References to National Laboratories within Federal Energy Regulatory Commission Orders

Earlier this year, the Federal Energy Regulatory Commission (FERC) created the Office of Public Participation (Office) to facilitate increased public engagement in its proceedings. The Pacific Northwest National Laboratory (PNNL) has partnered with staff assigned to the Office to identify specific barriers to public participation and possible ways in which the Department of Energy and the national laboratories can support the Office in reducing those barriers.

The national laboratories have developed extensive networks to provide technical assistance to state regulators, state energy policy makers, regional market operators and other regional organizations. However, these programs have historically had only limited engagement in FERC proceedings, primarily in the form of expert testimony given during technical conferences.

Some of the barriers to participation in FERC processes are procedural in nature, related to the challenges associated with navigating FERC's complex structure and practices. Others are technical in nature, related to the analytical and informational challenges that may prevent some stakeholders from engaging in FERC processes or limit their ability to do so effectively.

This memo presents a summary of instances in which FERC orders have cited work done by the national laboratories. While the publications cited were not exclusively prepared for FERC, their use by stakeholders to support arguments before FERC and FERC's inclusion of them in its final orders are indicative of the value placed on national laboratory sources. These examples also indicate the types of technical assistance that may be of use to FERC and its expanding group of stakeholders.

The table below includes a selection of FERC orders that reference work done by a national laboratory within their documentation. The purpose of this investigation was to obtain an understanding of whether the national laboratories or the Department of Energy conducts work that directly translates into regulatory actions at the federal level. References found within the table include citations both by FERC directly and by commenters in response to FERC proposals. The references are almost all made to laboratory reports or articles, excluding one reference in which a laboratory was noted as a commenter on a proposal and one in which a laboratory employee was noted as a participant in a technical workshop.

The process to retrieve these results involved filtering items from FERC's eLibrary. The criteria included only public orders/opinions made by the Commission that contain the phrase "national laboratory." This search revealed approximately 150 results. A smaller selection, therefore, was made to include approximately the last ten years of items, plus a small number of others that were released earlier and considered important to include.

The table contains the following items, in order:

- Date
- Docket number
- Order no. (if applicable)
- Accession number
- Order title
- Entity (Laboratory) being referenced
- Context for the reference

Interesting findings include the following:

- A large number of the references to labs were not made directly by FERC but by commenters in the industry that were using lab reports to support their arguments either against or in favor of FERC's proposals.
- There are some instances in which the same reference is used by both a commenter that opposes the FERC proposal and by FERC to counter the statement made by the commenter.
- There are three types of laboratory work products that FERC has cited in its orders:
    - Hydropower modeling, which is frequently cited in dam relicensing proceedings
    - Grid modeling, which has been cited in rulemakings and tariff proceedings, particularly those relating to the market participation and compensation of emerging technologies
    - Reference materials, such as resource cost studies and policy summaries

Date	Docket No.	Order No.	Accession No.	Order Title	Entity Referenced	Context
7/15/2021	RM21-17-000		20210715-3078	Advanced Notice of Proposed Rulemaking: Building for the Future Through Electric Regional Transmission Planning and Cost Allocation and Generation Interconnection	Lawrence Berkeley National Laboratory	A decade after instituting regional transmission planning requirements in Order 1000, FERC determined that it was time to revisit the transmission planning process and determine if additional reforms would be necessary to ensure that transmission plans reflect and accommodate the transformation taking place in the electric sector. FERC's advanced notice of proposed rulemaking cited two LBNL reports: "Queued Up: Characteristics of Power Plants Seeking Transmission Interconnection as of the End of 2020" and "Expert Elicitation Survey Predicts 37% to 49% Declines in Wind Energy Costs by 2050."
7/15/2021	RM96-1-042	587-Z	20210715-3028	Standards for Business Practices of Interstate Natural Gas Pipelines	Sandia National Laboratories	This order adopts the most recently developed business practice standards adopted by the Wholesale Gas Quadrant of the North American Energy Standards Board (NAESB) and incorporates them by reference into FERC regulations. Recommendations from an SNL report were cited as one of the reasons for updating the NAESB standards.

9/17/2020	RM18-9-000	2222	20200917-3162	Participation of Distributed Energy Resource Aggregations in Markets Operated by Regional Transmission Organization and Independent System Operators	Pacific Northwest National Laboratory, Lawrence Berkeley National Laboratory	Order 2222 is a landmark order requiring regional wholesale market operators to enable the participation of aggregated, distributed energy resources in markets. The order cited the comments offered by Jeffrey Taft of PNNL during a workshop regarding communications frameworks for distributed energy resources. It also cited a report from LBNL, "Distribution Systems in a High DER Future: Planning, Market Design, Operation and Oversight," regarding the potential for distribution system operators (DSOs).
12/3/2018	EL18-182-000 ; ER18-2364-000		20181203-3039	Order Accepting Compliance Filing & Requiring Informational Filings	Lawrence Berkeley National Laboratory	In August 2018, ISO-NE submitted proposed revisions to its Transmission, Markets and Services Tariff. ISO-NE stated that the proposed revisions establish a "fuel security study methodology, a short-term cost-of-service mechanism to ensure fuel security, and related provisions governing the allocation of costs for such out-of-market compensation." This order accepting these revisions includes comments and challenges, one of which came from NEPOOL which argued against how state renewable portfolio standard (RPS) requirements were modeled in the Fuel Security Study. They cited an LBNL report when stating that "achievement of [RPS] requirements has been maintained even as states have increased their renewable requirements"

2/15/2018	RM16-6-000	Order No. 842	20180215-3099	Order No. 842 Final Rule re the Essential Reliability Services and the Evolving Bulk-Power System -- Primary Frequency Response under RM16-6.	Lawrence Berkeley National Laboratory	This order is a revision of FERC's regulations to require new generating facilities to also install, maintain, and operate equipment that is capable of providing primary frequency response as a condition of interconnection. A 2010 LBNL report was cited by FERC in a footnote as an additional source in support of the statement that "inertia, primary frequency response, and secondary frequency response interact to mitigate frequency deviations."
1/8/2018	AD18-7-000; RM18-1-000		20180108-3061	Order terminating rulemaking proceeding, initiating new proceedings, & establishing additional procedures re Grid Reliability & Resilience Pricing under RM18-1 et al.	Argonne National Laboratory; Lawrence Berkeley National Laboratory	This order terminates a prior FERC proceeding that was initiated to address the Proposed Rule on Grid Reliability and Resilience Pricing submitted by the Secretary of Energy. In this order, FERC directs each RTO and ISO to submit information on certain resilience issues and concerns for their evaluation. Argonne National Laboratory (ANL) is cited in a paragraph in which FERC states that those that submitted comments on the initial FERC proceeding provided a wide variety of definitions for grid resilience, including one from ANL. LBNL, on the other hand, was included as a reference on the following statement by Commissioner Richard Glick concurring with FERC's decision: "even when fully operational, many coal and nuclear generators are incapable of providing all the NERC-defined essential reliability services."
1/19/2017	RM15-11-001	Order No. 830	20170119-3015	Order Deny Rehearing re Reliability Standard for Transmission System Planned Performance for	Los Alamos National Laboratory; Idaho National Laboratory; Oak Ridge	This order approves a reliability standard which establishes requirements for some entities to assess the impact of geomagnetic disturbance events (GMDs) on their transmission systems. A 2015 Los Alamos paper was cited within a summary of industry commenters in opposition to the changed standard. Specifically, the reference was related to the topic of "reference peak geoelectric field amplitude

				Geomagnetic Disturbance Events under RM15-11.	National Laboratory	values" and was used to argue against the commenters' statements that the currently established methodology is most accurate. A 2010 ORNL report was cited on the same topic by a commenter who used it as an example that there is research-based misunderstanding of historic GMDs to suggest that FERC require a larger number of events for simulation given the complexity of the topic. Lastly, Idaho National Lab was referenced with regard to the modification of thermal impact assessments by a commenter who argued an INL study provided information to counteract another commenter statement that "the 75 A/phase qualifying threshold for thermal impact assessments is not technically justified."
6/25/2015	P-12451-030		20150625-3067	Order on Fish Protection Effectiveness Report pursuant to Article 403 re SAF Hydroelectric, LLC under P-12451.	Oak Ridge National Laboratory	This order relates to a licensee (SAD Hydroelectric, LLC) and their Fish Protection Effectiveness Report for the Lower Saint Anthony Falls Project. ORNL is cited within the FERC report as a reference for the statement that "Spillway passage has the potential to injure or kill fish due to high velocities, shear on the spillway surface, pressure changes, and collisions with energy dissipation blocks, comparable to turbine passage" when commenting that the licensee appears to be confused by the difference between bypass structures and the Obermeyer gate structure.
5/14/2015	RM15-11-000		20150514-3102	Notice of proposed rulemaking re Reliability Standard for Transmission System Planned Performance for Geomagnetic Disturbance	Oak Ridge National Laboratory	This proposed Reliability Standard TPL-007-1 establishes requirements for certain entities to assess the vulnerability of their transmission systems to geomagnetic disturbance events (GMDs). A 2012 ORNL report on the effects of GMD events on the bulk power system is stated as a reference by FERC for the following statement "[Geomagnetic disturbances] could cause widespread blackouts and cause damage to equipment that could result in sustained system outages."

				Events under RM15-11.		
10/16/2014	RM14-1-001	Order No. 797-A	20141016-3003	Order No 797-A - Order denying rehearing re Reliability Standard for Geomagnetic Disturbance Operations under RM14-1	Oak Ridge National Laboratory	Resilient Societies filed a request for rehearing of Order No. 797 which approved Reliability Standard EOP-010-1 (Geomagnetic Disturbance Operations) submitted by the NERC, this order denies the request. ORNL is first used as a reference by Resilient Societies to state that "the 200 kV threshold in the applicability criteria is arbitrary" given that the 2010 ORNL report makes a case that "networks operating below 200 kV were in fact impacted by a moderate solar storm." Foundation Societies also referenced an alternative FERC order citing an ORNL report to support its position regarding the "alleged unreliability of two-way communications during a GMD event."
6/19/2014	RM14-1-000	Order No. 797	20140619-3006	Final Rule - Order No. 797 re Reliability Standard for Geomagnetic Disturbance Operations under RM14-1	Oak Ridge National Laboratory; Idaho National Laboratory	This order is FERC's approval of Reliability Standard EOP-010-1 regarding Geomagnetic Disturbance Operations. A commenter on the order, SmartSense, cited an ORNL study on GMD as well as an article from INL, in which sub-200 kV transformers were tested, to support their assertion that "the 200 kV threshold for transmission operators is inconsistent with the Commission-approved definition of bulk electric system," which is usually 100 kV or higher. The same ORNL report and INL article were referenced later, however, they were brought up by FERC to dispute claims made by commenters regarding the applicability threshold.

5/16/2013	RM12-22-000	Order No. 797	20130516-3090	Final Rule re the Reliability Standards for Geomagnetic Disturbances under RM12-22.	Oak Ridge National Laboratory; Idaho National Laboratory	The references within are the same as the item above (RM14-1-000).
3/22/2013	EL05-121-008		20130322-3049	Order on rehearing re PJM Interconnection, L.L.C under EL05-121.	Lawrence Berkeley National Laboratory	This order refers to another order in response to a remand by the United States Court of Appeals for the Seventh Circuit regarding cost allocation for new transmission facilities that operate at or above 500 kV. The reference to LBNL was made by Dayton, who was one of the entities making a rehearing request. The context for the reference was in a statement in which they claim that the Order on Remand's calculation of benefits to PJM, which was based on an LBNL's report on the average cost of interruptions, was incorrectly used. The LBNL report, Dayton states, is intended to be used for interruption benefits for customers, not an RTO.
03/21/2013	RM12-4-000	Order No. 777	20130321-3073	Order No 777 - Final Rule re revisions to reliability standard for Transmission Vegetation Management under RM12-4.	Pacific Northwest National Laboratory (PNNL)	This order is a FERC approval of Reliability Standard FAC-003-2 which "expands the applicability of the standard to include overhead transmission lines that are operated below 200 kV, if they are either an element of an Interconnection Reliability Operating Limit or an element of a Major WECC Transfer Path." PNNL was referenced due to the fact that they were retained by FERC to undertake an analysis to confirm that NERC's usage of the Gallet Equation in their petition to FERC for the now-approved reliability standard was technically justified. A final report by PNNL was included as part of the FERC docket.

6/22/2012	RM10-11-000	Order No. 764	20120622-3031	Order No. 764: Final Rule re the Integration of Variable Energy Resources under RM10-11. Commissioner LaFleur is dissenting in part with a separate statement attached.	Argonne National Laboratory; Lawrence Berkeley National Laboratory	This order is a final ruling by FERC to amend the pro forma Open Access Transmission Tariff to "remove unduly discriminatory practices and to ensure just and reasonable rates for Commission-jurisdictional services." ANL was referenced as one of the commenters in support of potential reforms and was noted as being among the commenting group that believes intra-hour scheduling allows for a more accurate prediction of the variable generation and that transmission resources should be scheduled on 15-minute intervals. ANL's comments and arguments are routinely noted throughout the document. An LBNL report prepared for FERC was later referenced by a commenter that suggested that FERC should unbundle regulation and frequency response into separate ancillary service schedules.
10/21/2011	ER10-1791-001; ER10-1791-002		20111021-3004	Order Denying In Part and Granting in Part Rehearing, Conditionally Accepting Compliance Filing, and Directing Further Compliance Filings	Lawrence Berkeley National Laboratory	FERC's approval of the Midcontinent Independent System Operator (MISO)'s proposed process for studying Multi-Value Projects during the transmission planning process was challenged by several utilities, who argued that a utility-by-utility analysis of the project should be required before costs can be allocated to any utility. To refute that argument, FERC cited multiple reports that discussed the regional value of improved reliability, including LBNL's report, "Scoping Study on Trends in the Economic Value of Electricity Reliability to the U.S. Economy."

2/17/2011	RM11-7-000; AD10-11-000			Notice of Proposed Rulemaking: Frequency Regulation Compensation in Wholesale Power Markets	Pacific Northwest National Laboratory	The emergence of new technologies capable of responding to grid signals more rapidly than traditional sources of frequency response prompted FERC to initiate a proceeding to determine if new rules would be necessary to enable fair and accurate compensation of resources capable of fast response. The notice of proposed rulemaking noted that multiple participants in a previous technical conference on the subject cited a PNNL report, "Assessing the Value of Regulation Resources Based on their Time Response Characteristics."
7/16/2009	PL09-4-000		20090716-3137	Policy Statement re Smart Grid Policy under PL09-4.	Lawrence Berkeley National Laboratory	In response to the need for action on challenges to the bulk power system, within this docket FERC provides "additional guidance on standards to help to realize a smart grid." In the Proposed Policy Statement, FERC identified several challenges to the reliable operation of the bulk power system including "issues associated with changes to the nation's generation mix." LBNL was referenced in a footnote to that with regard to a 2009 commissioning to help assess the potential for renewable integration of wind and other resources.

7/20/2006	RM06-4-000	Order 679	20060720-3062	Final Rule - Order 679 re Promoting Transmission Investment through Pricing Reform under RM06-4	Oak Ridge National Laboratory; Lawrence Berkeley National Laboratory	This order pertains to amending regulations to establish incentive-based rate treatments in interstate commerce by public utilities for the purpose of ensuring reliability and reducing transmission congestion. A report by ORNL is referenced in the document in support of the statement that the "decline in transmission investment in real dollars has occurred while the electric load using the nation's grid has more than doubled." An LBNL report was cited by a commenter (International Transmission) in supporting the need for new transmission investment when stating that the cost of power interruptions can "range from between $29 billion and $135 billion annually."
9/27/1989	P-2971-	Order 48 FERC 61,363	19891003-0433	Order denying applications for license of Allegheny Elec Coop for Proj #2971,et al.	Oak Ridge National Laboratory	Referencing why no additional continuous data collection of dissolved oxygen (DO) was required at the project, and overruling natural resource agency recommendations, the commission wrote: "Our conclusion in this regard is supported by the fact that the DO-related analysis performed for the FEIS was the most complete and scientifically advanced analysis of cumulative DO impacts ever performed. Furthermore, the work was performed by Oak Ridge National Laboratory personnel, recognized experts in the field."