



## EIA-930 Data Users Guide and Known Issues

---

### DATA USERS GUIDE

#### EIA-930 U.S. electric system operating data

The EIA-930 information collection consists of basic hourly electric system operating data from all balancing authorities (BAs) that make up the electric system in the lower 48 states. The following data elements are collected:

- Actual system demand
- Actual sub-regional demand (available July 1, 2018)
- Day-ahead system demand forecast
- System net generation
- System net generation by energy source (available July 1, 2018)
- System total interchange
- Interchange with directly connected balancing authorities

Aggregate values are calculated and made available for 13 regions and the U.S. lower 48 states. A list of the BAs that make up each region is provided at the end of this document.

#### Bulk historical data availability

**API Data Series:** Individual data series are available via API calls. Information about this is available on EIA's [OPENDATA page](#). API data series may be found in the [API Browser](#) tab under the [U.S. Electric System Operating Data](#) child category. API data series calls may be embedded in an Excel spreadsheet using [EIA's Excel Add-In](#). There is also a [bulk download facility](#).

The API data series include data up to the latest available:

- Actual system demand for today is available today 70 minutes after the end of the operating hour.
- Day-ahead system demand forecast for each hour today (1 am to midnight local time) is available after 8:30 am eastern time today.
- System net generation, system net generation by energy source, and total interchange for each hour yesterday (1 am to midnight local time) are available after 8:30 am eastern time today.
- Interchange with directly connected balancing authorities for each hour two days ago (1 am to midnight local time) is available after 8:30 am Eastern Time today.
- Actual sub-regional demand will be available on an up to one month lag

Note: API data series values are listed with a Greenwich Mean Time (GMT)/ Coordinated Universal Time (UTC) date-time stamp value. This allows matching values from different data series for the same hour without having to adjust for time zone and daylight saving time changes. If a value is missing in an API data series, the series will not include a record for that hour. Therefore, for multiple data series pulled into Excel, the value for the same hour for each series may not be on the same spreadsheet row.

**Bulk Database Files:** EIA-930 historical data is also available as zipped .csv files in six-month chunks starting with July 1 to December 31, 2015. For each six-month period, there are two zip files. The Interchange file contains interchange values reported by each BA with their directly connected balancing authorities. The Balance file contains all other data values. To find these files, on the U.S. Electric System Operating Data page ([https://www.eia.gov/beta/realtime\\_grid/](https://www.eia.gov/beta/realtime_grid/)) go to the **DETAILED** DATA tab and then to the TABLES sub-tab. On the right hand side above the data table, click on the Download icon with a downward facing triangle. This will present the options to do a Bulk Download of all the data or to select from a drop down menu of BA Balance or Interchange files available in 6-month blocks. To access the drop down menu click on the downward facing triangle next to the Download button.

The bulk database files, updated every day by 11 am eastern time, include the following data:

- Actual system demand through yesterday (1 am to midnight local time)
- Day-ahead system demand forecast through yesterday
- System net generation, system net generation by energy source (beginning July 1, 2018), and total interchange through yesterday
- Interchange with directly connected balancing authorities through two days ago
- Actual sub-regional demand will be available on a one month lag (beginning July 1, 2018)

Note: Data values are listed with local and a Greenwich Mean Time (GMT)/Coordinated Universal Time (UTC) date-time stamp values. BA local time zones are listed in a table at the end of this document. Arizona time is Mountain Standard Time all year long. Those that use it do not observe daylight saving time. There are a few BAs that observe time that you might not expect:

- El Paso Electric Company (EPE) – Located in the Mountain Time zone, but reports as Arizona Time.
- Idaho Power Company (IPCO) – Located in the Mountain Time zone, but reports as Pacific Time.
- Louisville Gas and Electric Company and Kentucky Utilities Company (LGEE) – Located in the Eastern Time zone, but reports as Central Standard Time all year long.
- Midcontinent Independent System Operator, Inc. (MISO) – Mostly located in the Central Time zone, but reports as Eastern Standard Time all year long.
- Public Service Company of New Mexico (PNM) – Located in the Mountain Time zone, but reports as Arizona Time.
- Western Area Power Administration - Rocky Mountain Region (WACM) – Located in the Mountain Time zone, but reports in Arizona Time.
- Southeastern Power Administration (SEPA) – Located in the Eastern time zone, but reports in Central time

**Generation-only balancing authorities:** The current data availability discussed above does not apply to ten BAs that do not report demand or demand forecasts. These BAs consist of a power plant or group of power plants and do not directly serve retail customers. The following BAs only report net generation and interchange:

- Arlington Valley, LLC – AVBA (DEAA)
- Electric Energy, Inc. (EEI)
- Gridforce Energy Management, LLC (GRID)
- Griffith Energy, LLC (GRIF)
- Gila River Power, LLC (GRMA)
- NaturEner Power Watch, LLC (GWA)
- New Harquahala Generating Company, LLC – HGBA (HGMA)
- Southeastern Power Administration (SEPA)
- NaturEner Wind Watch, LLC (WWA)
- Alcoa Power Generating, Inc. - Yadkin Division (YAD)

**Limited generation balancing authorities:** Two BAs do not always have net generation to report. Most BAs produce electricity within their balancing authority area. However, the following BAs have a small number of local generators that are not always producing electricity:

- Homestead, City of (HST)
- New Smyrna Beach, Utilities Commission of (NSB)

**Limited availability of sub-regional demand:** Beginning July 1, 2018 respondents that calculate in the normal course of business actual hourly demand values for sub-regions within their system (e.g., local balancing authorities, areas, zones, operating companies, etc.) are required to report their sub-regional demand. Consequently the following BAs report actual sub-regional demand:

- California Independent System Operator (CISO)
- Midcontinent Independent System Operator, Inc. (MISO)
- PJM Interconnection, LLC (PJM)
- Southwest Power Pool (SWPP)

## EIA-930 data quality

Users of the EIA-930 data should familiarize themselves with the quirks of the collection. These stem from the nature of the data and the collection design. Also, respondents are in various stages of enhancing their collection processes and correcting historical data.

### *The nature of the data*

Respondents submit their data and EIA posts the data on an “as is” nature. The collection process depends on serial automated processes from generator and tie line meters to energy management and accounting systems to data presentation and delivery. Things can and do happen to disrupt these processes and produce missing or anomalous values. When this happens to reported demand and net generation values, EIA estimates values to include in U.S. and regional aggregates, but the anomalous values are posted for the BA. Notwithstanding the “as is” nature of the collection, we expect respondents to correct anomalous values for the historical record.

### *EIA-930 collection design*

The EIA-930 collection was designed to marry near real-time reporting of demand and next-day reporting of other system operating measures with reasonably accurate historical data. For example, we collect actual demand values twice: once in near real-time during the operating day and then again at 7 am the next day. The reported values may or not be the same depending on the source of the data and revisions that have taken place overnight.

Similarly, we collect interchange values twice: once at 7 am the day after the operating day and then again the next day. Total interchange is needed the next day along with net generation to derive demand. The reporting of interchange values with each directly connected BA take advantage of a mandatory requirement that BAs agree on this value with neighboring BAs by the end of the next business day, known as interchange check-out. The total interchange value may or may not match the sum of the interchange with all the neighboring BAs depending on the source of the data and any revisions due to check-out.

### *Data relationships*

Relationships among the data elements can be used to check the quality of data reporting.

**System energy balance:** Respondents typically derive the value for actual demand (D) each hour from total interchange (TI) and net generation (NG), which are both aggregated metered values.  $D \text{ equals } NG \text{ minus } TI$ .

**Actual sub-regional demand:** Respondents that calculate hourly actual demand values for sub-regions within their system (e.g., local balancing authorities, areas, zones, operating companies, etc.) in the normal course of business will report these categories beginning July 1, 2018. The sum of the actual sub-regional demand should equal or approximate the actual system demand for the same hour. Where discrepancies exist they may be due to different methods for calculating these two data elements.

**Net Generation by Energy Source:** Total net generation (NG) should equal the sum of net generation by energy source (reported beginning July 1, 2018).

**Internal interchange reporting consistency:** Total interchange (TI) may equal the sum of interchange with each directly interconnected balancing authority (DIBA).  $TI = \text{SUM}(DIBA)$ . As mentioned above, these two values may differ due to the use of different data sources and revisions.

**External interchange reporting consistency:** BAs are physically connected to their neighboring BAs by one or more transmission lines. These lines have meters that measure the flow of electricity between BAs. Interchange reported by BA1 to or from BA2 should equal the interchange reported by BA2 to or from BA1.

Correcting mismatches in reporting of interchange is particularly challenging. It is difficult to identify the sources of mismatches. Is one BA or the other misreporting or is it both? The EIA-930 collection is designed to take advantage of a mandatory reliability standard that requires BAs to agree on actual interchange for each hour of a day by the end of the next business day. We have found that a number BAs are not reporting using a data source with the checked-out values (see the BA by BA comments below).

Interchange reported for each directly interconnected balancing authority (DIBA) should be the same magnitude but opposite sign as the interchange reported by each of the other balancing authorities with the respondent.  $DIBA \text{ reported by BA X with Y} = - DIBA \text{ reported by BA Y with X}$ . As mentioned above, balancing authorities are required to check-out interchange with their neighboring BAs after two days.

### *Exclusion of Dynamic Scheduling and Pseudo-ties*

The EIA-930 collection of system operating data attempts to represent as purely as possible a physical picture of supply, demand, and energy flow (interchange) on the U.S. electric grid. For the purposes of the EIA-930 survey, interchange is the physical flow of electricity metered at the tie line boundaries between electric systems. Net generation is a metered value of the output of generating units in the balancing authority. Demand (load, or [net energy for load](#)) is a calculated value based on the activity occurring within the tie line boundaries of the electric system.

This physical picture of balancing authority operations is not the way many electric systems account for and report how they dispatch their generators, manage interchange, and balance their systems. Utilities enter into commercial arrangements with other systems to (1) dispatch generating units located in other systems or to serve customers in other systems (dynamic scheduling) or (2) to transfer electric energy through “virtual” interchange, where no direct physical connections exist between the two systems (pseudo ties).

If operating data was reported with these commercial arrangements incorporated then “demand” might include demand served outside the BA’s tie line boundaries or exclude internal demand served by others BAs. “Net generation” might include the output of generating units outside the BA’s tie line boundaries or might exclude the output of internal units dispatched by other systems. Energy flows might be reported between BAs that are not directly connected. Metered physical flow values may be adjusted to account for dynamic scheduling arrangements and interchanges on pseudo ties.

Since physical tie line flows and generating unit output are metered, BAs have been asked to adjust their accounting to report the physical values of net generation and total interchange required for the EIA-930 survey. In some cases, this involves significant changes in the reported demand values, which are derived from net generation and total interchange. We are working with respondents when it appears that their data submissions erroneously include dynamic scheduling or pseudo-tie arrangements. Getting all these corrections in may take a while.

Electric systems produce demand forecasts aligned with the way they operate and account for electricity on their system. EIA has not asked respondents to produce a demand forecast consistent with our physical picture of their operations. This means that for some systems, where a significant portion of their demand is outside their system or other balancing authorities have significant demand inside their system, the comparison between actual and forecast demand color-coded on the webpage map and shown on the forecast error chart is not very meaningful. Those systems include:

- PowerSouth Energy Cooperative (AEC)
- Avista Corporation (AVA)
- Duke Energy Florida, Inc. (FPC)
- Gainesville Regional Utilities (GVL)
- Ohio Valley Electric Corporation (OVEC)
- Puget Sound Energy, Inc. (PSEI)
- Seminole Electric Cooperative (SEC)
- Southwestern Power Administration (SPA), and perhaps
- Tucson Electric Power (TEPC)

### *Reporting inconsistencies on which BAs are directly connected*

Not all BAs agree on which BAs they are directly connected to. We are working with respondents to correct these discrepancies.

### *Daylight saving time reporting*

Respondents have found reporting data for daylight saving time days particularly challenging. This may lead to duplicate values reported for the same hour or a missing value for an hour. Sometimes this leads to a value for an hour being reported as the value the hour before or after.

We have been focusing on this issue in our data quality reviews and have been notifying respondents to resubmit corrections. Getting all these corrections in may take a while. Also, there is no guarantee that respondents have successfully revised their reporting processes to report correctly in the future.

### *Anomalous value* balancing authority detail reports

Many respondents have reported anomalous data values involving blank, zero, negative, high, and low values.

## **KNOWN ISSUES WITH REPORTED DATA**

Our focus has been on working with EIA-930 respondents to properly report current data. While the quality of the historical data is much improved, **you should not assume that all historical data is good.**

In order to document the known issues we have created daily detailed reports for each balancing authority and two summary reports. The two summary reports provide an overview of the nature and scope of outstanding issues across all balancing authorities. The balancing authority detail reports identify specific outstanding issues for each balancing authority.

The two summary reports can be accessed through the hyperlinks below. The balancing authority detailed reports can be accessed through the hyperlinked BA names listed in the [table](#) at the end of this document.

### [Summary Statistics Table](#) issues

**Hours missing:** The number of hours that a given value is missing.

**Extreme values:** The number of hours that a given value is extremely large or extremely small relative to the history of submissions by that BA. Some of these values may be actual data recorded during unusual operating conditions but most are errors.

**Internal inconsistency of system balance:** The number of hours that net generation (NG) does not equal the sum of total interchange (TI) and demand (D) as it should. The error may be in any one of the three data elements NG, TI or D.

**Internal inconsistency of interchange:** The number of hours that total interchange (TI) does not equal the sum of the interchange reported with each directly interconnected balancing authority (DIBA).

**Internal inconsistency of net generation:** The number of hours that net generation (NG) does not equal the sum of reported generation by each fuel source (reported beginning July 1, 2018).

**Internal inconsistency of demand:** The number of hours that demand (D) does not equal the sum of reported demand by each sub-region (reported beginning July 1, 2018).

**Hours with at least one DIBA mismatch:** The number of hours that the reported interchange by the respondent and at least one DIBA pair does not match. The error could be the fault of either balancing authority.

**Median net generation:** A reference of the size of the balancing authority. This does not reflect an error.

### *DIBA Pair Mismatches Tables issues*

The 'Summary by BA' tab counts the number of mismatches in a given hour between the reported balancing authority listed at the top of the page and each of their directly interconnected balancing authority (DIBA) pairs. For example, if a balancing authority has 5 pairs and the value in a given hour is 2 then the interchange that they reported with their DIBA pairs for that hour does not match the interchange that two of their DIBA pairs reported with them.

The 'Summary by BA Pair' tab includes the hourly interchange imbalance reported by the balancing authority listed in the top row with each of their DIBA pairs listed in the next row. Values of 0 indicate the pair of BA's balance. Non-zero values indicate the magnitude of the imbalance.

### *Individual Balancing Authority Detail Report issues*

Tables with the hourly data and reporting issues each reporting balancing authority can be accessed through the hyperlinked names in the List of Balancing Authorities at the end of this document.

On the 'Detailed Data' tab, each row includes data and any issues for a given hour. The file includes the reported data date and hour, the local time based on the time zone, and the coordinated universal time (UTC). First the demand forecast, demand, net generation and total interchange values are reported. Any hours with missing data will be highlighted orange. If the balancing authority reports sub regions their hourly data will be reviewed on the 'Sub regions' tab.

**Missing columns:** Highlighted in pink, these columns can be used to filter for hours with missing values for DIBA, energy by source or demand by sub region. Filter for '1' to select only rows with missing data in a given category.

**Range Error columns:** If a value is extremely large or small relative to standard reporting for a given balancing authority on a given series then a value (the difference between the reported data and the usual upper or lower limit) will be entered and highlighted orange.

**Balance columns:** If relationships between data series are not balancing as they are supposed to then the imbalance will be calculated and highlighted yellow. For instance, if demand (D) fails to equal net generation (NG) minus total interchange (TI) as it should, then the difference will be recorded and highlighted in the Balance NG D TI column. In addition, categories are expected to sum to their totals. Individual reports of DIBA are expected to sum to total interchange (checked in the Balance TIDIBA column), net generation by energy source is expected to sum to total net generation (checked in the Balance NG column), and sub regional demand is expected to sum to total demand (checked in the Balance D column).

**Active columns:** The value '1' in these columns reflects that the balancing authority listed in the column title was actively interconnected with the reporting balancing authority for that hour. Relationships between balancing authorities may change over time and a '0' will be displayed if the connection ends between any directly interconnected balancing authority pairs.

**From DIBA columns:** Includes the interchange submitted by the balancing authority neighbor pair about the reporting balancing authority. It should be equal in magnitude but opposite in sign to the reporting balancing authority's DIBA interchange submission for that neighbor for that hour.

**Balance DIBA columns:** Any mismatch between the reporting balancing authority and their DIBA's corresponding data submissions will be calculated and highlighted.

**Pair Mismatch column:** This column will have a '1' value if there is an imbalance between the submissions of the reporting balancing authority and their DIBA pairs. If there are no mismatches, there will be a '0' value.

**File:** Data for a given hour is submitted over three separate days. The demand forecast is included in File 0, the demand, net generation, and total interchange are reported in File 2 and the DIBA interchange is reported in File 3. If a balancing authority submits sub regional data that file will be recorded under File D.



## List of U.S. and Connected Foreign Balancing Authorities with links to known issues detail reports

Code	Name	Time Zone	Region
<a href="#">AEC</a>	PowerSouth Energy Cooperative	Central	Southeast
<a href="#">AECI</a>	Associated Electric Cooperative, Inc.	Central	Midwest
<b>AESO</b>	Alberta Electric System Operator		Canadian Authorities
<a href="#">AVA</a>	Avista Corporation	Pacific	Northwest
<a href="#">AZPS</a>	Arizona Public Service Company	Arizona	Southwest
<a href="#">BANC</a>	Balancing Authority of Northern California	Pacific	California
<b>BCHA</b>	B.C. Hydro & Power Authority		Canadian Authorities
<a href="#">BPAT</a>	Bonneville Power Administration	Pacific	Northwest
<b>CEN</b>	Centro Nacional de Control de Energia		Mexican Authorities
<b>CFE</b>	Comision Federal de Electricidad		Mexican Authorities
<a href="#">CHPD</a>	Public Utility District No. 1 of Chelan County	Pacific	Northwest
<a href="#">CISO</a>	California Independent System Operator	Pacific	California
<a href="#">CPLE</a>	Duke Energy Progress East	Eastern	Carolinas
<a href="#">CPLW</a>	Duke Energy Progress West	Eastern	Carolinas
<a href="#">DEAA</a>	Arlington Valley, LLC - AVBA	Arizona	Southwest
<a href="#">DOPD</a>	PUD No. 1 of Douglas County	Pacific	Northwest
<a href="#">DUK</a>	Duke Energy Carolinas	Eastern	Carolinas
<a href="#">EEI</a>	Electric Energy, Inc.	Central	Midwest
<a href="#">EPE</a>	El Paso Electric Company	Arizona	Southwest
<a href="#">ERCO</a>	Electric Reliability Council of Texas, Inc.	Central	Electric Reliability Council of Texas, Inc.
<a href="#">FMPP</a>	Florida Municipal Power Pool	Eastern	Florida
<a href="#">FPC</a>	Duke Energy Florida, Inc.	Eastern	Florida
<a href="#">FPL</a>	Florida Power & Light Co.	Eastern	Florida
<a href="#">GCPD</a>	Public Utility District No. 2 of Grant County, Washington	Pacific	Northwest
<a href="#">GRID</a>	Gridforce Energy Management, LLC	Pacific	Northwest
<a href="#">GRIF</a>	Griffith Energy, LLC	Arizona	Southwest
<a href="#">GRMA</a>	Gila River Power, LLC	Arizona	Southwest
<a href="#">GVL</a>	Gainesville Regional Utilities	Eastern	Florida
<a href="#">GWA</a>	NaturEner Power Watch, LLC (GWA)	Mountain	Northwest
<a href="#">HGMA</a>	New Harquahala Generating Company, LLC - HGBA	Arizona	Southwest
<b>HQT</b>	Hydro-Quebec TransEnergie		Canadian Authorities
<a href="#">HST</a>	Homestead, City of	Eastern	Florida
<b>IESO</b>	Ontario IESO		Canadian Authorities
<a href="#">IID</a>	Imperial Irrigation District	Pacific	California
<a href="#">IPCO</a>	Idaho Power Company	Pacific	Northwest

<a href="#"><u>ISNE</u></a>	New England ISO	Eastern	New England ISO
<a href="#"><u>JEA</u></a>	JEA	Eastern	Florida
<a href="#"><u>LDWP</u></a>	Los Angeles Department of Water and Power	Pacific	California
<a href="#"><u>LGEE</u></a>	LG&E and KU Services Company as agent for Louisville Gas and Electric Company and Kentucky Utilities Company	Eastern Standard	Midwest
<b>MHEB</b>	Manitoba Hydro		Canadian Authorities
<a href="#"><u>MISO</u></a>	Midcontinent Independent System Operator, Inc.	Eastern Standard	Midwest
<b>NBSO</b>	New Brunswick System Operator		Canadian Authorities
<a href="#"><u>NEVP</u></a>	Nevada Power Company	Pacific	Northwest
<a href="#"><u>NSB</u></a>	New Smyrna Beach, Utilities Commission of	Eastern	Florida
<a href="#"><u>NWMT</u></a>	NorthWestern Corporation	Mountain	Northwest
<a href="#"><u>NYIS</u></a>	New York Independent System Operator	Eastern	New York Independent System Operator
<a href="#"><u>OVEC</u></a>	Ohio Valley Electric Corporation	Eastern	Mid-Atlantic
<a href="#"><u>PACE</u></a>	PacifiCorp East	Mountain	Northwest
<a href="#"><u>PACW</u></a>	PacifiCorp West	Pacific	Northwest
<a href="#"><u>PGE</u></a>	Portland General Electric Company	Pacific	Northwest
<a href="#"><u>PJM</u></a>	PJM Interconnection, LLC	Eastern	Mid-Atlantic
<a href="#"><u>PNM</u></a>	Public Service Company of New Mexico	Arizona	Southwest
<a href="#"><u>PSCO</u></a>	Public Service Company of Colorado	Mountain	Northwest
<a href="#"><u>PSEI</u></a>	Puget Sound Energy, Inc.	Pacific	Northwest
<a href="#"><u>SC</u></a>	South Carolina Public Service Authority	Eastern	Carolinas
<a href="#"><u>SCEG</u></a>	South Carolina Electric & Gas Company	Eastern	Carolinas
<a href="#"><u>SCL</u></a>	Seattle City Light	Pacific	Northwest
<a href="#"><u>SEC</u></a>	Seminole Electric Cooperative	Eastern	Florida
<a href="#"><u>SEPA</u></a>	Southeastern Power Administration	Central	Southeast
<a href="#"><u>SOCO</u></a>	Southern Company Services, Inc. - Trans	Central	Southeast
<a href="#"><u>SPA</u></a>	Southwestern Power Administration	Central	Central
<b>SPC</b>	Saskatchewan Power Corporation		Canadian Authorities
<a href="#"><u>SRP</u></a>	Salt River Project Agricultural Improvement and Power District	Arizona	Southwest
<a href="#"><u>SWPP</u></a>	Southwest Power Pool	Central	Central
<a href="#"><u>TAL</u></a>	Tallahassee, City of	Eastern	Florida
<a href="#"><u>TEC</u></a>	Tampa Electric Company	Eastern	Florida
<a href="#"><u>TEPC</u></a>	Tucson Electric Power	Arizona	Southwest
<a href="#"><u>TIDC</u></a>	Turlock Irrigation District	Pacific	California
<a href="#"><u>TPWR</u></a>	City of Tacoma, Department of Public Utilities, Light Division	Pacific	Northwest
<a href="#"><u>TVA</u></a>	Tennessee Valley Authority	Central	Tennessee Valley Authority
<a href="#"><u>WACM</u></a>	Western Area Power Administration - Rocky Mountain Region	Arizona	Northwest

<a href="#"><u>WALC</u></a>	Western Area Power Administration - Desert Southwest Region	Arizona	Southwest
<a href="#"><u>WAUW</u></a>	Western Area Power Administration - Upper Great Plains West	Mountain	Northwest
<a href="#"><u>WWA</u></a>	NaturEner Wind Watch, LLC	Mountain	Northwest
<a href="#"><u>YAD</u></a>	Alcoa Power Generating, Inc. - Yadkin Division	Eastern	Carolinas

### *Acronyms*

BA	balancing authority
DF	demand forecast
D	demand
NG	net generation
TI	total interchange
DIBA	directly interconnected balancing authority
UTC	coordinated universal time