Entity to its market structure/regulatory environment definition, NERC should be able to reflect the true coincident aggregate and category totals for a Region.

2.5 Intended Uses and Limitations of Data and Metrics

DADS will enable NERC to receive, manage, assess, and disseminate various types of data on demand response programs being implemented by retail and wholesale entities throughout North America. The goal of DADS is to collect demand response event information to measure the ongoing influence of demand response on reliability and provide a basis for projecting both dispatchable and non-dispatchable (price-driven) demand response toward planning (demand reduction) and operational reliability.

DADS will become a centralized repository for demand response enrollment, event and performance data in North America. To maintain accuracy and relevancy of the data, NERC will need to ensure that the data collected are complete and reported in a timely fashion. Users should be able to export specified public data for their own off-line analysis. NERC metrics should be available in viewable, printable and exportable formats.

Enrollment data can provide information on the influence demand response has on reliability. Event performance data may be analyzed to identify whether demand response resources are able to achieve the committed potential when activated and can serve as a basis for planning how demand response resources are incorporated in meeting operational and resource adequacy requirements. Market participation data, for products where demand response resources are scheduled to supplement generation, usually based on economics, rather than activated to respond to a reliability condition, can be analyzed to identify demand resources' capability and willingness to be deployed based on market conditions instead of reliability conditions.

The scope of the DADS project is limited to quantitative information: enrollment, event participation and performance data. Participation requirements, payments and other types of qualitative data about demand response (e.g., segmentation, how demand response is achieved, how it is notified, etc.) is not included in the scope of DADS. The data collection effort for obtaining such qualitative data would be very labor intensive and can be very subjective. Qualitative data does not provide any value to ascertaining reliability of a resource or market segment. There is also a risk that combining incomplete qualitative data with quantitative data can result in incorrect conclusions.

Future efforts will be coordinated with the Reliability Metrics Working Group (RMWG) to support metric development. The DRDTF will submit the metrics listed in Chapter 5 of this report, to the RMWG for consideration as industry-vetted historical demand response performance metrics.

2.6 Schedule and Resource Requirements

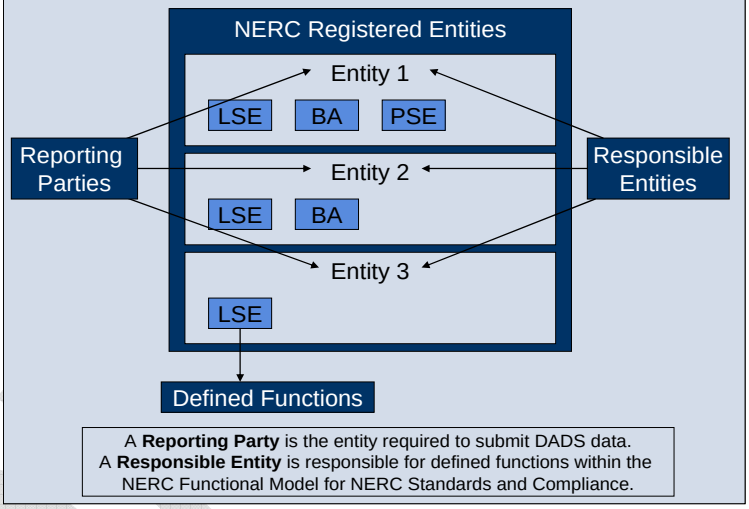
The DADS will require funding and staff to develop and implement. Phase I of DADS, also referred to as a "pilot run" will test reporting procedures and double-count mitigation algorithms. During the voluntary data submittal, called for in Phase I, the DRDTF will work with Reporting Parties to enhance the DADS system. Phase I will be developed in-house by NERC Staff. It will serve as a model for the future development of DADS Phase II. Because of the potentially large amounts of data DADS Phase III & IV will be handling, development of suitable software may be required. Since the final DADS product is an integrated system, handling all phases, the software should be developed at the start of Phase II to limit compatibility issues.

Chapter 3—Data Collection & Reporting Process

3.1 Required Reporting Parties

Entities responsible for reporting to DADS were identified using the current version of the NERC Functional Model.[13] Responsible Entity is a term used by NERC which applies to an organization that carries out the Tasks within a Function. Responsible Entities are registered by the Electric Reliability Organization (ERO) in the U.S. along with NERC in Canada/Mexico and maintained in its registry as described in the NERC Rules of Procedure[14] and Regional Delegation Agreements[15]. Such organizations are "responsible" to NERC for meeting the standards requirements assigned to the particular Responsible Entity.

Figure 8: Example Reporting Parties and Responsible Entities



While the Functional Model is used to identify Responsible Entities in NERC Reliability Standards, the DADS system will use the Functional Model to identify Responsible Entities to acquire the needed data, per the Rules of Procedure, *Section 1600: Request for Information or Data.* As such, these Responsible Entities will be classified as the Reporting Party, responsible for submitted DADS data. Figure 8 illustrates this relationship.

Responsible Entities will be required to maintain demand response data in DADS. A Reporting Party is generally the entity responsible for dispatching the demand response program, product or service. In order for DADS to be effective and complete, mandatory reporting is required from the NERC Registered Entities listed in Table 1.

[13] http://www.nerc.com/files/Functional_Model_Version3_Board_Approved_13Feb07.pdf
[14] http://www.nerc.com/files/NERC_Rules_of_Procedure_EFFECTIVE_20081219.pdf
[15] http://www.nerc.com/page.php?cid=1|9|119|181

Table 1: NERC Responsible Entities for DADS Data

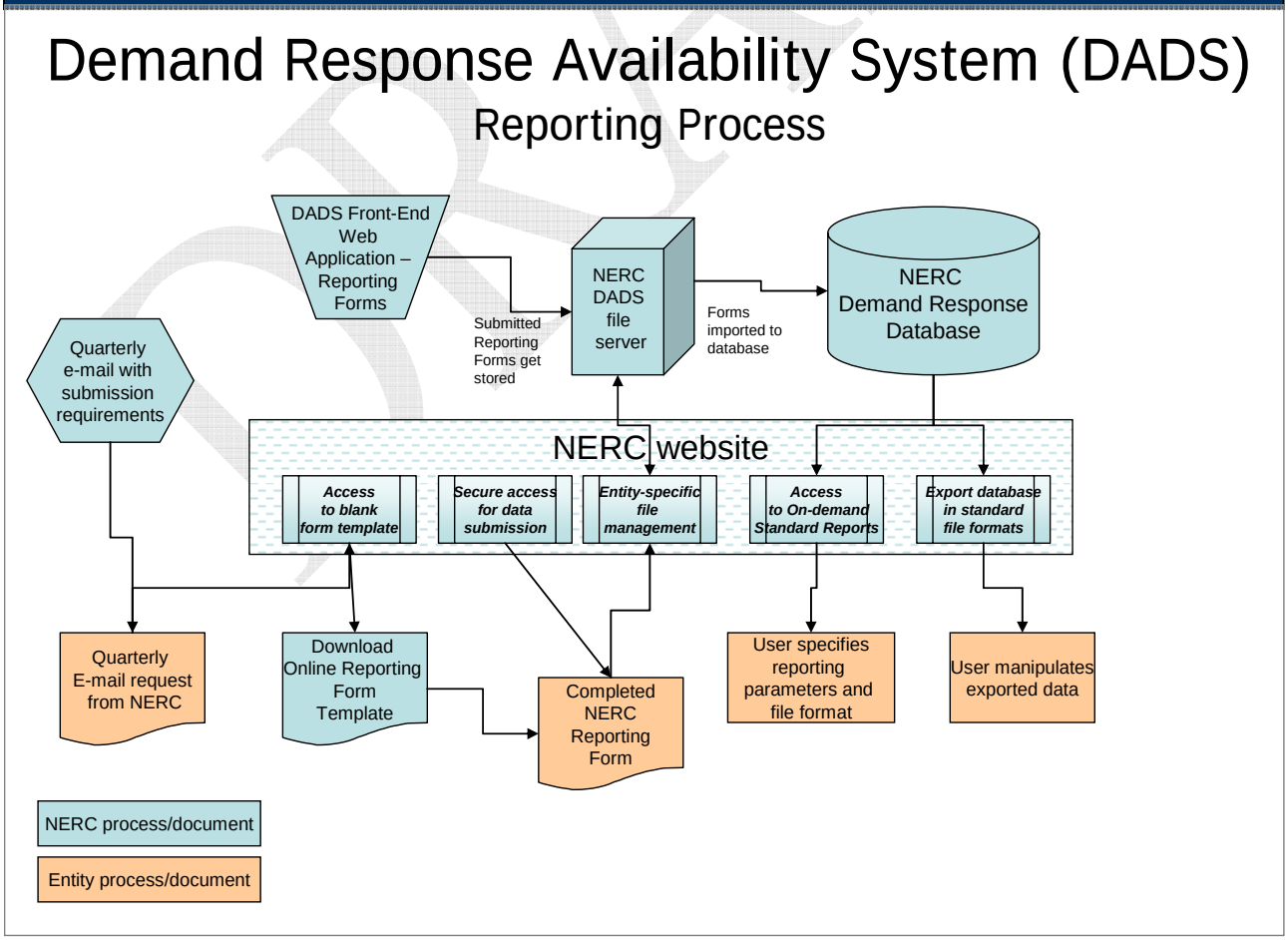
Function Name	Responsible Entity
Balancing	Balancing Authority
Distribution	Distribution Provider
Load-Serving	Load-Serving Entity
Purchasing-Selling	Purchasing-Selling Entity

All Registered Entities, designated as a Responsible Entities in Table 1, will ultimately be required to submit DADS data. It is common for one Registered Entity to serve multiple functions, based on the NERC Functional Model and they will be responsible for only one submission. An optimal data collection design should balance tradeoffs in the level of detail, the level of effort required for collection, and the value. Reporting Party functions will be based on the Registration Form.

3.2 Overall Process

The DRDTF recommends the process shown on the diagram in Figure 9. The reporting process will be dependent on a Web-based reporting mechanism using the developed forms. Reporting Parties will be required to log demand response program and event data on a quarterly basis.

Figure 9: DADS Reporting Process Flow Diagram



The process decribed above relates to all phases of DADS. However, as DADS evolves, the data collection process may be changed to reflect enhancements.

3.3 Measurment & Verification Framework for Demand Response Data

The North American Energy Standards Board (NAESB) is currently developing Demand Response Measurement & Verification Business Practice Standards[16] for the Wholesale and Retail Electric Sectors. The first phase of the Wholesale Measurement and Verification (M&V) identified several key characteristics of DR products and services have been identified in standards that were approved by the wholesale electric participants of the DSM-EE subcommittee on December 2, 2008, and approved by the Wholesale Electric Quadrant (WEQ) Executive Committee on February 10, 2009. It is now in the process of being ratified by NAESB WEQ members. Additional technical standards will be developed in 2009.

Because DADS data is so highly dependent on results of various entities measurement and verification efforts, it is vital that close coordination with the NAESB group produce definitions that are consistent and standard across the industry. M&V standards are intended to facilitate Demand Response by providing a common framework for:

- Transparency - Accessible and understandable M&V requirements for Demand Response programs, products, and services
- Accountability - Criteria that will enable the System Operator or Program Administrator to accurately measure performance of Demand Response resources
- Consistency - a process or protocol that will allow all entities involved to agree on the required steps to take to measure and verify demand reductions resulting from Demand Response programs in either wholesale or retail energy markets.
- Comprehensive - covers all forms of Demand Response

The standards[17] reflect business practices applicable to measurement and verification of wholesale market Demand Response services including the following four product/service categories:[18]

Energy Service
A type of Demand Response service in which Demand Resources are compensated based solely on demand reduction performance during a Demand Response event.

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.

[16] These standards are applicable only wholesale administered markets in North America and have only been approved for the Wholesale Electric Quadrant (WEQ).

[17] These standards establish Demand Response M&V criteria. They do not establish requirements related to the compensation, design, operation, or use of Demand Response services. In these regards, System Operators are not required to offer these Services and may not currently offer each of these Services. Terms that are capitalized in these standards have the meanings ascribed to them in the Definitions of Terms section.

[18] The terms Product(s) or Service(s) may be used interchangeably in these standards.

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.

Regulation Service
A type of Demand Response service in which a Demand Resource increases and decreases Load in response to real-time signals from the System Operator. Demand Resources providing Regulation Service are subject to dispatch continuously during a commitment period. Demand Resources providing Regulation Service automatically respond to changes in grid frequency (similar to the governor action on a generator), and also are subject to continuous dispatch based on instructions from the System Operator (similar to Automatic Generation Control). Provision of Regulation Service does not correlate to Demand Response Event timelines, deadlines and durations.

These M&V standards establish criteria for the use of equipment, technology, and procedures to quantify the Demand Reduction Value delivered. The standards developed may include commonalities among product types. The following outline of the NAESB M&V Standards is applicable to the four Demand Response service/product categories.

Table 2: NAESB Demand Response M&V Standards Outline

Standard	Criteria	
General	Advance Notification	**Required DADS Data Elements**
	Deployment Time	
	Reduction Deadline	
	Release/Recall	
	Normal Operations	
	Demand Resource Availability Measurement	
	Aggregation	
	Transparency of Requirements	
Telemetry	Telemetry Requirement	
	Telemetry Accuracy	
	Telemetry Interval	
	Other Telemetry Measurements	
	Communication Protocol	
	Governor Control Equivalent	
	On-Site Generation Telemetry Requirement	
After-The-Fact	After-the-Fact Metering Requirement	

	Meter Accuracy
	Details of Meter/Equipment Standards
	Meter Data Reporting Deadline
	Meter Data Reporting Interval
	Clock / Time Accuracy
	Validating, Editing & Estimating (VEE) Method
	On-Site Generation Meter Requirement
Performance Evaluation	Rules for Performance Evaluation

The DADS system will not require or collect data on all M&V aspects. However, those items identified in Chapter 4 of this report, will be critical in supporting consistency across all Reporting Parties.

For each Demand Response service, a performance evaluation method is used to determine the Demand Reduction Value provided by a Demand Resource. The standards include descriptions of acceptable Baselines and alternative performance measurements that are appropriate for each of the four types of Demand Response services/products. Table 4 provides an outline of the applicable criteria for performance evaluation methods.

Table 3: NAESB Performance Evaluation Methods

Baseline Information	Baseline Window
	Calculation Type
	Sampling Precision and Accuracy
	Exclusion Rules
	Baseline Adjustments
	Adjustment Window
Event Information	Use of Real-Time Telemetry
	Use of After-The-Fact Metering
	Performance Window
	Measurement Type
Special Processing	Highly-Variable Load Logic
	On-Site Generation Requirements

These standards do not specify detailed characteristics of performance evaluation methods, but rather provide a framework that may be used to develop performance evaluation methods for specific Demand Response services. The following methods are applicable to Demand Response Products/Services:

> **Maximum Base Load:** A performance evaluation method based solely on a Demand Resource's ability to reduce to a specified level of electricity demand, regardless of its electricity consumption or demand at Deployment.

Meter Before / Meter After: A performance evaluation method where electricity consumption or demand over a prescribed period of time prior to Deployment is compared to similar readings during the Sustained Response Period.

Baseline Type-I: A Baseline performance evaluation method based on a Demand Resource's historical interval meter data which may also include other variables such as weather and calendar data.

Baseline Type-II: A Baseline performance evaluation method that uses statistical sampling to estimate the electricity consumption of an Aggregated Demand Resource where interval metering is not available on the entire population.

Metering Generator Output: A performance evaluation method, 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.

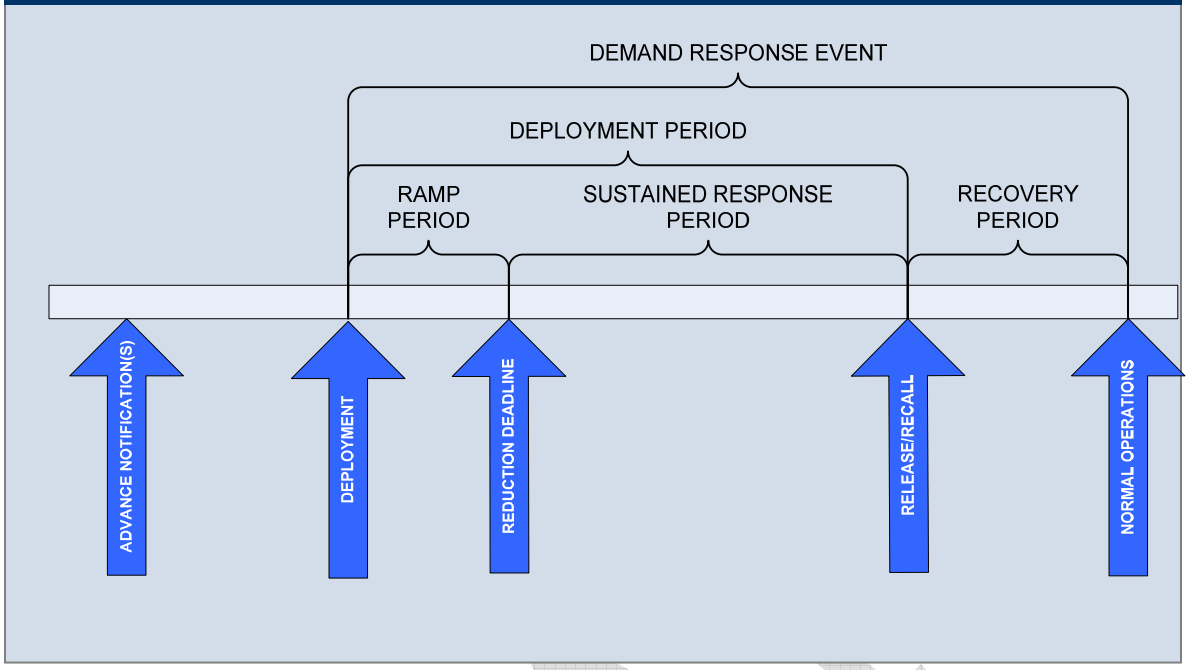
Specifying the Demand Response Performance Evaluation Method is important when performing a DADS data analysis. Additionally, NERC must understand the Baseline assumptions as this is a theoretical (except for Metering Generator Output) base-case, the Demand Reduction Value will be sensitive to the type of performance method used.

Table 4: Performance Evaluation Validation

Performance Evaluation Type	Valid For Service Type			
	Energy	Capacity	Reserves	Regulation
Maximum Base Load	✓	✓	✓	
Meter Before / Meter After	✓	✓	✓	✓
Baseline Type-I	✓	✓	✓	
Baseline Type-II	✓	✓	✓	
Metering Generator Output	✓	✓	✓	✓

The illustration below represents the terms for timing events and time durations applicable to the characteristics of a Demand Response Event. The definitions of the ten elements in the illustration are the basis for describing the Timing of a Demand Response Event. The applicability of these elements to a Demand Response Service is dependent on the service/product type. The proposed metrics for DADS data analysis are highly dependent on the definition of their timing. Consistent time-stamping definitions will be used to complete DADS data forms accurately and consistently. A Reporting Party shall specify whether any or all of the elements, illustrated in Figure 10, are applicable.

Figure 10: Illustration of Demand Response Timing During an Event



Chapter 4—Functional Requirements

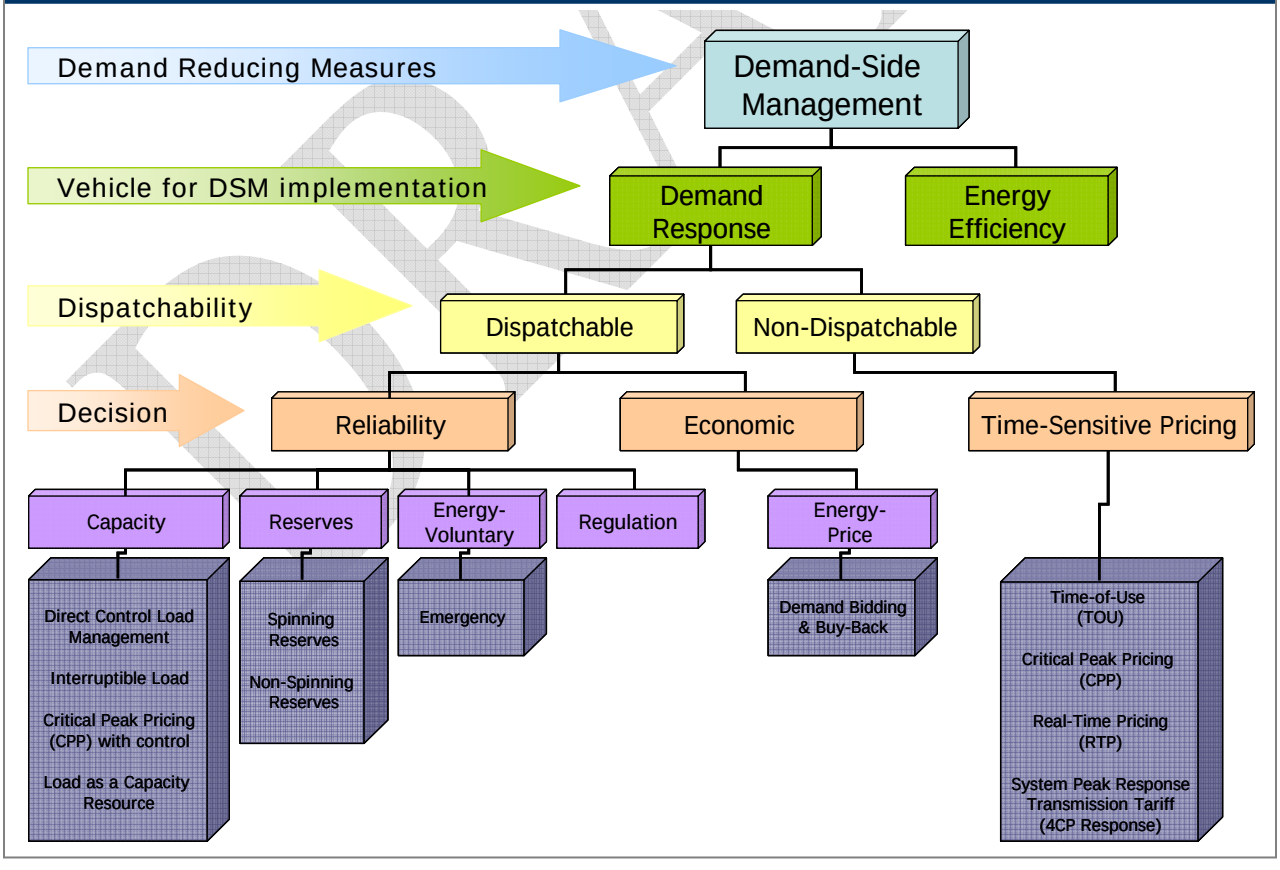
4.1 DADS Elements

The DADS system will collect data for both event (reliability-driven) and market participation (price-driven) demand response. All demand response will be categorized as either dispatchable or non-dispatchable and as one of the following products/services:

- Energy
- Capacity
- Reserve
- Regulation

While there are four (4) products/services identified with a Demand Response Resource, there are multiple categories, or programs, a it may be categorized. Figure 11 illustrates the relationship of a variety of demand response to Demand-Side Management, how load reductions are implemented, the dispatchability of a given resource, and the decision that triggers demand response.

Figure 11: Demand Side Management Categories



4.2 DADS Interface

The DRDTF is proposing a Web-based data management system that will have the characteristics listed below:

1) Controlled access to the database
2) Capable of two modes of data entry
3) Algorithms for data checking and validating based upon a set of pre-defined rules, eliminating double counting issues
4) Capable of generating reports and analysis based on a user defined query at the various levels (e.g., Regional Reliability Organization, Balancing Authority, and NERC level). Reports must be formatted in Excel for export.
5) Calculating predefined performance metrics

The management of users and administrators is vital when handling confidential data. Therefore, DADS will need controlled access for those submitting data (User/Reporting Party) and those handling the data (System Administrator/NERC Staff). These requirements are listed below.

Manage Users:

The system must support management of different types of users. The following functionality is required.

Add Users

Adding new users to the system:

- **Reporting Party Administrator**
- **Reporting Party User**
- **Guest**
- **System Administrator**

Update/Edit Users

- Reporting Party Administrator will be able to add, update and edit Reporting Party Users.
- Reporting Party Users and Administrators will be able to update and edit unrestricted data fields (i.e., contact information)
- Changes to restricted field will require System Administrator approval.

Deactivate Reporting Users

- Reporting Party Administrator can deactivate a Reporting Party Users from their organization.
- Only the System Administrator can delete a Reporting Party Administrator.

Manage User Roles and Access Levels

- Limit certain Users ability to view data Reporting Party level data versus NERC aggregated metrics.

4.3 Program Data Collection Forms

DADS is designed to collect data on four forms:

- **Form 1A**: Register Program
- **Form 1B**: Manage Program

- **Form 2**: Reliability Event Data
- **Form 3**: Market Participation Data
- **Form 4**: Ancillary Product Data

The details of each of these forms are provided below.

Form 1A: Register Program:

Reporting Parties must first establish their demand response programs in the system prior to providing any program data. The system must allow the Reporting Parties to update and edit the information, as well as deactivate the demand response program at the end of its life.

Add Program

- Reporting Parties will be required to enroll their program(s) in the system prior to submitting Registration, Event and Market Participation reports.
- Program enrollment will include required and optional program characteristics (i.e., program type, location, etc.)
- Programs will have a status (i.e., active, retired). Registration, Event and Market Participation reports can be submitted for active programs.
- Upon submitting all the required data fields, the program status will be set to Active.

Table 5 – DADS Form 1A: Register Program

Name	Description	Field Type
Reporting Party	Name of the retail or wholesale organization responsible for the program	Required
Reporting Party NCR ID#	NERC Compliance Registry Number	Required
Reporting Party Type	Type of organization reporting data consistent with Table 1.	Required
Program Name	Name of the Program	Required
NERC Region	The NERC Region in which the load reductions will occur. NERC defined.	Required
Market Type	Retail, Wholesale	Required
Product Type	Energy, Capacity, Reserve, Regulation	Required
Service Type	Programs must be classified into one of the following categories: 1. Capacity – Critical Peak Pricing with Load Control 2. Capacity – Direct Control Load Management 3. Capacity – Interruptible Load 4. Capacity – Load as a Capacity Resource 5. Regulation 6. Reserves – Non-Spin/Non-Synchronous 7. Reserves – Spinning/Synchronous 8. Energy – Price	Required

Table 5 – DADS Form 1A: Register Program		
Name	**Description**	**Field Type**
	9. Energy – Voluntary	
Performance Evaluation Method	Method used to evaluate performance as defined in the proposed NAESB standards: (Programs may use multiple methods.) 1. Maximum Base Load 2. Meter Before / Meter After 3. Baseline Type-I 4. Baseline Type-II 5. Metering Generator Output	Required
Contact Name	Name of the person to contact regarding the program	Required
Contact Phone Number	Phone number of contact regarding the program	Required
Contact E-Mail Address	E-mail address of contact regarding the program	Required
Program Data	Which type of data will you be reporting? (Event or Market Participation)	
Program Relationship 1	Is the Registration, Event or Market Participation data reported for this program reported for any other program (Yes, No)?	Required
Program Relationship 2	If Yes, Name of the program	Required
Program Relationship 3	If Yes, Name of the Reporting Party	Required
Program Relationship 4	Is this program the "Parent" or "Child" in the Program Relationship	Required
Program Status	Active or Retired	Required
Program Start Date	Date the program starts	Required
Program End Date	Date the program ends or None	Required
Program Data Confidentiality	The confidentiality status of a specific program. • Confidential Business and Market Information • Non-Confidential	Required
Program ID	Unique identifier provided by the System	System

Validate Program Data

- The system will validate that the required fields are entered. The user will not be able to complete the addition of a new program without entering valid data for all required fields.
- The system will flag programs with relationships to other programs. The Parent/Child relationship will be maintained between programs so Registration, Event and Market Participation data will not be doubled counted.

Program Reporting Relationships (Parent/Child)

- The system will maintain the Parent/Child relationship between programs that can be among (i) a Reporting Party's programs or (ii) another Reporting Parties program(s).
- The system will exclude registration and performance data from "Child" programs from any summary reports so that registration and performance data is not double counted.

Edit/Update Program:

- Reporting Parties will be able to edit/update program characteristics pursuant to the following rules:
- Establish rules on when the data can be updated (i.e. Quarterly)

Table 6 – Edit/ Update Business/Program Rules

Name	Update/Edit
Reporting Party	No
Program Name	Yes
NERC Region	Yes
Market Type	No
Product Type	No
Service Type	No
Contact Name	Yes
Contact Phone Number	Yes
Contact E-Mail Address	Yes
Program Relationship 1	Yes
Program Relationship 2	Yes
Program Relationship 3	Yes
Program Status	Yes
Program Start Date	Yes
Program End Date	Yes
Program Data Confidentiality	Yes
Program ID	No

Retire Program:

- The reporting party can change the status of the program from Active to Retired and specify an effective date of the retirement.
- The reporting party cannot provide additional Registration, Event or Market Participation data for programs in a Retired status.
- The system will maintain historical data on Retired programs.

Register Zones by Reporting Party

- The system will maintain pre-defined Zones by Reporting Party and Program.
- Each Zone must be associated with a single Time Zone.

Form 1B: Manage Program Data:

The system must allow Reporting Parties to add and update Registration, Event and Market Participation data.

Add Registration Data

- A Reporting Party can add registration data for any of their programs that are in an Active status.
- The system will maintain the date, time and user that added the registration data.

Table 7 – DADS Form 1B: Manage Program Data

Name	Units	Data Type	Format	Validation	Description
Record Date	N/A	DATE	DD/MM/YYYY		Date the record was prepared (this is not the period being reported)
Version	N/A	NUMBER		1(initial), 2,3,4,….	Indicates if the data is the initial submission or a subsequent update. Auto generated by system when the Program ID, Registration Month and Zone already exist in the database.
Registration Month	N/A	DATE	MM/YYYY		Month and Year for the registration month being reported.
Program ID	N/A	STRING			Unique program identifier
Zone	N/A	STRING			Name of the location. User defined, maintained in a table with the Time Zone for the Zone
Number of Registered Resources Assets	N/A	NUMBER	######		The number of registered resources/assets in the zone for the program being reported.
Registered MW	MW	NUMBER	#######.###		The registered MW available for reduction in the zone for the program being reported.

Validate Registration Data

- The system will check that all required fields are entered and warn the user of any missing data fields.

Update Registration Data

- A Reporting Party can update registration data for any of their programs that are in an Active status.
- Data submitted after the initial addition will be identified as updated data.
- The Reporting Party can update a single entry or all the data for a reporting period.
- The system will maintain the date, time and user that added the registration data.
- The system will maintain the initial submission. No data will be deleted.

Form 2: Reliability Event Data

- Reliability Event Data will be reported for Demand Response services in which resources are obligated over a defined period of time to provide Demand Response upon deployment by the appropriate Balancing Authority, Load Serving Entity, Distribution Provider, etc.
- A Reporting Party can add event data for any of their programs that are in an Active status.
- Event Data will be reported in a manner consistent with the proposed NERC/NAESB definitions of Demand Response Event Terms. The timeline terms in Table 8: Form 2 should be reported in accordance with Figure 8. These terms are defined in the *Definitions of Terms* section of this report.
- The system will maintain the date, time and user that added the event data.

Table 8 – DADS Form 2: Reliability Event Data

Name	Units	Data Type	Format	Validation	Description
Record Date	N/A	DATE	DD/MM/YYYY		Date the record was prepared (this is not the period being reported)
Version	N/A	NUMBER		1(initial), 2,3,4,…	Indicates if the data is the initial submission or a subsequent update. Auto generated by system when the Program ID, Registration Month and Zone already exist in the database.
Registration Month	N/A	DATE	MM/YYYY		Month and Year for the registration month being reported.
Event Type	N/A	STRING		Actual, Audit	The type of event
Event Reason	N/A	PRE-DEFINED STRING			Description of the reason for the event: • System-wide capacity insufficiency • Frequency Control • Localized Events • Reactive Power Support??
Program ID	N/A	STRING			Unique program identifier
Zone	N/A	STRING			Name of the location. User defined.
Advance Notification Date	N/A	DATE	DD/MM/YYYY		The date one or more communications to Demand Resources of an impending Demand Response Event in advance of the actual event was issued

Table 8 – DADS Form 2: Reliability Event Data					
Name	**Units**	**Data Type**	**Format**	**Validation**	**Description**
Advance Notification Time	N/A	TIME	HH24:MI:SS		The time one or more communications to Demand Resources of an impending Demand Response Event were issued in advance of the actual event.
Deployment Date	N/A	DATE	DD/MM/YYYY		The date a Demand Resource begins reducing Demand on the system in response to an instruction.
Deployment Time	N/A	TIME	HH24:MI:SS		The time a Demand Resource begins reducing Demand on the system in response to an instruction.
Reduction Deadline	N/A	TIME	HH24:MI:SS		The time at the end of the Ramp Period when a Demand Resource is required to have met its Demand Reduction Value obligation
Release/Recall Date	N/A	DATE	DD/MM/YYYY		The date when a System Operator, Utility or Demand Response Provider notifies a Demand Resource that the Deployment Period has ended or will end
Release/Recall Time	N/A	TIME	HH24:MI:SS		The time when a System Operator, Utility or Demand Response Provider notifies a Demand Resource that the Deployment Period has ended or will end.
Normal Operations Date	N/A	DATE	DD/MM/YYYY		The date following Release/Recall at which a System Operator may require Demand Resource to have returned its Load consumption to normal levels, and to be available again for Deployment.
Normal Operations Time	N/A	TIME	HH24:MI:SS		The time following Release/Recall at which a System Operator may require

Table 8 – DADS Form 2: Reliability Event Data					
Name	**Units**	**Data Type**	**Format**	**Validation**	**Description**
					Demand Resource to have returned its Load consumption to normal levels, and to be available again for Deployment.
Committed (MW)	MW	NUMBER	#######.###		The Committed (or Contracted/Registered) MW in the Program on the Deployment Date for the Zone/Location activated.
Number of Committed Resources	N/A	NUMBER	######		The number of Committed (or Contracted/Registered) Resources (or Assets) on the Deployment Date for the Zone/Location activated
Dispatched (MW)	MW	NUMBER	#######.###		The Average MW dispatched during the Event. If the all the Committed MW in the reported zone were dispatched, then the Average Dispatched MW should equal the Committed MW value. If a subset of the Committed MW in the zone were dispatched, the Average Dispatched should be less than the Committed MW value.
Estimated Realized Energy Reduction (MWh)	MWH	NUMBER	#######.###		The estimated total energy reduction (MWh) achieved from all the dispatched resources in the Deployment Period.

Validate Event Data

- The system will check that all required fields are entered and warn the user of any missing data fields.

Update Event Data

- A Reporting Party can update event data for any of their programs that are in an Active status.
- Data submitted after the initial addition will be identified as updated data.
- The Reporting Party can update a single entry or all the data for a reporting period.
- The system will maintain the date, time and user that added the event data.
- The system will maintain the initial submission. No data will be deleted.

Form 3: Market Participation Data

- A Reporting Party can add market participation data for any of their programs that are in an Active status.
- The system will maintain the date, time and user that added the market participation data.

Table 9 – DADS Form 3: Market Participation Data

Name	Units	Data Type	Format	Validation	Description
Record Date	N/A	DATE	DD/MM/YYYY	Auto-Generated	Date the record was prepared (this is not the period being reported)
Version	N/A	NUMBER		1(initial), 2,3,4,…	Indicates if the data is the initial submission or a subsequent update. Auto generated.
Registration Month	N/A	DATE	MM/YYYY		Month and Year for the registration month being reported.
Program ID	N/A	STRING			Unique program identifier
Number of Registered Resources	N/A	NUMBER	######		The number of registered resources/assets for the program being reported.
Total Offer and Self Scheduled Hours	N/A	NUMBER	######		The total number of offer and self scheduled hours made by demand response resources/assets during the reported month.
Scheduled/Cleared Hours	N/A	NUMBER	######		The total number of hours where offers made by demand response resources/assets cleared or were scheduled during the reported month.
Offered or Self Scheduled Energy Reduction	MWH	NUMBER	#######.###		The total MWh offered by demand response resources/assets during the reported month.
Scheduled Energy Reduction	MWH	NUMBER	#######.###		The total MWh where offers made by demand response

Table 9 – DADS Form 3: Market Participation Data					
Name	**Units**	**Data Type**	**Format**	**Validation**	**Description**
					resources/assets cleared or were scheduled during the reported month.
Estimated Realized Energy Reduction	MWH	NUMBER	#######.###		The total MWh reduced by demand response resources/assets during the reported month.
Offered or Self Scheduled Demand Reduction	MW	NUMBER	#######.###		The total MW offered by demand response resources/assets during the reported month.
Scheduled Demand Reduction	MW	NUMBER	#######.###		The total MW where offers made by demand response resources/assets cleared or were scheduled during the reported month.
Estimated Realized Demand Reduction	MW	NUMBER	#######.###		The total MW reduced by demand response resources/assets during the reported month.

Validate Market Participation Data

- The system will check that all required fields are entered and warn the user of any missing data fields.

Update Market Participation Data

- A Reporting Party can update market participation data for any of their programs that are in an Active status.
- Data submitted after the initial addition will be identified as updated data.
- The Reporting Party can update a single entry or all the data for a reporting period.
- The system will maintain the date, time and user that added the market participation data.

Form 4: Ancillary Product Data

- A Reporting Party that administers Ancillary Services can add any Load participation in those Services that are in an Active status.
- The system will maintain the date, time and user that added the Ancillary Product data.

Table 10 – DADS Form 4: Ancillary Product Data

Name	Units	Data Type	Format	Validation	Description
Record Date	N/A	DATE	DD/MM/YYYY		Date the record was prepared (this is not the period being reported)
Version	N/A	NUMBER		1(initial), 2,3,4,…	Indicates if the data is the initial submission or a subsequent update. Auto generated.
Registration Month	N/A	DATE	MM/YYYY		Month and Year for the registration month being reported.
Ancillary Service ID	N/A	PRE-DEFINED STRING	• Responsive/ Synchronous/ Spinning Reserves • Non-Spinning Reserves • Regulation		Ancillary Service Type
Program ID	N/A	STRING			Unique program identifier
Number of Registered and Qualified Resources	N/A	NUMBER	######		The number of registered and qualified resources/assets for the Ancillary Service being reported.
Registered and Qualified Resource Capacity	MW	NUMBER	####		The capacity in MW of capable demand response for the registered and qualified Resources
Total Offer and Self Scheduled Hours	N/A	NUMBER	######		The total number of hours for which demand response resources/assets were offered or self-scheduled in the reporting period for the Ancillary Service being reported.

Table 10 – DADS Form 4: Ancillary Product Data					
Name	**Units**	**Data Type**	**Format**	**Validation**	**Description**
Committed Hours	N/A	NUMBER	######		The total number of hours for which demand response resources/assets were committed (due either to market clearing or self-scheduling) in the reporting period for the Ancillary Service being reported.
Offered or Self Scheduled Capacity	MW	NUMBER	#######.###		The total capacity (in MW) offered or self-scheduled by demand response resources/assets during the reporting period for the Ancillary Service being reported.
Committed Capacity	MW	NUMBER	#######.###		The total capacity (in MW) committed by demand response resources/assets due to clearing or self-scheduling during the reporting period for the Ancillary Service being reported.
Average Hourly Committed Capacity	MW per Hour	NUMBER	#####		The total committed MW divided by the total committed hours during the reporting period for the Ancillary Service being reported.
Deployment Hours (Regulation)	Hours	NUMBER	#######.###		The total number of hours that demand response resources/assets were deployed for Regulation Service in the reporting period.
Deployments (Reserves)	N/A	NUMBER	#######.###		The total number of deployments of demand response resources/assets in the reporting period for the Reserve Ancillary Service being reported.

Table 10 – DADS Form 4: Ancillary Product Data					
Name	**Units**	**Data Type**	**Format**	**Validation**	**Description**
Estimated Demand Response (Reserves)	MW x Hours	NUMBER	#######.###		The total estimated response for the reporting period for the Reserve Ancillary Service being reported, calculated by multiplying the committed MW times the duration of any event(s), in hours.

Validate Ancillary Services Product Data

- The system will check that all required fields are entered and warn the user of any missing data fields.

Update Ancillary Services Product Data

- A Reporting Party can update product data for any of their Ancillary Services that are open to Load participation and are in Active status.
- Data submitted after the initial addition will be identified as updated data.
- The Reporting Party can update a single entry or all the data for a reporting period.
- The system will maintain the date, time and user that added the Ancillary Services product data.

4.4 DADS Functionality

Search and Extract Program Data:

The system will allow all users to search and extract program data stored in DADS based on user defined criteria.

View Program Data

- Users shall have the ability to search for Program data using any combination of the following attributes.
    - Reporting Party
    - Reporting Party Type
    - Program Name
    - NERC Region
    - Market Type
    - Product Type
    - Service Type
    - Performance Evaluation Method
    - Program Relationship 1
    - Program Relationship 2
    - Program Relationship 3
    - Program Relationship 4
    - Program Status
    - Program Start Date
    - Program End Date

View Event Data

- Users shall have the ability to search for Event data using any combination of the following attributes.
    - Registration Month
    - Event Type
    - Event Reason
    - Program ID
    - Reporting Party
    - Reporting Party Type
    - Program Name
    - NERC Region
    - Market Type
    - Product Type
    - Service Type
    - Zone
    - Advance Notification Date
    - Advance Notification Time
    - Deployment Date
    - Deployment Time
    - Reduction Deadline
    - Release/Recall Date
    - Release/Recall Time
    - Normal Operations Date
    - Normal Operations Time

View Registration Data

- Users shall have the ability to search for Registration data using any combination of the following attributes.
    - Registration Month
    - Program ID
    - Reporting Party
    - Reporting Party Type
    - Program Name
    - NERC Region
    - Market Type
    - Product Type
    - Service Type
    - Zone
    - Number of Registered Resources Assets
    - Registered MW

View Market Participation Data

- Users shall have the ability to search for Market Participation data using any combination of the following attributes.

  - Registration Month
  - Reporting Party
  - Reporting Party Type
  - Program Name
  - NERC Region
  - Market Type
  - Product Type
  - Service Type
  - Zone
  - Program ID
  - Number of Registered Resources
  - Total Offer and Self Scheduled Hours
  - Scheduled/Cleared Hours
  - Offered or Self Scheduled Energy Reduction
  - Scheduled Energy Reduction
  - Estimated Realized Energy Reduction
  - Offered or Self Scheduled Demand Reduction
  - Scheduled Demand Reduction
  - Estimated Realized Demand Reduction

View Ancillary Product Data

- Users shall have the ability to search for Ancillary Product data using any combination of the following attributes.

  - Registration Month
  - Reporting Party
  - Reporting Party Type
  - Program Name
  - NERC Region
  - Market Type
  - Product Type
  - Service Type
  - Zone
  - Program ID
  - Number of Registered Resources
  - Total Offer and Self Scheduled Hours
  - Scheduled/Cleared Hours
  - Offered or Self Scheduled Energy Reduction
  - Scheduled Energy Reduction
  - Estimated Realized Energy Reduction
  - Offered or Self Scheduled Demand Reduction
  - Scheduled Demand Reduction
  - Estimated Realized Demand Reduction

Develop Program Metrics and Publish Reports:

The system must allow Reporting Parties to define their demand response programs prior to program data submission. In addition, the system must allow the Reporting Parties to update and edit the information, as well as delete the program at the end of its life.

Publish Quarterly Reports

Data for the current reporting quarter that has passed through the appropriate data checks will be used to develop NERC quarterly reports, as well as, data that are archived. Reports are required on several levels:

- Individual Load-Serving Entities
- Balancing Authority
- NERC Region
- NERC Region, sub-categorized by country
- NERC as a whole
- A country as a whole

Chapter 5—DADS Statistics, Metrics and Analysis

The final DADS will support the dissemination of data submitted to the system and ensure accurate calculations of metrics. A parent/child relationship structure will prevent the double counting. The following statistics and metrics will enable NERC and authorized users to assess capability and performance of demand response resources.

5.1 Useful Statistics

- Types of programs being implemented, by area
- Frequency of use, by product and area
- Registration Information provided by the reporting entity
- Number of registered resources, by area
- Number of registered MWs, by area
- Initial activation of program
- Trend of performance, by product and area
- Trend of capability, by product and area
- How much is committed over how many hours per year, by product and area
- Baseline types, by product type and area
- Duration of events, by product type and area
- Minimum load reduction request, by product type and area
- Maximum load reduction request, by product type and area
- Frequency of activation
    - Location of activation
    - Expected load reduction
    - Actual load reduction
- How long a resource has been registered

5.2 Metrics

All metrics provided below, will be coordinated with the RMWG. A specification sheet will be completed for each. DR metrics are critical to the credibility and reliability of DADS Reports.

- Realization rate
    - (Actual Load Reduction)/(Expected Load Reduction)
    - (Actual Load Reduction)/(Load Reduction Requested)
- Activation rate
    - Mean time to activate after request
    - Number of times activated
- Mean load reductions
- Mean length of event
- Mean time of event
- Percentage activated/realized to Internal Demand

Chapter 6—Next Steps

The following list describes the remaining milestones to accomplish before implementation:

1. Data Reporting Instruction Manual - The DRDTF is targeting the completion of an updated Phase I DADS Data Reporting Instruction Manual by September 2010. This manual which will be aimed at providing Reporting Parties with information and examples to assist them in implementation.
2. Issue RFP for DADS Software - With NERC's Board of Trustee approval, NERC will issue an RFP for the DADS data entry and analysis software.
3. Notification to Reporting Entities - Because Phase I is voluntary, no formal request will be needed. NERC Staff and the DRDTF will hold a technical workshop to engage entities in the reporting process during Phase I. When BOT approval is obtained for Phase II, NERC will begin implementation of Phase II in late 2010 by issuing a data request to the Reporting Parties.
4. Conduct DADS Technical Workshops – Training sessions will be held during the final quarter of 2009 and 2010.

Chapter 7—Conclusions & Recommendations

The Demand Response Data Task Force recommends the following:

1. Initiate the *Section 1600: Request for Information or Data* process.
2. Deploy the Demand Response Availability Data System (DADS) Phase I by the first quarter of 2010.
3. The Data Coordination Subcommittee (DCS) should review NERC Reliability Standard MOD-16-1-1 for reporting of demand response data to determine how best to proceed, whether through modification or retirement of the Standards.
4. For the purposes of satisfying DADS functional requirements, third-party load aggregators, or Curtailment Service Providers (CSPs), data will not be required.
5. The DRDTF will submit the metrics listed in Chapter 5 of this report, to the RMWG for consideration as industry-vetted historical demand response performance metrics.

Definitions of Terms Used In This Report

NOTE: the context of the definitions is demand-side management, rather than bulk power systems and, therefore, they are not meant to mirror those used in the system context.

Adjustment Window: *The period of time prior to a Demand Response Event used for calculating a Baseline adjustment.*

Advance Notification(s): *One or more communications to Demand Resources of an impending Demand Response Event in advance of the actual event.*

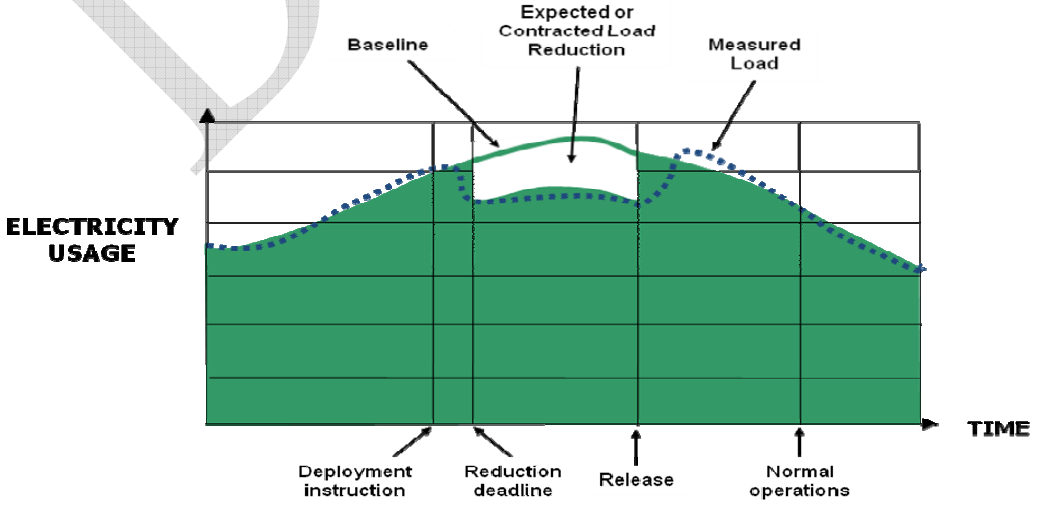
After-the-Fact Metering: *Interval meter data separate from Telemetry that is used to measure Demand Response. May not apply to Demand Resources under Baseline Type II (Non-Interval Meter)*

Aggregated Demand Resource: *A group of independent Load facilities that provide Demand Response services as a single Demand Resource.*

Ancillary: *Demand-side resource displaces generation deployed as operating reserves and/or regulation; penalties are assessed for nonperformance.*

Baseline: *A Baseline is a method of estimating the electricity that would have been consumed by a Demand Resource in the absence of a Demand Response Event. The Baseline is compared to the actual metered electricity consumption during the Demand Response Event to determine the Demand Reduction Value. Depending on the type of Demand Response product or service, Baseline calculations may be performed in real-time or after-the-fact. The System Operator may offer multiple Baseline models and may assign a Demand Resource to a model based on the characteristics of the Demand Resource's Load or allow the Demand Resource to choose a performance evaluation model consistent with its load characteristics from a predefined list. The figure below illustrates the concept of Baseline relative to a Demand Response Event.*

Illustration of Baseline Concept



Baseline Adjustment: *An adjustment that modifies the Baseline to reflect actual conditions immediately prior to or during a Demand Response Event to provide a better estimate of the energy the Demand Resource would have consumed but for the Demand Response Event. The adjustments may include but are not limited to weather conditions, near real time event facility Load, current Demand Resource operational information, or other parameters based on the System Operator's requirements.*

Baseline Type-I (Interval Metered): *A Baseline performance evaluation method based on a Demand Resource's historical interval meter data which may also include other variables such as weather and calendar data.*

Baseline Type-II (Non-Interval Metered): *A Baseline performance evaluation method that uses statistical sampling to estimate the electricity consumption of an Aggregated Demand Resource where interval metering is not available on the entire population.*

Baseline Window: *The window of time preceding and optionally following, a Demand Response Event over which the electricity consumption data is collected for the purpose of establishing a Baseline. The applicability of this term is limited to Meter Before/Meter After, and Baseline Type-I and Type-II.*

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.*

Capacity: *demand-side resource displaces or augments generation for planning and/or operating resource adequacy; penalties are assessed for nonperformance.*

Coincident resources: *refers to the amount demand response curtailments that would be realized if all DR products were called simultaneously and all responded by curtailing their enrolled quantity.*

Critical Peak Pricing (CPP) with controls: *demand-side management that combines direct remote control with a pre-specified high price for use during designated critical peak periods, triggered by system contingencies or high wholesale market prices.*

Critical Peak Pricing (CPP): *rate and/or price structure designed to encourage reduced consumption during periods of high wholesale market prices or system contingencies by imposing a pre-specified high rate for a limited number of days or hours.*

Demand: *The rate at which electric energy is delivered to or by a system or part of a system, generally expressed in kilowatts or megawatts, at a given instant or averaged over any designated interval of time; and the rate at which energy is being used by the customer.*

Demand Bidding & Buy-Back: *demand-side resource bids into a wholesale electricity market to offer load reductions at a price, or identifies how much load it is willing to curtail at a specific price.*

Demand Reduction Value: *Quantity of reduced electrical consumption by a Demand Resource, expressed as MW or MWh.*

Demand Response: *changes in electric use by demand-side resources from their normal consumption patterns in response to changes in the price of electricity, or to incentive payments designed to induce lower electricity use at times of high wholesale market prices or when system reliability is jeopardized.*

Demand Response Event: *The time periods, deadlines and transitions during which Demand Resources perform. The System Operator shall specify the duration and applicability of a Demand Response Event.*

Demand Response Provider: *The entity that is responsible for delivering Demand reductions from Demand Resources and is compensated for providing such Demand Response products in accordance as specified by the System Operator.*

Demand Response Resource: *A Load or aggregation of Loads capable of measurably and verifiably providing Demand Response.*

Demand Side Management (DSM): *all activities or programs undertaken to influence the amount and timing of electricity use.*

Deployment: *The time at which a Demand Resource begins reducing Demand on the system in response to an instruction.*

Deployment Period: *The time in a Demand Response Event beginning with the Deployment and ending with the Release/Recall.*

Direct Load Control: *demand-side management that is under direct remote control of a control center. It is the magnitude of customer demand that can be interrupted at the time of the Regional Council seasonal peak by direct control of the System Operator by interrupting power supply to individual appliances or equipment on customer premises.*

Dispatchable: *demand-side resource curtails according to instruction from a control center.*

Dual-purpose or jointly enrolled resources: *refers to resources that are enrolled in two or more product categories.*

Economic: d*ispatchable demand response, demand-side resources offered to provide load reductions to displace generation resources.*

Emergency: *demand-side resource curtails during system and/or local capacity constraints.*

Energy Efficiency: *permanent changes to electricity use through replacement with more efficient end-use devices or more effective operation of existing devices. Generally it results in reduced consumption across all hours rather than event-driven targeted load reductions.*

Energy-Price: *demand-side resource bids to curtail load for scheduling or dispatch and displaces generation resources; penalties are assessed for nonperformance.*

Energy-Voluntary: *demand-side resource curtails voluntarily when offered the opportunity to do so for compensation, but nonperformance is not penalized.*

Energy Service: *A type of Demand Response service in which Demand Resources are compensated solely based on their performance during a Demand Response Event.*

Guest User: *Entities that can view and extract data from the system. Data users cannot add, update, edit or delete data.*

Internal Demand: *Is the sum of the metered (net) outputs of all generators within the system and the metered line flows into the system, less the metered line flows out of the system. The demands for station service or auxiliary needs (such as fan motors, pump motors, and other equipment essential to the operation of the generating units) are not included. Internal Demand includes adjustments for all non-dispatchable demand response programs (such as Time-of-Use, Critical Peak Pricing, Real Time Pricing and System Peak Response Transmission Tariffs) and some dispatchable demand response (such as Demand Bidding and Buy-Back).*

Interruptible Load: *curtailment options integrated into retail tariffs that provide a rate discount or bill credit for agreeing to reduce load during system contingencies. It is the magnitude of customer demand that, in accordance with contractual arrangements, can be interrupted at the time of the Regional Council's seasonal peak. In some instances, the demand reduction may be effected by action of the System Operator (remote tripping) after notice to the customer in accordance with contractual provisions.*

Load: *An end-use device or customer that receives power from the electric system.*

Load as a Capacity Resource: *demand-side resources that commit to pre-specified load reductions when system contingencies arise.*

Maximum Base Load: *A performance evaluation method based solely on a Demand Resource's ability to reduce to a specified level of electricity Demand, regardless of its electricity consumption or Demand at Deployment.*

Meter Before / Meter After: *A performance evaluation method where electricity Demand over a prescribed period of time prior to Deployment is compared to similar readings during the Sustained Response Period.*

Meter Data Recording Interval: *The time between electricity meter consumption recordings.*

Meter Data Reporting Deadline: *The maximum allowed time from the end of a Demand Response Event (Normal Operations) to the time when meter data is required to be submitted for performance evaluation and settlement. The Meter Data Reporting Deadline may be either relative (a number of hours/days after Normal Operations) or fixed (a fixed calendar time, such as end-of-month).*

Metering Generator Output: *A performance evaluation method, 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.*

Performance Window: *The period of time in a Demand Response Event analyzed by the System Operator to measure and verify the Demand Reduction Value for a Demand Resource.*

Non-dispatchable: *demand-side resource curtails according to tariff structure, not instruction from a control center.*

Net Internal Demand: *Equals the Total Internal Demand reduced by Direct Control Load Management and Interruptible Demand.*

Net Energy to Load: *Net Balancing Authority Area generation, plus energy received from other Balancing Authority Areas, less energy delivered to Balancing Authority Areas through interchange. It includes Balancing Authority Area losses but excludes energy required for storage at energy storage facilities.*

Normal Operations: The time following Release/Recall at which a System Operator may require Demand Resource to have returned its Load consumption to normal levels, and to be available again for Deployment.

Non-Spin Reserves: *demand-side resource not connected to the system but capable of serving demand within a specified time.*

Ramp Period: The time between Deployment and Reduction Deadline, representing the period of time over which a Demand Resource is expected to achieve its change in Demand.

Ramp Rate: *The rate, expressed in megawatts per minute, that a generator changes its output. Demand Resource ramp rate is the rate, expressed in megawatts per minute, that a Demand Resource changes its Load.*

Real Time Pricing (RTP): *rate and price structure in which the price for electricity typically fluctuates to reflect changes in the wholesale price of electricity on either a day-ahead or hour-ahead basis.*

Recovery Period: The time between Release/Recall and Normal Operations, representing the window over which Demand Resources are required to return to their normal Load.

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.

Release/Recall: The time when a System Operator or Demand Response Provider notifies a Demand Resource that the Deployment Period has ended or will end.

Reliability: *dispatchable demand response, demand-side resources used to supplement generation resources resolving system and/or local capacity constraints.*

Regulation Service: *A type of Demand Response service in which a Demand Resource increases and decreases Load in response to real-time signals from the System Operator. Demand Resources providing Regulation Service are subject to dispatch continuously during a commitment period. This service is usually responsive to Automatic Generation Control (AGC) to provide normal regulating margin. Provision of Regulation Service does not correlate to Demand Response Event timelines, deadlines and durations as depicted in the DR event figure..*

Reporting Party: A *Responsible Entity required to maintain demand response data in the NERC system. A Reporting Party is generally the entity responsible for dispatching the demand response program, product or service.*

Reporting Party Administrator: *Reporting Party User that is responsible for adding, updating, editing and deleting Reporting Party Users within the same organization. Each Reporting Party will have one Reporting Party Administrator.*

Reporting Party User: *Users created and maintained by a Reporting Party Administrator that are responsible for adding, updating, editing and deleting demand response data in the system.*

Responsible Entity: *Responsible Entity is a term used by NERC which applies to an organization that carries out the Tasks within a Function. Responsible Entities are registered by the Electric Reliability Organization (ERO) in the U.S. and NERC in Canada/Mexico and maintained in its registry as described in the NERC Rules of Procedure and Regional Delegation Agreements. Such organizations are "responsible" to NERC for meeting the standards requirements assigned to the particular Responsible Entity*.

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.*

Spinning/Responsive Reserves: *demand-side resources that is synchronized and ready to provide solutions for energy supply and demand imbalance within the first few minutes of an electric grid event.*

Standby Demand: *the demand specified by contractual arrangement with a customer to provide power and energy to that customer as a secondary source or backup for an outage of the customer's primary source. Standby Demand is intended to be used infrequently by any one customer.*

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.

System Administrator: *Entity responsible for maintaining the system, including managing users.*

System Peak Response Transmission Tariff: *rate and/or price structure in which interval metered customers reduce load during coincident peaks as a way of reducing transmission charges.*

System Operator: *A System Operator is a Balancing Authority, Transmission Operator, or Reliability Coordinator whose responsibility is to monitor and control an electric system in real time. The System Operator is responsible for initiating Advance Notifications, Deployment, and Release/Recall instructions.*

Telemetry: *Real-time continuous communication between a Demand Resource or Demand Response Provider and the System Operator.*

Telemetry Interval: *The time unit between communications between a Demand Resource or Demand Response Provider and a System Operator.*

Time-of-Use (TOU): *rate and/or price structures with different unit prices for use during different blocks of time.*

Time-Sensitive Pricing: *retail rates and/or price structures designed to reflect time-varying differences in wholesale electricity costs, and thus provide consumers with an incentive to modify consumption behavior during high-cost and/or peak periods.*

Total Internal Demand: *equals the sum of the Internal Demand and the Standby Demand.*

Validation, Editing and Estimation: *The process of taking raw meter data and performing validation and, as necessary, editing and estimation of corrupt or missing data, to create validated data. (VEE guidelines are published in the Edison Electric Institute's Uniform Business Practices for Unbundled Electricity Metering, Volume Two, Published 12/05/00, http://www.naesb.org/REQ/req_form.asp)*

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