

BAL-003-1 Frequency Response and Frequency Bias Setting

Implementation Procedure for Operating Year 2016
December 22, 2015

Introduction

NERC Standard BAL-003-1 Frequency Response and Frequency Bias Setting is to be implemented in phases. Requirements R2, R3, and R4 concerning Frequency Bias Settings (FBS) go into effect on April 1, 2016. Compliance with Requirement R1 on Frequency Response performance goes into effect on December 1, 2016.

This document outlines the new procedure for setting Frequency Bias Settings for 2016 under BAL-003-1, and publishes the Balancing Authority Frequency Response Obligations (FROs)¹ for BAL-003 operating year 2016 and the minimum FBS allocated in accordance with BAL-003-1. The document also outlines the procedures in place for allocating those values and special guidance for Balancing Authorities (BAs) using Variable Frequency Bias.

Frequency Bias Setting Procedure under BAL-003-1

In the past, a letter was sent to all BAs requesting submittal of Frequency Bias information. This year marks the transition to Frequency Bias determination under Requirements R2, R3, and R4 of Standard BAL-003-1. Under the new process, BAs will submit data on FRS Forms FR-1 and FR-2 through the Balancing Authority Submittal Site (BAS Site)² no later than March 7, 2016. Those forms are posted on the BAS Site. The ERO will then publish the final Frequency Bias Settings in time for implementation on or about April 1, 2016.

Frequency Response Obligations

Attached are the individual Balancing Authority Frequency Response Obligations (FROs)¹ for BAL-003-1 operating year 2016 (December 1, 2015 through November 30, 2016). These values are provided for use in the application of NERC Standard BAL-003-1 Requirements R2, 3, and 4 related to the calculation and application of FBS. BAL-003-1 Requirement R1 for Frequency Response Performance does not go into effect until operating year 2017 (December 1, 2016 through November 30, 2017).

FBS calculated using these data will be instituted in all BAs on or about April 1, 2016, in accordance with the provisions of the Standard.

NOTE: These FROs are NOT in force for BAL-003-1 Requirement 1 frequency response enforcement in BAL-003-1 operating year 2016 (December 1, 2015 through November 30, 2016).

¹ Only for use in BAL-003-1 Requirements 2, 3, and 4. Requirement R1 obligations go do not go into effect until December 1, 2016 for Operating Year 2017.

² Instructions on gaining access to the BAS Site are located in the [Balancing Authority Submittal Site User Manual](#).

Minimum Frequency Bias Settings

Also included with the BA FROs, are the minimum FBS for each BA. Previously, the minimum FBS were calculated as 1.0% of the BA's projected peak demand. Under BAL-003-1, the minimum FBS values are allocated from a Minimum Interconnection Frequency Bias that is 0.9% of the sum of the non-coincident monthly peak demands for the BAs in that interconnection for calendar year 2014. Details on that calculation and its allocation to the BAs is provided.

CPS2 Calculations

The CPS2 calculation requires accurate L₁₀ limits, which are calculable only after all of the Frequency Bias Settings for the interconnections are known. Therefore, after all the Frequency Bias Setting are submitted, the ERO will calculate L₁₀ values and distribute the data along with the final FBS for implementation on or about April 1, 2016.

NOTE: The BAL-001-1 CPS2 measure will remain in effect unless the BA has either received a waiver from the field trial or when Standard BAL-001-2 goes into effect July 1, 2016.

Frequency Response Obligations

Interconnection Frequency Response Obligations (IFROs) are annually calculated for each of the four Interconnections and published in the *Frequency Response Annual Analysis* report.³ Through approval of that report in September of each year, the NERC Operating Committee sanctions the IFROs for allocation by the ERO through the methods put forth in Standard BAL-003-1.

The ERO then allocates portions of the IFROs to the individual BAs in accordance with the methods detailed in Standard BAL-003-1.

Data Source and FRO Allocation Methodology

The ERO annually allocates the approved IFROs to the individual registered BAs of record (as of July 1st) and other non-registered entities performing BA functions, for the upcoming BAL-003 operating year (December 1st through November 30th). The IFROs will be published and posted each year on or about November 15th.

The IFROs are allocated based on Net Generation MWh and Net Energy for Load MWh (NEL) for the most recent calendar year. The data source used for those values is from the most recently reported FERC Form 714, which is filed by the BAs in June of each year. There are some entities, such as Canadian, Mexican, and smaller BAs, that are not subject to those filings. The ERO separately polls those BAs for their data to complete the dataset for each Interconnection.

The IFRO allocation is calculated by the ERO using the following formula:

$$FRO_{BA} = IFRO \times \frac{\text{Annual Gen MWh}_{BA} + \text{Annual Load MWh}_{BA}}{\text{Annual Gen MWh}_{Int} + \text{Annual Load MWh}_{Int}}$$

³ The [2015 FRAA report](#) was unanimously approved by the NERC Operating Committee on September 15-16, 2015, and is posted on the Resources Subcommittee.

Where:

- IFRO is the Interconnection Frequency Response Obligation.
- FRO_{BA} is the Frequency Response Obligation of the BA.
- Annual Gen MWh_{BA} is the annual Net Generation (MWh), FERC Form 714, Part II-Schedule 3.
- Annual Load MWh_{BA} is the annual Net Energy for Load (MWh), FERC Form 714, Part II-Schedule 3.
- Annual Gen MWh_{Int} is the sum of all Annual Gen MWh_{BA} values reported in that interconnection.
- Annual Load MWh_{Int} is the sum of all Annual Load MWh_{BA} values reported in that interconnection.

Description of FRO Table

The FRO Table consists of listings of all BAs, their acronyms, their data submitted on FERC Form 714 for calendar year 2014, and the FRO allocation value. That table is embedded in the BAL-003-1 Frequency Response Forms FRS Forms FR-1 and FR-2 posted on the Balancing Authority Submittal (BAS) Site. Once the BA selects its acronym from the pull-down selection in the upper portion of the form (see Figure 1), all of the appropriate data will be pre-populated in the form.

Balancing Authority		FPC	FWG: Please select your BA mnemonic from the drop down list.			NERC FRS FORM 1 20 to		
Time	Date/Time (t-0)	BA Time	BA	BA Bias	Relay Lmt R1	Value "A" Information		Value "B"
Zone	BA Time	Zone	Time	Delfreq	Delfreq	NAI	Adjustment	NAI

Figure 1: Balancing Authority Selection on FRS Form FR-1

Included in the Form 714 data is each BA’s 2014 Maximum Monthly Peak Demand (MW), used in calculating the minimum FBS based on peak demand. The minimum FBS are also published in the table.

The BA FROs and FRS Forms FR-1 and FR-2 are posted under the “Forms” section of the BAS Site.

Frequency Bias Setting Process

This year marks the transition to Frequency Bias determination under Requirements R2, R3, and R4 of Standard BAL-003-1. Under the new process, BAs will submit data on FRS Forms FR-1 and FR-2 through the BAS Site no later than March 7, 2016. Those forms are posted under the “Forms” section of the BAS Site. The ERO will then publish the final FBS in time for implementation on or about April 1, 2016.

The forms currently only contain frequency disturbance events for the first nine months of BAL-003 operating year 2015 (December 2014 through November 2015), vetted by the NERC Resources Subcommittee's Frequency Working Group (FWG). No later than the second business day of February 2016, the ERO will update the forms posted with all four quarters of operating year 2015. The forms contain instructions for their use. Additionally, there is a presentation and a recording of the BAL-003-1 - Frequency Response Implementation and Balancing Authority Submittal Site Webinar held on October 20, 2015 posted under the 2015 [Reliability Risk Management Webinars](#).

Completed forms are to be submitted through the BAS Site. That site is a secure SharePoint site for the submittal of data and forms associated with the BAL Standards. Users from each BA are be able to

download forms and upload their data and forms to their own exclusive area. Instructions on gaining access to the BAS Site are located in the [Balancing Authority Submittal Site User Manual](#).

Process for Adjusting Interconnection Minimum Frequency Bias Setting⁴

The following procedure will be used by the ERO for modifying the minimum FBS for 2016 to better meet reliability needs. The ERO will post the minimum FBS values on the ERO website along with other balancing standard limits.

Under BAL-003-1, the minimum FBS will be moved toward the natural Frequency Response in each interconnection. In the first year, the minimum FBS for each interconnection is shown on the attached *Balancing Authority Frequency Response Obligations (FROs) and Minimum Frequency Bias Settings* table. Each Interconnection Minimum FBS is based on the sum of the non-coincident peak loads for each BA from the currently available FERC 714 Report or equivalent.

The 2016 Interconnection Minimum FBS is calculated from the sum of the non-coincident peak loads in each interconnection, multiplied by 0.9% for the Eastern and Western Interconnections. No such adjustment is made for the ERCOT or Québec Interconnections.⁵

The Interconnection Minimum FBS is allocated among the BAs in an interconnection using the same allocation method used for allocation of the Interconnection Frequency Response Obligations (IFROs).

NOTE: The minimum FBS published in the attached table are the MINIMUM values that can be used by the BAs in accordance with BAL-003-1 Attachment A at page 10.

The Interconnection Minimum FBS allocation is calculated by the ERO using the following formulae for the Eastern and Western Interconnections:⁵

$$MFBS_{Int} = RedFactor_{Int} \times \sum NCPL_{BAS}$$

$$MFBS_{BA} = MFBS_{Int} \times \frac{Annual\ Gen\ MWh_{BA} + Annual\ Load\ MWh_{BA}}{Annual\ Gen\ MWh_{Int} + Annual\ Load\ MWh_{Int}}$$

Where:

- $MFBS_{Int}$ is the Interconnection Minimum FBS.
- $RedFactor_{Int}$ is the FBS reduction factor⁶ for the interconnection.
- $\sum NCPL_{BAS}$ is the sum of the BA monthly non-coincident peak loads (MW) for the interconnection.

⁴ From the *Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard* filed with BAL-003-1.

⁵ The minimum Frequency Bias Setting requirement does not apply to a Balancing Authority that is the only Balancing Authority in its Interconnection. These Balancing Authorities are solely responsible for providing reliable frequency control of their Interconnection. These Balancing Authorities are responsible for converting frequency error into a megawatt error to provide reliable frequency control, and the imposition of a minimum bias setting greater than the magnitude the Frequency Response Obligation may have the potential to cause control system hunting, and instability in the extreme.

⁶ The Frequency Bias Setting reduction factor is 0.009 (0.9%) for the Eastern and Western Interconnections.

- $MFBS_{BA}$ is the Minimum FBS of the BA.
- Annual Gen MWh_{BA} is the annual Net Generation (MWh), FERC Form 714, Part II-Schedule 3.
- Annual Load MWh_{BA} is the annual Net Energy for Load (MWh), FERC Form 714, Part II-Schedule 3.
- Annual Gen MWh_{Int} is the sum of all Annual Gen MWh_{BA} values reported in that interconnection.
- Annual Load MWh_{Int} is the sum of all Annual Load MWh_{BA} values reported in that interconnection.

Guidance for Balancing Authorities Using Variable Frequency Bias

Implementation of Requirement R3 of BAL-003-1 for BAs utilizing Variable FBS requires the use of the FRO in its determination. However, there is a time offset between the schedule for implementing the FBS and the effective FRO implementation:

- FROs are calculated each year and sent to the BAs for implementation (in accordance with BAL-003-1 Requirement R1) for the upcoming BAL-003 operating year (December 1st through November 30th).
- FBS are determined each year in March (in accordance with BAL-003-1 requirements R2, R3, and R4) and are implemented by the BAs from April 1st through March 31st.

This offset in annual implementation dates creates potential confusion, particularly for those BAs using Variable FBS, concerning which FRO to use in their Bias Settings under R3.

To clarify the way in which this FRO calculation and utilization should be implemented in Requirement R3 of BAL-003-1, the ERO makes the following recommendation:

Recommendation

BAs utilizing Variable Bias Settings should use the FRO⁷ provided for implementation on December 1, 2015 for the purpose of compliance with Requirement R3 starting on April 1, 2016. That FRO shall remain constant through the entire FBS year (April 1, 2016 through March 31, 2017).

The FRO provided by the ERO for implementation on December 1, 2016 shall then be used for purposes of compliance with Requirement R3 of BAL-003-1 starting April 1, 2017. That FRO shall remain constant through the entire FBS year (April 1, 2017 through March 31, 2018).

Each year, there will be a short lag period between receipt of the FRO and the implementation the Variable FBS by BAs using it in Requirement R3 of BAL-003-1.⁸

Example: On April 1, 2016 when the new FBS is being implemented, the operating year 2016 FRO in place is the one implemented on December 1, 2015. When the FRO changes on December 1, 2016, the BA will continue to use the 2016 FRO⁷ through March 2017. Then, when changing the FBS in April 2017, the BA will use the operating year 2017 FRO implemented in December of 2016.

Frequency Bias Setting Schedule for 2016

⁷ See the *BAL-003-1 Detailed Implementation Timeline - August 20, 2014* for Requirement R1.

⁸ See e.g., Attachment A of BAL-003-1, at p. 12 (reflecting the target schedule with a similar lag).

The FBS to be used for Bias Setting year 2016 (April 1, 2016 through March 31, 2017) for compliance with Requirements R2, R3, and R4 of Standard BAL-003-1 will be implemented using the following process:

1. December 1, 2015 – The BAS Site available for data submittal. FRS Forms FR-1 and FR-2 are posted with Frequency Events for the 3rd quarter of operating year 2015 (December 1, 2014 through November 30, 2015) contained in the forms.
2. By the second business day in February 2016 – Revised FRS Forms FR-1 and FR-2 are posted with Frequency Events for all four quarter of operating year 2015 (December 1, 2014 through November 30, 2015) contained in the forms.
3. By March 7, 2016 – BAs complete their frequency response sampling for all four quarters of operating year 2015, and their FBS calculations, and submit the results to the ERO through the BAS Site.
4. By March 24 – The ERO validates FBS, computes the sum of FBS for each Interconnection, and determines L10 values for the CPS 2 criterion for each BA. The ERO will post that report on the BAS Site and the RS website.
5. During the first three business days of April 1, 2016 – BAs will implement the 2016 Bias Setting in their Automatic Generation Control (AGC) systems. The ERO will announce a target date.

Details of the BAL-003-1 implementation schedule can be found in the *BAL-003-1 Detailed Implementation Timeline - August 20, 2014* posted under the “Forms” section of the Balancing Authority Submittal Site, and on the “Frequency Response Standard Resources” section of the [Resources Subcommittee website](#).

Balancing Authority Frequency Response Obligations (FROs) and Minimum Frequency Bias Settings

BA Name	NCR Number	BA Acronym	2014 Maximum Monthly Peak Demand (MW)	2014 BA Net Generation (MWh)	2014 BA Net Energy for Load (MWh)	2014 BA Net Generation + BA Net Energy for Load (MWh)	% Ratio	2016 Operating Year BA FROs [MW/0.1 Hz]	Minimum BA Frequency Bias Settings
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Non-FERC Form 714 data =

ERCOT Interconnection

			66,456	338,842,819	340,033,352	678,876,171	100%	-381.00	N/A
Electric Reliability Council of Texas, Inc.	NCR04056	ERCO	66,456	338,842,819	340,033,352	678,876,171	100%	-381.00	

Québec Interconnection

			39,240				100%	-179.00	N/A
Hydro-Québec TransEnergie	NCR07112	HQT	39,240	0	0	0	100%	-179.00	

Eastern Interconnection

			581,790	3,106,225,398	3,142,667,030	6,248,892,428	100%	-1015.00	-5,236.11
Duke Energy Florida, Inc. (Progress Energy (Florida Power Corp.))	NCR00063	FPC	10,540	38,633,990	51,185,656	89,819,646	1.44%	-14.59	-75.26
Florida Municipal Power Pool	NCR00023	FMPP	3,412	15,621,289	16,680,860	32,302,149	0.52%	-5.25	-27.07
Florida Power & Light Co.	NCR00024	FPL	22,870	117,340,769	115,593,466	232,934,235	3.73%	-37.84	-195.18
Gainesville Regional Utilities	NCR00032	GVL	429	1,745,333	1,975,667	3,721,000	0.06%	-0.60	-3.12
Homestead, City of	NCR00037	HST	101	14,635	522,565	537,200	0.01%	-0.09	-0.45
JEA	NCR00040	JEA	2,823	12,090,226	12,657,925	24,748,151	0.40%	-4.02	-20.74
New Smyrna Beach, Utilities Commission of	NCR00052	NSB	91	244	409,180	409,424	0.01%	-0.07	-0.34
Seminole Electric Cooperative	NCR00068	SEC	286	11,196,957	1,242,683	12,439,640	0.20%	-2.02	-10.42
Tallahassee, City of	NCR00073	TAL	574	2,806,764	2,750,917	5,557,681	0.09%	-0.90	-4.66
Tampa Electric Company	NCR00074	TEC	4,054	20,838,166	19,318,675	40,156,841	0.64%	-6.52	-33.65
Midcontinent Independent System Operator, Inc.	NCR00826	MISO	114,124	630,252,038	668,486,931	1,298,738,969	20.78%	-210.95	-1,088.25
Manitoba Hydro	NCR01003	MHEB	4,781	35,746,275	26,808,189	62,554,464	1.00%	-10.16	-52.42
Saskatchewan Power Corporation	NCR01029	SPC	3,485	22,727,761	23,379,675	46,107,436	0.74%	-7.49	-38.63
ISO-NE	NCR07124	ISNE	24,443	106,480,000	127,178,000	233,658,000	3.74%	-37.95	-195.79
New York Independent System Operator	NCR07160	NYIS	29,782	140,689,192	160,024,764	300,713,956	4.81%	-48.84	-251.98
New Brunswick Power Corporation	NCR07155	MAR	3,021	16,134,377	16,131,180	32,265,557	0.52%	-5.24	-27.04
Nova Scotia Power Inc.	NCR07178	NSPI	2,118	10,693,958	11,037,228	21,731,186	0.35%	-3.53	-18.21
Ontario IESO	NCR07184	IESO	22,774	153,898,643	139,116,411	293,015,054	4.69%	-47.59	-245.52
Ohio Valley Electric Corporation	NCR00857	OVEC	175	11,410,009	459,366	11,869,375	0.19%	-1.93	-9.95
PJM Interconnection, LLC	NCR00879	PJM	141,678	792,805,588	797,461,180	1,590,266,768	25.45%	-258.31	-1,332.53
Alcoa Power Generating, Inc. - Yadkin Division	NCR01169	YAD	10	784,545	17,561	802,106	0.01%	-0.13	-0.67
Associated Electric Cooperative, Inc.	NCR01177	AECI	4,753	21,073,327	20,458,985	41,532,312	0.66%	-6.75	-34.80
Duke Energy Carolinas	NCR01219	DUK	22,260	102,657,303	101,942,920	204,600,223	3.27%	-33.23	-171.44
Duke Energy Progress, Inc. (Progress Energy (Carolina Power & Light Company))	NCR01298	CPLE	15,024	67,114,822	67,077,546	134,192,368	2.15%	-21.80	-112.44
Electric Energy, Inc.	NCR11399	EEL	-	7,168,136	100,727	7,268,863	0.12%	-1.18	-6.09
LG&E and KU Services Company as agent for Louisville Gas and Electric Company and Kentucky Utilities Company	NCR01223	LGEE	7,371	39,357,910	37,149,175	76,507,085	1.22%	-12.43	-64.11
PowerSouth Energy Cooperative (Alabama Electric Cooperative Inc.)	NCR10203	AEC	2,400	5,244,367	5,892,841	11,137,208	0.18%	-1.81	-9.33
South Carolina Electric & Gas Company	NCR00915	SCEG	4,847	25,553,893	23,867,766	49,421,659	0.79%	-8.03	-41.41
South Carolina Public Service Authority	NCR01312	SC	5,673	21,506,712	27,403,280	48,909,992	0.78%	-7.94	-40.98
Southeastern Power Administration	NCR00070	SEPA	-	1,791,145	-	1,791,145	0.03%	-0.29	-1.50
Southern Company Services, Inc. - Trans	NCR01320	SOCO	46,966	246,056,762	240,615,908	486,672,670	7.79%	-79.05	-407.80
Tennessee Valley Authority	NCR01151	TVA	33,352	159,513,410	164,616,907	324,130,317	5.19%	-52.65	-271.60
Southwestern Power Administration	NCR01144	SPA	227	4,834,195	1,247,655	6,081,850	0.10%	-0.99	-5.10
Southwest Power Pool	NCR01143	SWPP	47,346	262,442,657	259,855,241	522,297,898	8.36%	-84.84	-437.65

Balancing Authority Frequency Response Obligations (FROs) and Minimum Frequency Bias Settings

BA Name	NCR Number	BA Acronym	2014 Maximum Monthly Peak Demand (MW)	2014 BA Net Generation (MWh)	2014 BA Net Energy for Load (MWh)	2014 BA Net Generation + BA Net Energy for Load (MWh)	% Ratio	2016 Operating Year BA FROs [MW/0.1 Hz]	Minimum BA Frequency Bias Settings
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Non-FERC Form 714 data =

Western Interconnection

			166,257	859,774,646	873,709,347	1,733,483,993	100%	-858.00	-1,496.31
Arizona Public Service Company	NCR05016	AZPS	7,188	29,602,422	30,929,306	60,531,728	3.49%	-29.96	-52.25
Arlington Valley, LLC - AVBA (Duke Energy Control Area Services LLC)	NCR03049	DEAA	-	1,130,725	-	1,130,725	0.07%	-0.56	-0.98
Avista Corporation	NCR05020	AVA	2,380	10,883,733	12,784,347	23,668,080	1.37%	-11.71	-20.43
Balancing Authority of Northern California (Sacramento Municipal Utility District & City of Redding Electric Utility)	NCR11118	BANC	4,415	11,436,836	17,205,882	28,642,718	1.65%	-14.18	-24.72
Bonneville Power Administration	NCR05032	BPAT	10,643	112,582,517	54,536,432	167,118,949	9.64%	-82.72	-144.25
California Independent System Operator	NCR05048	CISO	44,703	167,855,024	231,311,307	399,166,331	23.03%	-197.57	-344.55
City of Tacoma, Department of Public Utilities, Light Division	NCR05097	TPWR	1,016	3,409,395	4,917,933	8,327,328	0.48%	-4.12	-7.19
El Paso Electric Company	NCR05140	EPE	1,764	3,984,943	8,230,271	12,215,214	0.70%	-6.05	-10.54
Gila River Power, LLC	NCR05169	GRMA	-	4,398,190	-	4,398,190	0.25%	-2.18	-3.80
Gridforce Energy Management, LLC (CSTO)	NCR11393	GRID	-	3,102,311	-	3,102,311	0.18%	-1.54	-2.68
Griffith Energy, LLC	NCR03050	GRIF	-	2,419,829	-	2,419,829	0.14%	-1.20	-2.09
Idaho Power Company	NCR05191	IPCO	3,550	15,664,883	16,985,010	32,649,893	1.88%	-16.16	-28.18
Imperial Irrigation District	NCR05195	IID	982	6,151,846	3,699,656	9,851,502	0.57%	-4.88	-8.50
Los Angeles Department of Water and Power	NCR05223	LDWP	6,343	21,796,949	29,696,030	51,492,979	2.97%	-25.49	-44.45
NaturEner Power Watch, LLC (Glacier Wind Balancing Authority)	NCR10395	GWA	-	532,990	-	532,990	0.03%	-0.26	-0.46
NaturEner Wind Watch, LLC	NCR11382	WWA	-	567,996	-	567,996	0.03%	-0.28	-0.49
Nevada Power Company	NCR05261	NEVP	5,861	23,832,843	26,753,693	50,586,536	2.92%	-25.04	-43.67
New Harquahala Generating Company LLC - HGBA	NCR02552	HGMA	-	1,313,145	-	1,313,145	0.08%	-0.65	-1.13
NorthWestern Corporation (NorthWestern Energy)	NCR05282	NWMT	1,748	12,331,089	10,874,638	23,205,727	1.34%	-11.49	-20.03
PacifiCorp_East	NCR05304	PACE	8,725	51,737,147	49,932,363	101,669,510	5.87%	-50.32	-87.76
PacifiCorp_West	NCR05304	PACW	3,807	22,084,350	20,921,420	43,005,770	2.48%	-21.29	-37.12
Portland General Electric Company	NCR05325	PGE	3,894	11,152,804	20,657,434	31,810,238	1.84%	-15.74	-27.46
Public Service Company of Colorado	NCR05521	PSCO	7,248	35,857,297	40,854,385	76,711,682	4.43%	-37.97	-66.22
Public Service Company of New Mexico	NCR05333	PNM	2,585	14,410,020	14,661,019	29,071,039	1.68%	-14.39	-25.09
Public Utility District No. 1 of Chelan County	NCR05338	CHPD	728	6,501,004	3,931,027	10,432,031	0.60%	-5.16	-9.00
Public Utility District No. 2 of Grant County Washington	NCR05342	GCPD	738	8,452,958	5,212,111	13,665,069	0.79%	-6.76	-11.80
PUD No. 1 of Douglas County	NCR05343	DOPD	392	4,499,298	1,524,408	6,023,706	0.35%	-2.98	-5.20
Puget Sound Energy, Inc.	NCR05344	PSEI	4,896	15,486,696	24,303,329	39,790,025	2.30%	-19.69	-34.35
Salt River Project Agricultural Improvement and Power District	NCR05372	SRP	6,805	36,052,273	29,150,480	65,202,753	3.76%	-32.27	-56.28
Seattle City Light	NCR05382	SCL	1,863	7,529,746	9,899,341	17,429,087	1.01%	-8.63	-15.04
Tucson Electric Power	NCR05434	TEPC	3,190	12,394,412	15,676,340	28,070,752	1.62%	-13.89	-24.23
Turlock Irrigation District	NCR05435	TIDC	602	1,860,200	2,626,558	4,486,758	0.26%	-2.22	-3.87
Western Area Power Administration - Desert Southwest Region	NCR05461	WALC	1,748	11,918,685	9,864,577	21,783,262	1.26%	-10.78	-18.80
Western Area Power Administration - Rocky Mountain Region	NCR05464	WACM	4,070	37,828,928	24,736,224	62,565,152	3.61%	-30.97	-54.01
Western Area Power Administration - Upper Great Plains Region	NCR05467	WAUW	147	477,453	811,737	1,289,190	0.07%	-0.64	-1.11
Alberta Electric System Operator	N/A	AESO	11,169	78,486,006	79,976,563	158,462,569	9.14%	-78.43	-136.78
British Columbia Hydro and Power Authority	N/A	BCHA	10,768	57,653,459	58,843,484	116,496,943	6.72%	-57.66	-100.56
Comision Federal de Electricidad	N/A	CFE	2,289	12,394,244	12,202,042	24,596,286	1.42%	-12.17	-21.23