



# Ask CAMD Session on CAMD Data Products

April 20, 2020



## Overview of Agenda

1. Welcome from CAMD Director Reid Harvey
2. Allowance Data
3. Power Sector Emissions Data
4. Deposition and Environmental Effects Data
5. Wrap-Up



# Allowance Data



## AMPD: Allowance Data

|                         |   |
|-------------------------|---|
| <b>Account Details</b>  | Account ownership details for all facilities in MD                                    |
| <b>Account Holdings</b> | Number of allowances by vintage year held by a specific account                       |
| <b>Transactions</b>     | All the private transactions for the CSOSG2 program during the 2019 compliance year   |
| <b>Compliance</b>       | Facility X's compliance information, emissions & allowances deducted for a given year |

[www.ampd.epa.gov/ampd](http://www.ampd.epa.gov/ampd)



# Air Markets Program Data

» You are here: [EPA Home](#) » [Clean Air Markets](#) » [Data Resources](#) » [AMPD](#)

[Home](#) [Query](#) [Prepackaged Data](#) [Reports](#) [Glossary](#) [Related Resources](#) [About](#)

## Air Markets Program Data

The Air Markets Program Data tool allows users to search EPA data to answer scientific, general, policy, and regulatory questions about industry emissions. More information about EPA's emissions trading programs can be found on our [Programs and Regulations](#) page.

Get Started: Visit the [About](#) page to watch a short animation describing the AMPD data, and to view a tutorial designed to help you navigate the AMPD website.

### Customized Data Queries

This section allows users to create custom queries for smaller, customized sets of emissions, allowance, compliance and/or facility information.

The query tool allows users to create user-defined queries based on program, date, location, facility name, unit characteristics or classifications, owners and operators, or representatives. The results can be previewed or downloaded.

START

### Prepackaged Data Download

This section allows users to download bulk data that is prepackaged in data sets of emissions, allowance, and compliance data. Commonly requested data are bundled so users can easily download large amounts of data without having to submit multiple database queries.

The Prepackaged Data Sets can also be accessed directly via the FTP site at [newftp.epa.gov/DMDnLoad](http://newftp.epa.gov/DMDnLoad).

START

### Get Reports

This section allows users to access pre-defined reports of emissions and allowance data with a simple, interactive interface.

Several reports and charts are available to show trends in emissions, view top emitters, look up your allowance account balance, view allowance allocations, and more.

START



# User Queries

## Query:

- Account information
- Facilities in Maryland
- Participating in the ARP program

### My Selected Criteria

**Selected for Report**  
Not Yet Selected

---

**Program**  
Not Yet Selected

**Data Set**  
Not Yet Selected

---

**Time Frame**  
Not Yet Selected

---

**Criteria**  
Not Yet Selected

---

**Variables**  
Not Yet Selected

[START OVER](#)

**Programs and Data Sets** » **Time Frame** » **Criteria** » **Variables** » **Preview**

? **Programs**

---

**Annual Programs**

- ☒ Acid Rain Program (ARP)
- ☐ Cross-State Air Pollution SO2 Annual Group 1 Program (CSSO2G1)
- ☐ Cross-State Air Pollution SO2 Annual Group 2 Program (CSSO2G2)
- ☐ Cross-State Air Pollution NOx Annual Program (CSNOX)
- ☐ Mercury and Air Toxics Standards (MATS)
- ☐ Regional Greenhouse Gas Initiative (RGGI)
- ☐ Texas SO2 Trading Program (TXSO2)
- ☐ Clean Air Interstate Rule SO2 (CAIRSO2) (ended 2014)
- ☐ Clean Air Interstate Rule NOx Annual (CAIRNOX) (ended 2014)

**Ozone Programs**

- ☐ Cross-State Air Pollution Rule NOx Ozone Season Group 1 Program (CSOSG1)
- ☐ Cross-State Air Pollution Rule NOx Ozone Season Group 2 Program (CSOSG2)
- ☐ SIP NOx Program (SIPNOX)
- ☐ Cross-State Air Pollution NOx Ozone Season Program (CSNOXOS) (ended 2016)
- ☐ Clean Air Interstate Rule Ozone Season (CAIROS) (ended 2014)



# User Queries

## Query:

- Account information
- Facilities in Maryland
- Participating in the ARP program

### ? Data Sets

- ☐ Emissions
  - ☐ Unit Level
  - ☐ Monitoring Location
- ☒ Allowances
  - ☒ Account Information
  - ☐ Allowance Details
  - ☐ Transaction History
- ☐ Allowance History
- ☐ Compliance
  - ☐ Allowance Based
  - ☐ Emission Based
- ☐ Facility Attributes



# User Queries

## Query:

- Account information
- Facilities in Maryland
- Participating in the ARP program

### My Selected Criteria

Selected for Account Information Report  
17 Account(s)

**Program**  
Acid Rain Program (ARP)  
**Data Set**  
Allowance: Account Information

**Time Frame**

**Allowance**

**Criteria**  
Not Yet Selected

**Variables**  
Not Yet Selected

[START OVER](#)

Programs and Data Sets » Time Frame » **Criteria** » Variables » Preview

Filter Allowance [Download Data Updates](#)

How would you like to filter your **Allowance** data? [Clear All Filters](#)

\*Which account types do you want include?  
☐ All Account Types ☒ **Facility** ☐ Unit ☐ General ☐ Reserve ☐ Surrender  
\*When you select facilities for a report, you will only be able to view facility and unit account types.

[Account Number and Name](#)

[Facility ID and Name](#)

[Owners and Operators](#)

[Designated Representative](#)

[State](#)

Kentucky  
Louisiana  
Maine

Maryland





# User Queries

## Query:

- Account information
- Facilities in Maryland
- Participating in the ARP program

### My Selected Criteria

Selected for Account Information Report

17 Account(s)

---

**Program**  
Acid Rain Program (ARP)  
**Data Set** [Edit](#)  
Allowance: Account Information [Edit](#)

---

**Time Frame**

**Allowance** [Edit](#)

---

**Allowance Criteria**  
State : Maryland [Edit](#)

---

**Variables**  
Not Yet Selected

Programs and Data Sets » Time Frame » Criteria » **Variables** » Preview

? Allowances - Account Info [?](#)

☐ Select All

|  |                   |
|--|-------------------|
| <input checked="" type="checkbox"/> Program              | <a href="#">?</a> |
| <input checked="" type="checkbox"/> Account Number       | <a href="#">?</a> |
| <input checked="" type="checkbox"/> Account Name         | <a href="#">?</a> |
| <input checked="" type="checkbox"/> Facility ID (ORISPL) | <a href="#">?</a> |
| <input type="checkbox"/> Unit ID                         | <a href="#">?</a> |
| <input type="checkbox"/> State                           | <a href="#">?</a> |
| <input type="checkbox"/> EPA Region                      | <a href="#">?</a> |
| <input type="checkbox"/> NERC Region                     | <a href="#">?</a> |
| <input type="checkbox"/> Source Category                 | <a href="#">?</a> |
| <input type="checkbox"/> Operating Status                | <a href="#">?</a> |
| <input checked="" type="checkbox"/> Owner                | <a href="#">?</a> |



# User Queries

## Query:

- Account information
- Facilities in Maryland
- Participating in the ARP program

Preview of up to one hundred records.

The file(s) you requested returns 17 records.

☒ .CSV ☐ .TXT [Download Selected](#) [Learn about zip files](#) [Download Data Definitions](#) [Bookmark query](#)

Excel automatically formats certain variable types in .CSV format which will result in the removal of leading zeros from unit IDs and account numbers, and other undesired format changes. Choose ".txt format" if you wish to retain the original variables. You will need to manually import the .txt format file into MS Excel and specify the column types to prevent any change in variable format.

**Allowance - Account Information**

☒ Download

| Program | Account Number | Account Name   | Facility ID (O... | Owner                              | Operator                           |
|---------|----------------|----------------|-------------------|------------------------------------|------------------------------------|
| ARP     | 000602FACLT    | Brandon Shores | 602               | Raven Power Fort Smallwood LLC     | Raven Power Fort Smallwo           |
| ARP     | 001552FACLT    | C P Crane      | 1552              | C.P. Crane LLC<br>C. P. Crane, LLC | C. P. Crane, LLC<br>PurEnergy, LLC |
| ARP     | 001553FACLT    | Gould Street   | 1553              | Constellation Power Service Ge...  | Constellation Power Service        |



# Pre-Packaged Datasets

? Allowance Data [Clear Selection](#)

|                          | Package Name  | Date Upda... | Description   | File Size |
|--------------------------|---|--------------|---|-----------|
| <input type="checkbox"/> | Texas SO2 Trading Program Allowances Held           | Mar 19, 2020 | Current Texas SO2 Trading Program allowance holdings. | 2 KB      |
| <input type="checkbox"/> | TXSO2 Transactions                                  | Jan 21, 2020 | Texas SO2 Trading Program allowance trades by year.   | 4 KB      |
| <input type="checkbox"/> | Initial allocation of Acid Rain Program allowanc... | Sep 21, 2007 | Initial allocation of Acid Rain Program allowances.   | 160 KB    |
| <input type="checkbox"/> | ARP Transactions                                    | Jan 24, 2018 | Acid Rain Program allowance transfers by year.        | 12,196 KB |
| <input type="checkbox"/> | ARP Allowances Held                                 | Mar 19, 2020 | Current Acid Rain Program allowance holdings.         | 633 KB    |

? Compliance Data [Clear Selection](#)

| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Package Name   | Date Upda... | Description                             |
|--------------------------|-------------------------------------|--|--------------|---|
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Acid Rain Program Annual Reconciliation Data             | Jul 11, 2019 | Acid Rain SO2 Program Allowance Holding |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Acid Rain NOx Program Compliance Summary                 | Jul 11, 2019 | Acid Rain NOx Program Rate-Based Comp   |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Acid Rain NOx Program Averaging Plan Summary             | Jul 11, 2019 | Acid Rain NOx Program Rate-Based Comp   |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | CAIR NOx Annual Program Annual Reconciliation Data       | Jul 11, 2019 | CAIR NOx Annual Program Allowance Hols  |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | CAIR NOx Ozone Season Program Annual Reconciliation Data | Jul 11, 2019 | CAIR NOx Ozone Season Program Allowa    |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | NOx Budget Trading Program Annual Reconciliation Data.   | May 29, 2014 | NOx Budget Trading Program Allowance H  |

\*Data at program level



# Power Sector Emissions Data



## CAMD's Power Sector Emissions Data

- CAMD collects its Power Sector Emissions Data according to requirements under 40 CFR Part 75 to ensure compliance with emissions trading and other air quality programs operated by EPA.
- 40 CFR Part 75 establishes requirements for EGUs to continuously measure emissions and report those measurements, along with facility, operation, and QA test data, to EPA. Requirements for monitoring vary depending on the size and type of unit, amount of operation, and type of fuel combusted.
- EGUs report data to CAMD if they are affected by one of these programs.
  - In general, EPA programs apply to EGUs that burn fossil fuels with a nameplate capacity of greater than 25 MW (with some exceptions).
- Data must be submitted to EPA within 30 days of the end of each calendar quarter.

## CAMD's Power Sector Emissions Data



- Emissions (short tons): hourly SO<sub>2</sub>, NO<sub>x</sub>, CO<sub>2</sub>, Hg
- Facility information
  - Unit type (e.g., steam turbine, combustion turbine, combined cycle)
  - Source category (e.g., electric utility, industrial boiler)
  - Owner/operator
  - Location (latitude/longitude)
- Primary and secondary fuel type, including the begin and end dates of use

## CAMD's Power Sector Emissions Data



- Emissions control devices and installation dates of those devices
- Hourly gross electricity generation (e.g., MWh)
- Type of monitoring method, including the begin and end dates of use
- Quality assurance (QA) test information used to validate hourly emissions data, such as the date of testing, type of test, and the difference in the readings between the monitor and the reference value





# EPA Programs Relying on Power Sector Emissions Data

- Acid Rain Program (ARP)
  - SO<sub>2</sub>, NO<sub>x</sub>, CO<sub>2</sub> emissions
  - Some units began in 1995, all units required to report by 2000
- Cross-State Air Pollution Rule (CSAPR)
  - SO<sub>2</sub> and NO<sub>x</sub> emissions
  - Program began in 2015, many affected units were already reporting under earlier programs like ARP and/or Clean Air Interstate Rule
- Mercury and Air Toxics Standard (MATS)
  - Hg emissions
  - Went into effect in April 2015; however, some EGUs received extensions to April 2016, and some to April 2017; 2018 is first full year for which the vast majority of sources affected by MATS reported emissions





## Quality Assurance/Quality Control of Power Sector Emissions Data

- QA tests are conducted at the source. Requirements vary based on the monitoring methodology.
- EPA also conducts periodic field audits to verify that monitors and data handling systems are performing properly.
- The software that sources use to submit data conducts thousands of electronic checks for completeness and proper formatting as well as consistency with program requirements and source's monitoring plan.
- EPA staff conduct additional checks, including statistical checks to detect anomalous data.



# How to Download the Power Sector Emissions Data

- [Air Markets Program Data \(AMPD\)](#)
- [FTP](#)
- [Field Audit Checklist Tool \(FACT\)](#)
- [FACT Application Programming Interface \(API\)](#)
- [Monitoring Plan Viewer](#)



# AMPD

## Air Markets Program Data

» You are here: EPA Home » Clean Air Markets » Data Resources » AMPD » Query

Home Query Prepackaged Data Reports Glossary Related Resources About

### Query

#### My Selected Criteria

**Selected for Emissions Report - Unit Level**

1461 Facility(s) and 4533 Unit(s)

**Program**

All Programs  
Data Set [Edit](#)

Emissions: Unit Level [Edit](#)

**Time Frame**

Emissions :  
Annual : 2016 [Edit](#)

**Criteria**

Not Yet Selected

**Variables**

Not Yet Selected

Programs and Data Sets » Time Frame » **Criteria** » Variables » Preview

Filter Emissions [Download Data Updates](#)

How would you like to filter your **Emissions** data? [Clear All Filters](#)

?

Facility ID and Name

>>

?

Owners and Operators

>>

?

Designated Representative

>>

?

State

>>

?

Unit Characteristics

>>

?

Unit Classification

>>

PREVIOUS STEP

PREVIEW RESULTS

NEXT STEP

Preview Results

State

ORISPL

Facility Name

- Web-based
- Create queries or view pre-packaged datasets and download
- Good at downloading data for more than one unit at a time
- Does not allow access to monitoring plan and QA test data
- Data back to the 1990s
- Note: AMPD only allows the user to pull 30 days of hourly data at a time.



**Program**

All Programs

**Data Set**

Emissions: Unit Level

**Time Frame**

Not Yet Selected

**Criteria**

Not Yet Selected

**Variables**

Not Yet Selected

START OVER

**Annual Programs**

☐ Acid Rain Program (ARP)

☐ Cross-State Air Pollution SO2 Annual Group 1 Program (CSSO2G1)

☐ Cross-State Air Pollution SO2 Annual Group 2 Program (CSSO2G2)

☐ Cross-State Air Pollution NOx Annual Program (CSNOX)

☐ Mercury and Air Toxics Standards (MATS)

☐ Regional Greenhouse Gas Initiative (RGGI)

☐ Texas SO2 Trading Program (TXSO2)

☐ Clean Air Interstate Rule SO2 (CAIRSO2) (ended 2014)

☐ Clean Air Interstate Rule NOx Annual (CAIRNOX) (ended 2014)

**Ozone Programs**

☐ Cross-State Air Pollution Rule NOx Ozone Season Group 1 Program (CSOSG1)

☐ Cross-State Air Pollution Rule NOx Ozone Season Group 2 Program (CSOSG2)

☐ SIP NOx Program (SIPNOX)

☐ Cross-State Air Pollution NOx Ozone Season Program (CSNOXOS) (ended 2016)

☐ Clean Air Interstate Rule Ozone Season (CAIROS) (ended 2014)

☐ NOx Budget Program (NBP) (ended 2008)

☐ Ozone Transport Commission NOx Budget Program (OTC) (ended 2002)

☒ All Programs

**Data Sets**

☒ Emissions

☒ Unit Level

☐ Monitoring Location

## AMPD: Query Example



### Selected for Emissions Report - Unit Level

0 Facility(s) and 0 Unit(s)

#### Program

All Programs

#### Data Set

Edit

Emissions: Unit Level

Edit

#### Time Frame

Not Yet Selected

#### Criteria

Not Yet Selected

#### Variables

Not Yet Selected

START OVER

### ? Emissions

#### Time Frame

☒ Annual

☐ Ozone Season

☐ Quarterly

☐ Monthly

☐ Daily

☐ Hourly

2019  
2018  
2017  
2016  
2015  
2014  
2013  
2012  
2011  
2010  
2009

←  
PREVIOUS STEP

🔍  
PREVIEW RESULTS

→  
NEXT STEP

## AMPD: Query Example



## Selected for Emissions Report - Unit Level

1442 Facility(s) and 4377 Unit(s)

### Program

All Programs

### Data Set

Emissions: Unit Level

### Time Frame

Emissions :

Annual : 2017

### Criteria

Not Yet Selected

### Variables

Not Yet Selected

START OVER

## Filter Emissions

[Download Data Updates](#)

How would you like to filter your **Emissions** data?

[Clear All Filters](#)

? Facility ID and Name

? Owners and Operators

? Designated Representative

? State

? Unit Characteristics

? Unit Classification



PREVIOUS STEP



PREVIEW RESULTS



NEXT STEP

Preview Results

| State | ORISPL | Facility Name |
|-------|--------|---------------|
|-------|--------|---------------|

# AMPD: Query Example



**Data Set** Edit

Emissions: Unit Level Edit

---

**Time Frame**

Emissions :  
Annual : 2017 Edit

---

**Criteria**

Not Yet Selected

---

**Variables**

Not Yet Selected

[START OVER](#)

---

**Owners and Operators** >

**Designated Representative** >

**State** >

Florida  
Hawaii  
Idaho  
Illinois  
Indiana  
Iowa  
Kansas  
Kentucky  
Louisiana  
Maine

↑

→

→

←

←

↓

Georgia

**Unit Characteristics** >

**Unit Classification** >

[PREVIOUS STEP](#) [PREVIEW RESULTS](#) [NEXT STEP](#)

## AMPD: Query Example



**Selected for Emissions Report - Unit Level**  
34 Facility(s) and 143 Unit(s)

**Program**  
All Programs

**Data Set**  
Emissions: Unit Level

**Time Frame**  
Emissions :  
Annual : 2017

**Emissions Criteria**  
State : Georgia

**Variables**  
Not Yet Selected

Edit

Edit

Edit

Edit

Filter Aggregation

Download Data Updates

How would you like to filter your **Aggregation** data?

? Unit Level Emissions Data

☒ No Aggregation (Unit Level)

☐ Facility

☐ State

☐ EPA Region

☐ National

Do you want to further aggregate your unit level data to:

PREVIOUS STEP

PREVIEW RESULTS

NEXT STEP

## AMPD: Query Example





### Selected for Emissions Report - Unit Level

34 Facility(s) and 143 Unit(s)

#### Program

All Programs

#### Data Set

Edit

Emissions: Unit Level

Edit

#### Time Frame

Emissions :

Annual : 2017

Edit

#### Emissions Criteria

State : Georgia

#### Aggregate Criteria

Edit

No Aggregation (Unit Level)

Edit

#### Variables

Not Yet Selected

#### ? Emission - Unit



☐ Select All

☒ State

?

☒ Facility Name

?

☒ Facility ID (ORISPL)

?

☒ Unit ID

?

☒ Associated Stacks

?

☒ Year

?

☒ Program(s)

?

☒ Operating Time

?

☐ # of Months Reported

?

☒ Gross Load (MW-h)

?

☒ Steam Load (1000lb)

?

☒ SO2 (tons)

?

☒ Avg. NOx Rate (lb/MMBtu)

?

## AMPD: Query Example



The file(s) you requested returns 143 records.

☒ .CSV

☐ .TXT

Download Selected

[Learn about zip files](#)

Download Data Definitions

[Bookmark query](#)

Excel automatically formats certain variable types in .CSV format which will result in the removal of leading zeros from unit IDs and account numbers, and other undesired format changes. Choose ".txt format" if you wish to retain the original variables. You will need to manually import the .txt format file into MS Excel and specify the column types to prevent any change in variable format.

Emissions - Unit Level Data

Data Caveats

☒ Download

| State | Facility Name                   | Facility ID (O... | Uni... | Associated Stacks | Year | Program(s)              | Operating |
|-------|---------------------------------|-------------------|--------|-------------------|------|-------------------------|-----------|
| GA    | AL Sandersville Energy Facility | 55672             | CT1    |                   | 2017 | ARP, CSNOX, CSOSG1, ... |           |
| GA    | AL Sandersville Energy Facility | 55672             | CT2    |                   | 2017 | ARP, CSNOX, CSOSG1, ... |           |
| GA    | AL Sandersville Energy Facility | 55672             | CT3    |                   | 2017 | ARP, CSNOX, CSOSG1, ... |           |
| GA    | AL Sandersville Energy Facility | 55672             | CT4    |                   | 2017 | ARP, CSNOX, CSOSG1, ... |           |
| GA    | AL Sandersville Energy Facility | 55672             | CT5    |                   | 2017 | ARP, CSNOX, CSOSG1, ... |           |
| GA    | AL Sandersville Energy Facility | 55672             | CT6    |                   | 2017 | ARP, CSNOX, CSOSG1, ... |           |
| GA    | AL Sandersville Energy Facility | 55672             | CT7    |                   | 2017 | ARP, CSNOX, CSOSG1, ... |           |
| GA    | AL Sandersville Energy Facility | 55672             | CT8    |                   | 2017 | ARP, CSNOX, CSOSG1, ... |           |
| GA    | Albany Green Energy LLC         | 60340             | B0004  |                   | 2017 | ARP, CSNOX, CSOSG1, ... |           |
| GA    | Allen B Wilson Combustion ...   | 6258              | 1A     |                   | 2017 | CSNOX, CSOSG1, CSSO...  |           |
| GA    | Allen B Wilson Combustion ...   | 6258              | 1B     |                   | 2017 | CSNOX, CSOSG1, CSSO...  |           |



# FACT

FACT Audit Checklist Tool (FACT)

File View Help

Monitoring plans Barry: 6A

ID (ORIS): 3  
Barry  
Monitoring plan location IDs: 6A

County: Mobile County  
State: AL  
Location: 31.0069, -88.0103

Monitoring plan QA and certification Quarterly summary Emissions

Monthly calibration tests

| Component ID | Component type | End date/time    | Rpt test result | Span scale | Applicable span value | Span unit of measure | Upscale gas level | Upscale injection | Upscale measure |
|--------------|----------------|------------------|-----------------|------------|-----------------------|----------------------|-------------------|-------------------|-----------------|
| I2           | CO2            | 04/01/2019 06:46 | PASSED          | H          | 10                    | PCT                  | MID               | 04/01/2019 06:46  | 5.6             |
| XX           | NOX            | 04/01/2019 06:46 | PASSED          | H          | 200                   | PPM                  | MID               | 04/01/2019 06:35  | 109.2           |
| XX           | NOX            | 04/01/2019 06:46 | PASSED          | L          | 10                    | PPM                  | MID               | 04/01/2019 06:40  | 5.5             |
| I2           | CO2            | 04/02/2019 06:46 | PASSED          | H          | 10                    | PCT                  | MID               | 04/02/2019 06:46  | 5.6             |
| XX           | NOX            | 04/02/2019 06:46 | PASSED          | H          | 200                   | PPM                  | MID               | 04/02/2019 06:35  | 112.0           |
| XX           | NOX            | 04/02/2019 06:46 | PASSED          | L          | 10                    | PPM                  | MID               | 04/02/2019 06:41  | 5.5             |
| I2           | CO2            | 04/03/2019 06:46 | PASSED          | H          | 10                    | PCT                  | MID               | 04/03/2019 06:46  | 5.6             |
| XX           | NOX            | 04/03/2019 06:46 | PASSED          | H          | 200                   | PPM                  | MID               | 04/03/2019 06:35  | 110.7           |
| XX           | NOX            | 04/03/2019 06:46 | PASSED          | L          | 10                    | PPM                  | MID               | 04/03/2019 06:40  | 6.1             |
| I2           | CO2            | 04/04/2019 06:46 | PASSED          | H          | 10                    | PCT                  | MID               | 04/04/2019 06:46  | 5.5             |
| XX           | NOX            | 04/04/2019 06:46 | PASSED          | H          | 200                   | PPM                  | MID               | 04/04/2019 06:35  | 109.8           |
| XX           | NOX            | 04/04/2019 06:46 | PASSED          | L          | 10                    | PPM                  | MID               | 04/04/2019 06:40  | 5.4             |
| I2           | CO2            | 04/05/2019 06:46 | PASSED          | H          | 10                    | PCT                  | MID               | 04/05/2019 06:46  | 5.6             |
| XX           | NOX            | 04/05/2019 06:46 | PASSED          | H          | 200                   | PPM                  | MID               | 04/05/2019 06:35  | 109.1           |
| XX           | NOX            | 04/05/2019 06:46 | PASSED          | L          | 10                    | PPM                  | MID               | 04/05/2019 06:40  | 5.4             |
| I2           | CO2            | 04/06/2019 06:46 | PASSED          | H          | 10                    | PCT                  | MID               | 04/06/2019 06:46  | 5.6             |
| XX           | NOX            | 04/06/2019 06:46 | PASSED          | H          | 200                   | PPM                  | MID               | 04/06/2019 06:35  | 109.5           |
| XX           | NOX            | 04/06/2019 06:46 | PASSED          | L          | 10                    | PPM                  | MID               | 04/06/2019 06:40  | 5.4             |
| I2           | CO2            | 04/07/2019 06:46 | PASSED          | H          | 10                    | PCT                  | MID               | 04/07/2019 06:46  | 5.6             |
| XX           | NOX            | 04/07/2019 06:46 | PASSED          | H          | 200                   | PPM                  | MID               | 04/07/2019 06:35  | 109.9           |
| XX           | NOX            | 04/07/2019 06:46 | PASSED          | L          | 10                    | PPM                  | MID               | 04/07/2019 06:40  | 5.4             |

- Windows desktop application
- All data: emissions data, operation data, facility information, monitoring plans, QA test data
- Good when looking at a single monitoring configuration
- Only goes back to 2009
- Associated REST API



# FACT: Example – Facilities List

Field Audit Checklist Tool (FACT)

File Edit View Help

Select monitoring plans

| Region   | ORIS | Facility name                | State |
|----------|------|------------------------------|-------|
| Region 4 | 3    | Barry                        | AL    |
| Region 4 | 5    | Chickasaw                    | AL    |
| Region 4 | 7    | Gadsden                      | AL    |
| Region 4 | 8    | Gorgas                       | AL    |
| Region 6 | 9    | Copper Station               | TX    |
| Region 4 | 10   | Greene County                | AL    |
| Region 4 | 26   | E C Gaston                   | AL    |
| Region 4 | 47   | Colbert                      | AL    |
| Region 4 | 50   | Widows Creek                 | AL    |
| Region 6 | 51   | Dolet Hills Power Station    | LA    |
| Region 4 | 54   | Smith Generating Facility    | KY    |
| Region 4 | 56   | Charles R Lowman             | AL    |
| Region 7 | 59   | Platte                       | NE    |
| Region 7 | 60   | Gerald Whelan Energy Center  | NE    |
| Region 6 | 87   | Escalante                    | NM    |
| Region 7 | 108  | Holcomb                      | KS    |
| Region 9 | 113  | Cholla                       | AZ    |
| Region 9 | 116  | Ocotillo Power Plant         | AZ    |
| Region 9 | 117  | APS West Phoenix Power Plant | AZ    |
| Region 9 | 118  | APS Saguaro Power Plant      | AZ    |
| Region 9 | 120  | Yucca Power Plant            | AZ    |

Facility ID (ORIS): 3  
Name: Barry  
County: Mobile County  
State: AL  
Location: 31.0069, -88.0103

Monitoring configurations Units Owners Contacts

| Selection                | Unit/stack pipe     | Status   |
|--------------------------|---------------------|----------|
| <input type="checkbox"/> | 1, 2, 3, CS0AAN     | Inactive |
| <input type="checkbox"/> | 1, 2, CS0AAN        | Active   |
| <input type="checkbox"/> | 4                   | Inactive |
| <input type="checkbox"/> | 4                   | Active   |
| <input type="checkbox"/> | 4, MS4A, MS4B       | Inactive |
| <input type="checkbox"/> | 5                   | Inactive |
| <input type="checkbox"/> | 5, MS5A, MS5B       | Inactive |
| <input type="checkbox"/> | 5, MS5C, MS5D       | Inactive |
| <input type="checkbox"/> | 5, MS5C, MS5D, MS5E | Active   |
| <input type="checkbox"/> | 6A                  | Active   |
| <input type="checkbox"/> | 6B                  | Active   |
| <input type="checkbox"/> | 7A                  | Active   |
| <input type="checkbox"/> | 7B                  | Active   |

Monitoring Plan List View Facility List View

Open Selected



# FACT: Example – Monitoring Plan

Field Audit Checklist Tool (FACT)

File Edit View Help

Select monitoring plans Yucca Power Plant: 1

Facility ID (ORIS): 120 County: Yuma County  
Name: Yucca Power Plant State: AZ  
Monitoring plan location IDs: 1 Location: 32.7214, -114.7097

Monitoring plan QA and certification Quarterly summary Emissions Owner/operator and people

Monitoring location and relationships

Unit information  
Monitoring method  
Monitoring system  
Span, range, and formulas  
Load or operating information  
Monitoring defaults  
Qualification  
Comments

Show inactive: ☒

**Reporting frequency**

| Monitoring plan location IDs | Reporting frequency | Begin year quarter | End year quarter |
|------------------------------|---------------------|--------------------|------------------|
| 1                            | Q                   | 1995 Q1            |                  |

**Monitoring location attributes**

| Duct indicator | Ground elevation (ft) | Stack height (ft) | Cross area exit (ft <sup>2</sup> ) | Cross area flow | Material | Shape | Begin date | End date |
|----------------|-----------------------|-------------------|------------------------------------|-----------------|----------|-------|------------|----------|
| Unit ID: 1     |                       |                   |                                    |                 |          |       |            |          |
|                | 120                   | 146               | 87                                 |                 |          |       | 01/01/1995 |          |



# FACT: Example – QA and Certification

Field Audit Checklist Tool (FACT)

File Edit View Help

Select monitoring plans Yucca Power Plant: 1

Facility ID (ORIS): 120 County: Yuma County  
Name: Yucca Power Plant State: AZ  
Monitoring plan location IDs: 1 Location: 32.7214, -114.7097

Monitoring plan QA and certification Quarterly summary Emissions Owner/operator and people

Relative accuracy test  
7-day calibration  
Cycle time test  
Fuel flowmeter accuracy test  
Transmitter transducer test  
Linearity check  
Certification events  
Test extension exemptions

| Selection                | Monitoring location ID | System component | Test number  | Test result | Year-quarter | End date hour         | Submission date       |
|--------------------------|------------------------|------------------|--------------|-------------|--------------|-----------------------|-----------------------|
| <input type="checkbox"/> | 1                      | NOX system: 101  | 19           | PASSED      | 2018 Q2      | 5/24/2018 12:00:00 AM | 7/23/2018 6:30:24 PM  |
| <input type="checkbox"/> | 1                      | NOX system: 101  | 20           | PASSED      | 2018 Q4      | 12/6/2018 12:00:00 AM | 1/17/2019 3:12:51 PM  |
| <input type="checkbox"/> | 1                      | NOX system: 101  | 21           | PASSED      | 2019 Q2      | 5/29/2019 12:00:00 AM | 7/25/2019 6:28:11 PM  |
| <input type="checkbox"/> | 1                      | NOX system: 101  | 18           | PASSED      | 2017 Q2      | 5/11/2017 12:00:00 AM | 7/28/2017 12:10:32 PM |
| <input type="checkbox"/> | 1                      | NOX system: 101  | 17           | PASSED      | 2016 Q2      | 6/14/2016 12:00:00 AM | 7/6/2016 1:23:24 PM   |
| <input type="checkbox"/> | 1                      | NOX system: 101  | EPA-101-2004 | PASSED      | 2006 Q2      | 4/12/2006 12:00:00 AM |                       |
| <input type="checkbox"/> | 1                      | NOX system: 101  | EPA-101-2002 | PASSAPS     | 2004 Q2      | 6/15/2004 12:00:00 AM |                       |
| <input type="checkbox"/> | 1                      | NOX system: 101  | EPA-101-2006 | PASSED      | 2008 Q1      | 2/28/2008 12:00:00 AM |                       |
| <input type="checkbox"/> | 1                      | NOX system: 101  | EPA-101-2003 | PASSED      | 2005 Q2      | 4/7/2005 12:00:00 AM  |                       |
| <input type="checkbox"/> | 1                      | NOX system: 101  | EPA-101-2005 | PASSED      | 2007 Q1      | 3/28/2007 12:00:00 AM |                       |
| <input type="checkbox"/> | 1                      | NOX system: 101  | EPA-101-2001 | PASSED      | 2003 Q2      | 6/17/2003 12:00:00 AM |                       |
| <input type="checkbox"/> | 1                      | NOX system: 101  | 1            | PASSED      | 2009 Q1      | 3/24/2009 12:00:00 AM | 4/8/2009 6:24:05 PM   |
| <input type="checkbox"/> | 1                      | NOX system: 101  | 10           | PASSED      | 2010 Q1      | 3/4/2010 12:00:00 AM  | 4/22/2010 11:15:04 AM |
| <input type="checkbox"/> | 1                      | NOX system: 101  | 13           | PASSED      | 2013 Q2      | 6/4/2013 12:00:00 AM  | 7/13/2013 11:18:46 AM |
| <input type="checkbox"/> | 1                      | NOX system: 101  | 12           | PASSED      | 2012 Q2      | 5/24/2012 12:00:00 AM | 7/3/2012 10:11:14 AM  |
| <input type="checkbox"/> | 1                      | NOX system: 101  | 15           | PASSED      | 2015 Q1      | 2/25/2015 12:00:00 AM | 4/3/2015 12:42:57 PM  |

View selected test details



# FACT: Example – Emissions

Field Audit Checklist Tool (FACT)

File Edit View Help

Select monitoring plans Yucca Power Plant: 1

Facility ID (ORIS): 120 County: Yuma County  
Name: Yucca Power Plant State: AZ  
Monitoring plan location IDs: 1 Location: 32.7214, -114.7097

Monitoring plan QA and certification Quarterly summary **Emissions** Owner/operator and people

1 x

Hourly emissions

| Date/hr          | Op time | Load | Load UOM | Load range | Common stack load range | % H2O | H2O value source | NOx rate MODC | NOx rate PMA | NOx rate diluent param |
|------------------|---------|------|----------|------------|-------------------------|-------|------------------|---------------|--------------|------------------------|
| 10/01/2019 12 AM | 1.00    | 31   | MW       | 4          |                         |       |                  | 01            | 99.4         | O2                     |
| 10/01/2019 01 AM | 1.00    | 26   | MW       | 4          |                         |       |                  | 01            | 99.4         | O2                     |
| 10/01/2019 02 AM | 1.00    | 26   | MW       | 4          |                         |       |                  | 01            | 99.4         | O2                     |
| 10/01/2019 03 AM | 1.00    | 27   | MW       | 4          |                         |       |                  | 01            | 99.4         | O2                     |
| 10/01/2019 04 AM | 1.00    | 27   | MW       | 4          |                         |       |                  | 01            | 99.4         | O2                     |
| 10/01/2019 05 AM | 1.00    | 42   | MW       | 6          |                         |       |                  | 01            | 99.4         | O2                     |
| 10/01/2019 06 AM | 1.00    | 31   | MW       | 4          |                         |       |                  | 01            | 99.4         | O2                     |
| 10/01/2019 07 AM | 1.00    | 28   | MW       | 4          |                         |       |                  | 01            | 99.4         | O2                     |
| 10/01/2019 08 AM | 1.00    | 25   | MW       | 4          |                         |       |                  | 01            | 99.4         | O2                     |
| 10/01/2019 09 AM | 1.00    | 26   | MW       | 4          |                         |       |                  | 01            | 99.4         | O2                     |
| 10/01/2019 10 AM | 1.00    | 26   | MW       | 4          |                         |       |                  | 01            | 99.4         | O2                     |
| 10/01/2019 11 AM | 1.00    | 25   | MW       | 4          |                         |       |                  | 01            | 99.4         | O2                     |

Return to selection list



# Monitoring Plan Viewer

## Clean Air Markets

[CONTACT US](#) [SHARE](#) [f](#) [t](#) [p](#) [e](#)

## Monitoring Plans for Part 75 Sources

**Instructions:** click on a facility name in the table to display detailed information.

Show  entries

| ORIS Code | Facility Name             | State     | View              |
|-----------|---------------------------|-----------|-------------------|
| 3         | Barry                     | Alabama   | <a href="#">i</a> |
| 5         | Chickasaw                 | Alabama   | <a href="#">i</a> |
| 7         | Gadsden                   | Alabama   | <a href="#">i</a> |
| 8         | Gorgas                    | Alabama   | <a href="#">i</a> |
| 9         | Copper Station            | Texas     | <a href="#">i</a> |
| 10        | Greene County             | Alabama   | <a href="#">i</a> |
| 26        | E C Gaston                | Alabama   | <a href="#">i</a> |
| 47        | Colbert                   | Alabama   | <a href="#">i</a> |
| 50        | Widows Creek              | Alabama   | <a href="#">i</a> |
| 51        | Dolet Hills Power Station | Louisiana | <a href="#">i</a> |
| 54        | Smith Generating Facility | Kentucky  | <a href="#">i</a> |

Showing 1 to 100 of 1,756 entries

[Previous](#) [1](#) [2](#) [3](#) [4](#) [5](#) ... [18](#) [Next](#)

[Display Overview](#)

Selected Facility: Holcomb

ORIS Code: 108

[Location](#) [Contacts](#) [Units](#) [Monitoring Plans](#)

**Instructions:** click on a unit ID in the table to display detailed information.

☒ Show operating units only

| Unit ID | Commence Operation Date | Status    | View              |
|---------|-------------------------|-----------|-------------------|
| SGU1    | 08/01/1983              | Operating | <a href="#">i</a> |

**Unit ID: SGU1**

**Status:** Operating

**Heat Input Capacity (mmBtu/hr):** 4320  
**Primary Fuel:** Coal  
**Ignition (Startup) Fuel:** Pipeline Natural Gas

**NO<sub>x</sub> Control:** Low NO<sub>x</sub> Burner Technology (Dry Bottom only)  
**PM Control:** Baghouse  
**SO<sub>2</sub> Control:** Dry Lime FGD

**Programs:**

- Acid Rain Program
- Cross-State Air Pollution Rule NO<sub>x</sub> Annual Program
- Cross-State Air Pollution Rule NO<sub>x</sub> Ozone Season Program Group 2
- Cross-State Air Pollution Rule SO<sub>2</sub> Annual Program Group 2
- Mercury and Air Toxics Standards

- View monitoring plans and unit information (e.g., pollution controls)
- Intended for users to view the data in an easy-to-read format; not a download tool





# Monitoring Plan Viewer: Example

## Monitoring location attributes

[↑ Top of page](#)

| Duct indicator | Ground elevation (ft) | Stack height (ft) | Cross area exit (ft <sup>2</sup> ) | Cross area flow | Material | Shape            | Begin date | End date |
|----------------|-----------------------|-------------------|------------------------------------|-----------------|----------|------------------|------------|----------|
| Unit ID: 4     |                       |                   |                                    |                 |          |                  |            |          |
| No             | 22                    | 600               | 147                                | 254             | Brick    | Oval or Circular | 01/01/1995 |          |

## Stack/pipes and unit relationships

[↑ Top of page](#)

| Associated unit            | Bypass stack indicator | Activation date | Retirement date | Begin date | End date |
|----------------------------|------------------------|-----------------|-----------------|------------|----------|
| No data available in table |                        |                 |                 |            |          |

## Unit operations

[↑ Top of page](#)

| Commence operation date | Commercial operation date | Boiler/turbine type | Boiler/turbine begin date | Boiler/turbine end date | Max heat input (mmBtu) | Heat input begin date | Heat input end date |
|-------------------------|---------------------------|---------------------|---------------------------|-------------------------|------------------------|-----------------------|---------------------|
| Unit ID: 4              |                           |                     |                           |                         |                        |                       |                     |
| 05/28/1969              | 12/31/1969                | Tangentially-fired  | 05/28/1969                |                         | 6372                   | 10/31/2002            |                     |

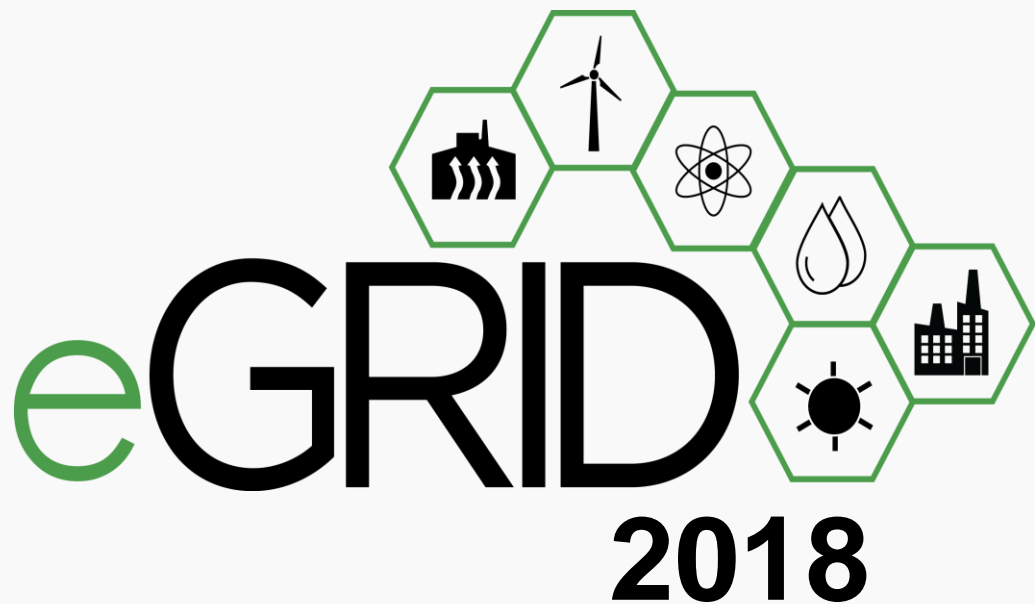
## Unit programs

[↑ Top of page](#)

| Program           | Unit class | Certification begin date | Certification deadline |
|-------------------|------------|--------------------------|------------------------|
| Unit ID: 4        |            |                          |                        |
| Acid Rain Program | Phase 2    | 01/01/1995               | 01/01/1995             |

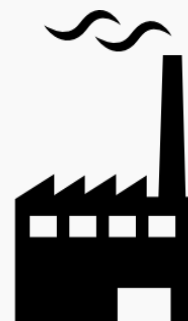
## What is eGRID?

- A comprehensive source of data on the environmental characteristics of the US power sector.
- An Excel spreadsheet which shows generation, emissions, and emission rates for all (almost) US power plants.



Emissions & Generation Resource  
Integrated Database

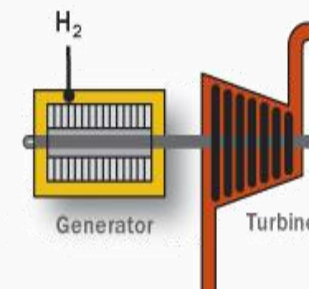
<https://www.epa.gov/energy/emissions-generation-resource-integrated-database-eGRID>



Plants  
11k



Units  
27k



Generators  
28k



## Data

- Emissions (EPA-CAMD)
  - Nitrogen oxide (NO<sub>x</sub>), sulfur dioxide (SO<sub>2</sub>), carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O) and mercury (Hg)
- Net generation (EIA-923)
- Fuel use and heat input (EIA-923)
- Plant attributes (EIA-860)
  - Unit and generator type, nameplate capacity, capacity factor, emission controls, latitude and longitude, and NERC regions/balancing authorities
- Emissions rates
  - Input (lb/MMBtu), output (lb/MWh), fuel based, combustion/non-combustion, and nonbaseload
- Grid gross loss factors



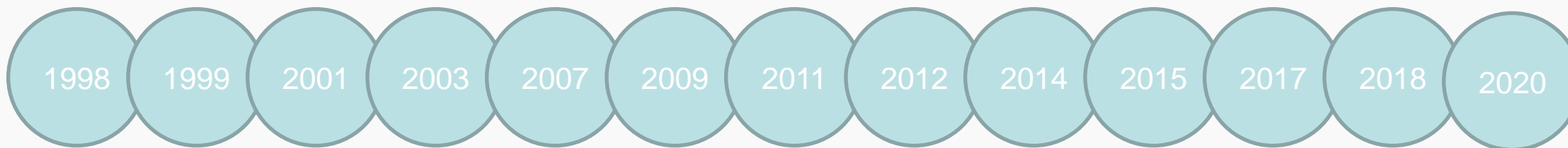
**Fills data gaps through established methodologies**



# History

- First released in 1998 (1996 data)
- Current edition – eGRID2018 released in Jan 2020 (13<sup>th</sup>)
- Even year releases
- Production time
  - EIA data is finalized in September of following year
  - e.g. EIA 2018 data finalized in Sept 2019, eGRID released in January 2020

## Released Year

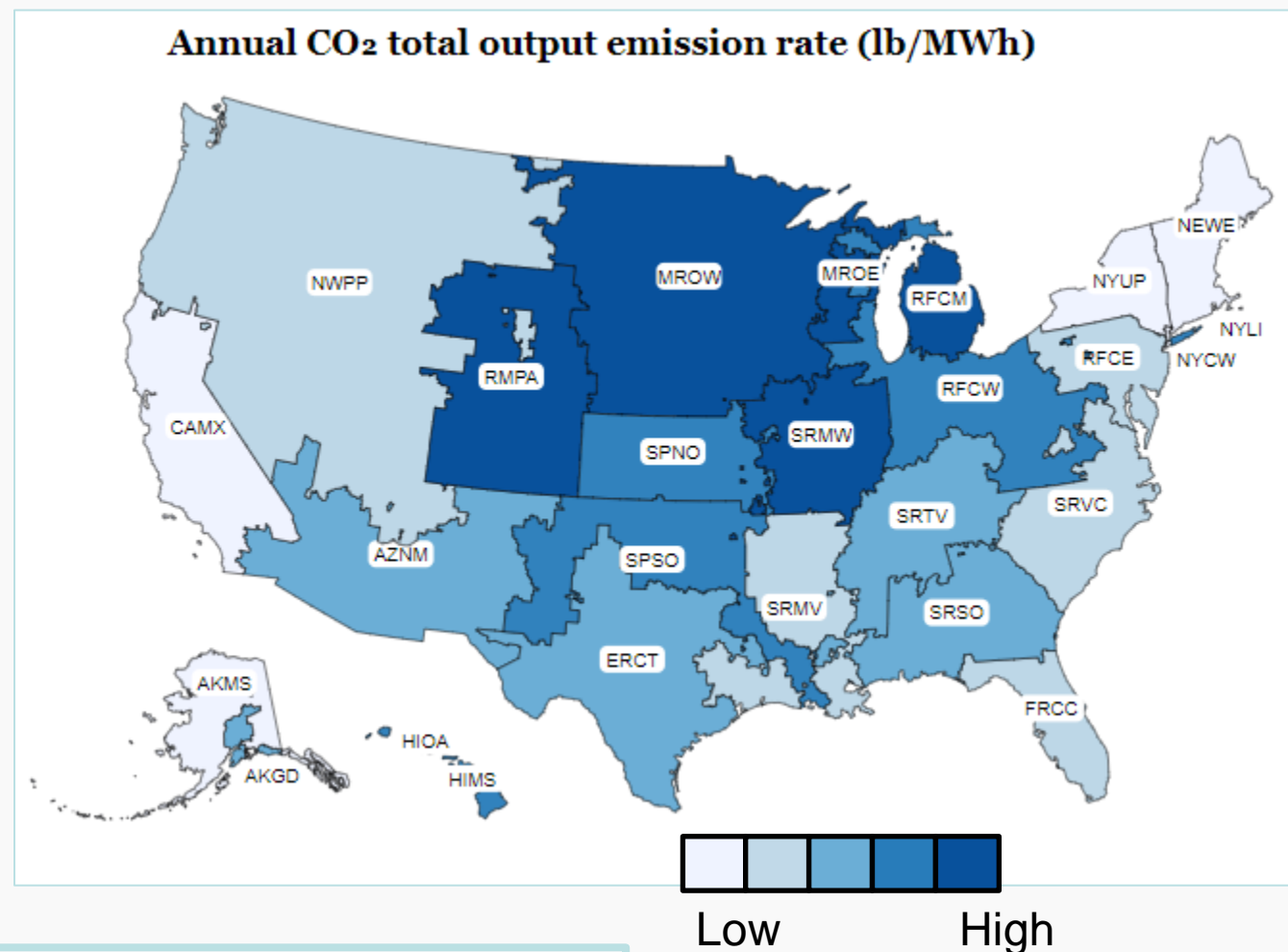


## Data Year

1996 1997 1998 2000 2004 2005 2007 2009 2010 2012 2014 2016 2018

## Who uses eGRID?

- Corporate GHG reporting (Scope 2)
- Federal, State, and local governments
- Utilities
- ISOs/RTOs
- General Public
- Environmental Groups
- Academia



**Mainly used to determine emissions from electricity use.**



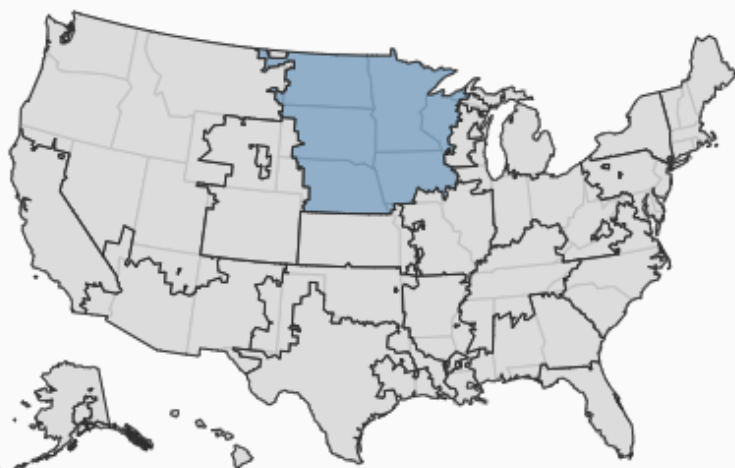
## Power Profiler

Enter zip code:



eGRID Subregions [More Info](#)

MROW (MRO West) ▼



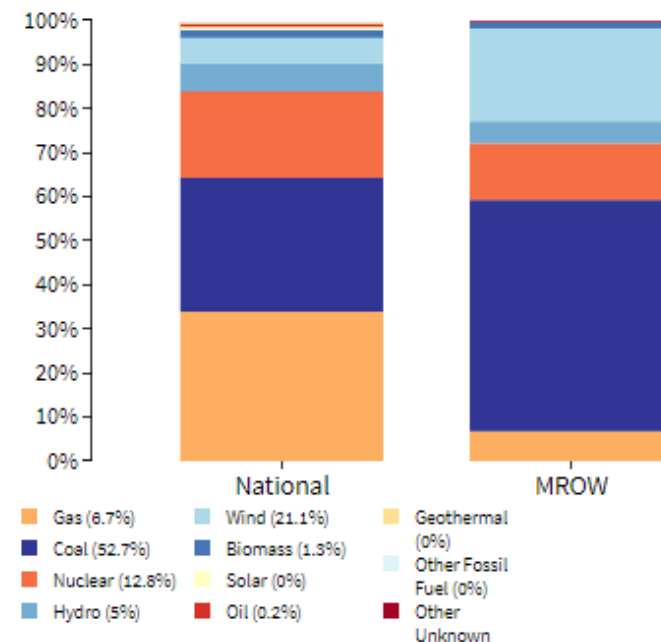
[« Back to All Subregions](#)

### Fuel Mix

This chart compares fuel mix (%) of sources used to generate electricity in the selected [eGRID subregion](#) to the national fuel mix (%).

<https://www.epa.gov/energy/power-profiler#/>

Generation



### Emission Rates

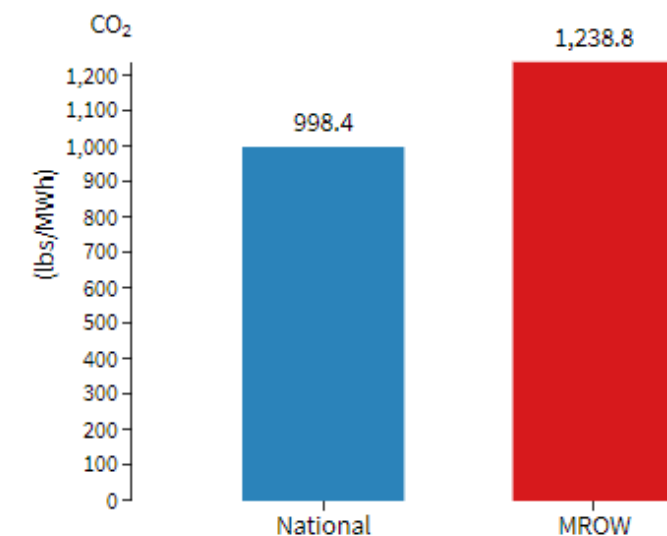
This chart compares the average emission rates (lbs/MWh) in the selected [eGRID subregion](#) to the national average emission rates (lbs/MWh) for [carbon dioxide \(CO<sub>2</sub>\)](#), [sulfur dioxide \(SO<sub>2</sub>\)](#), and [nitrogen oxide \(NO<sub>x</sub>\)](#).

Select:

CO<sub>2</sub>

SO<sub>2</sub>

NO<sub>x</sub>





## Estimate Your Emissions

Enter your [average monthly electricity use](#).

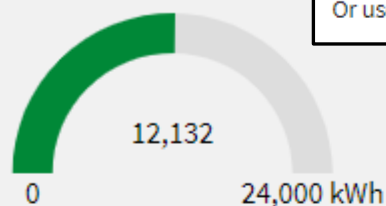
kWh

**Go**

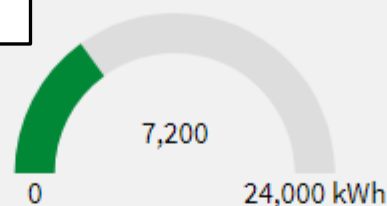
Or enter your [actual electricity use for each month](#).

Or use the [national average electricity use](#).

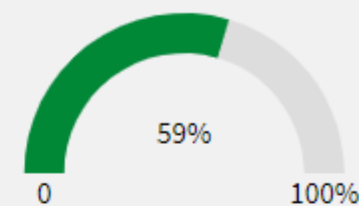
### National Annual Electricity Use



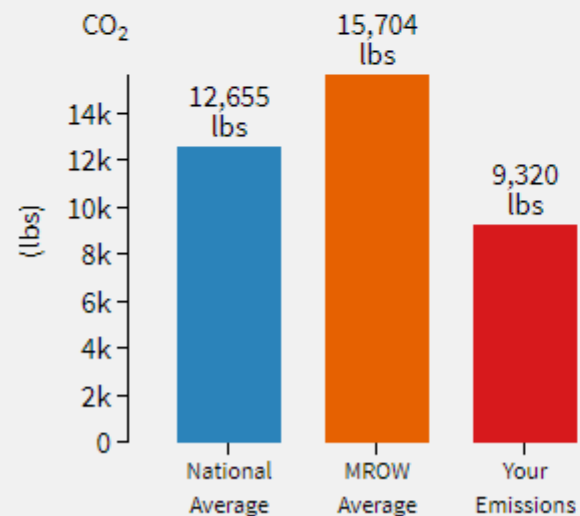
### Your Annual Electricity Use



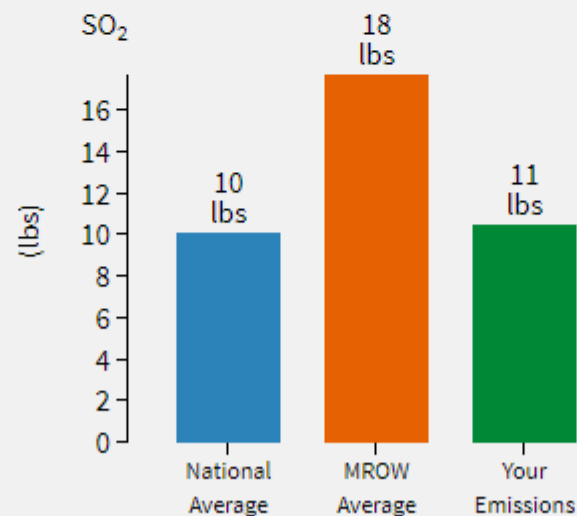
### Your Electricity Use Compared to the National Average



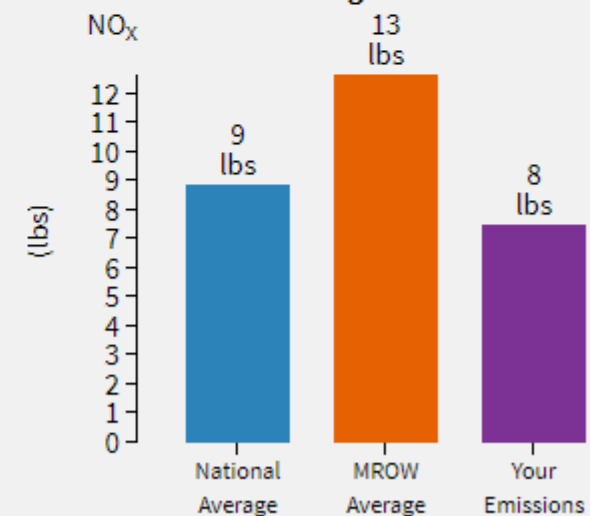
### Carbon Dioxide



### Sulfur Dioxide

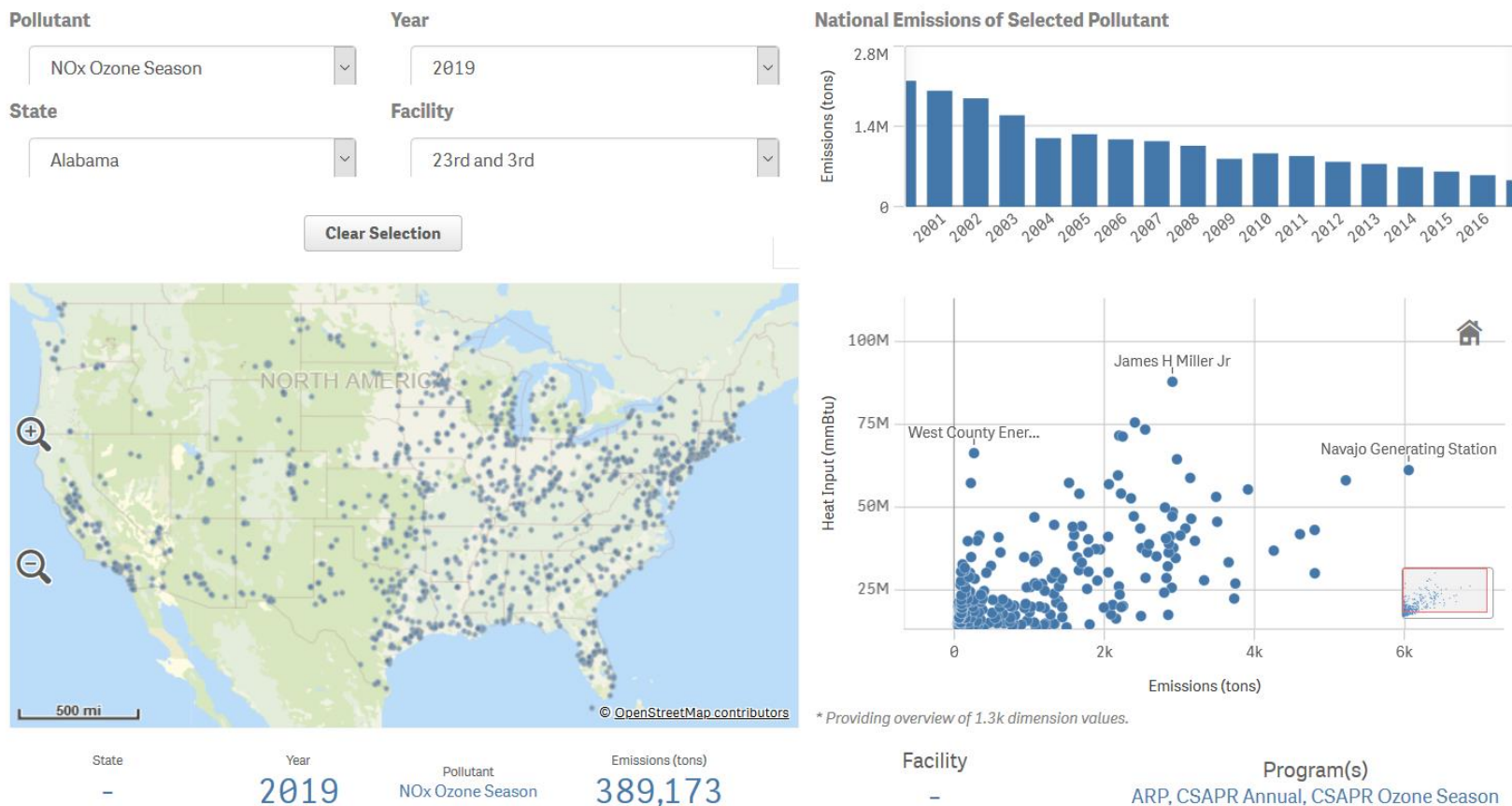


### Nitrogen Oxides





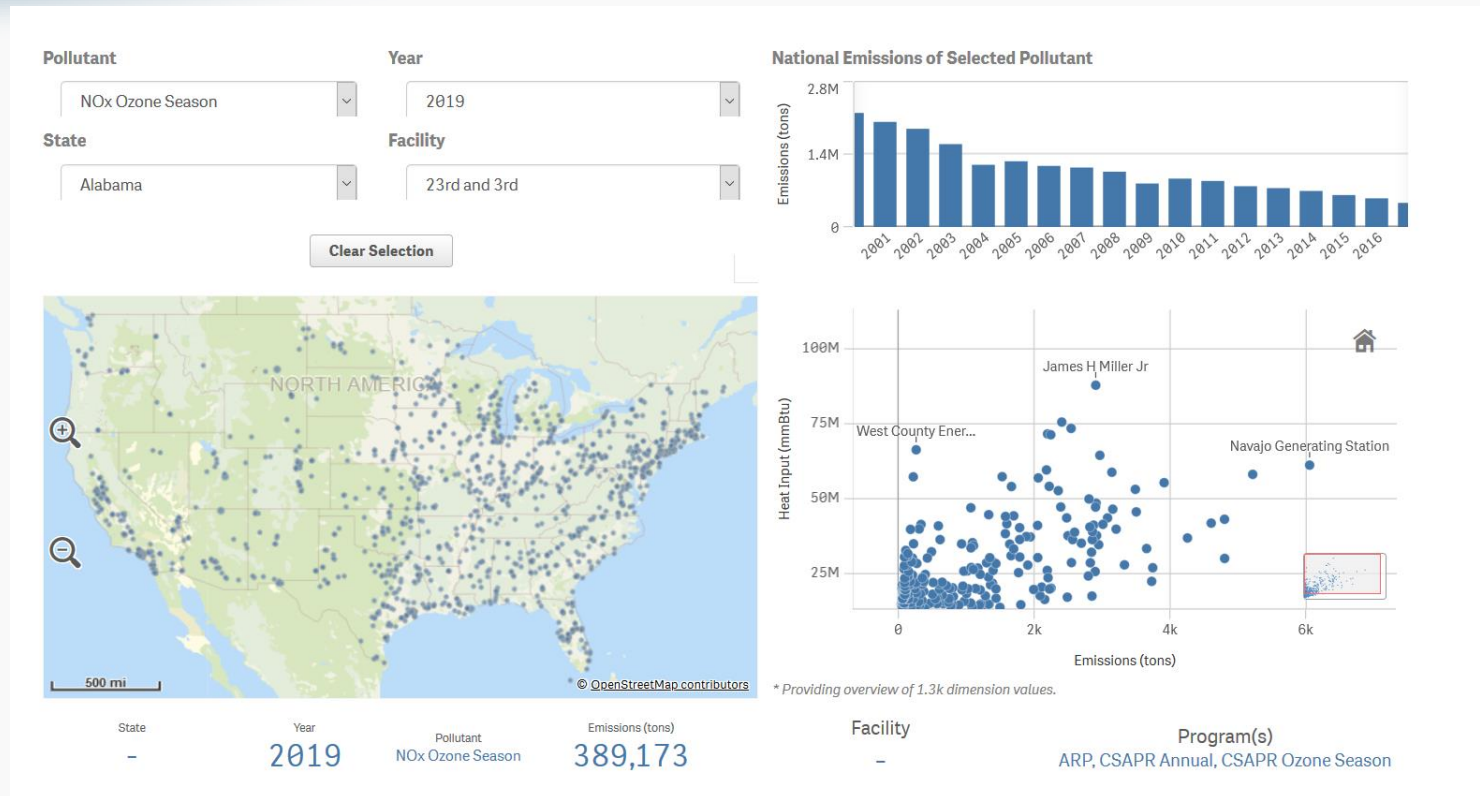
# Power Plant Data Viewer





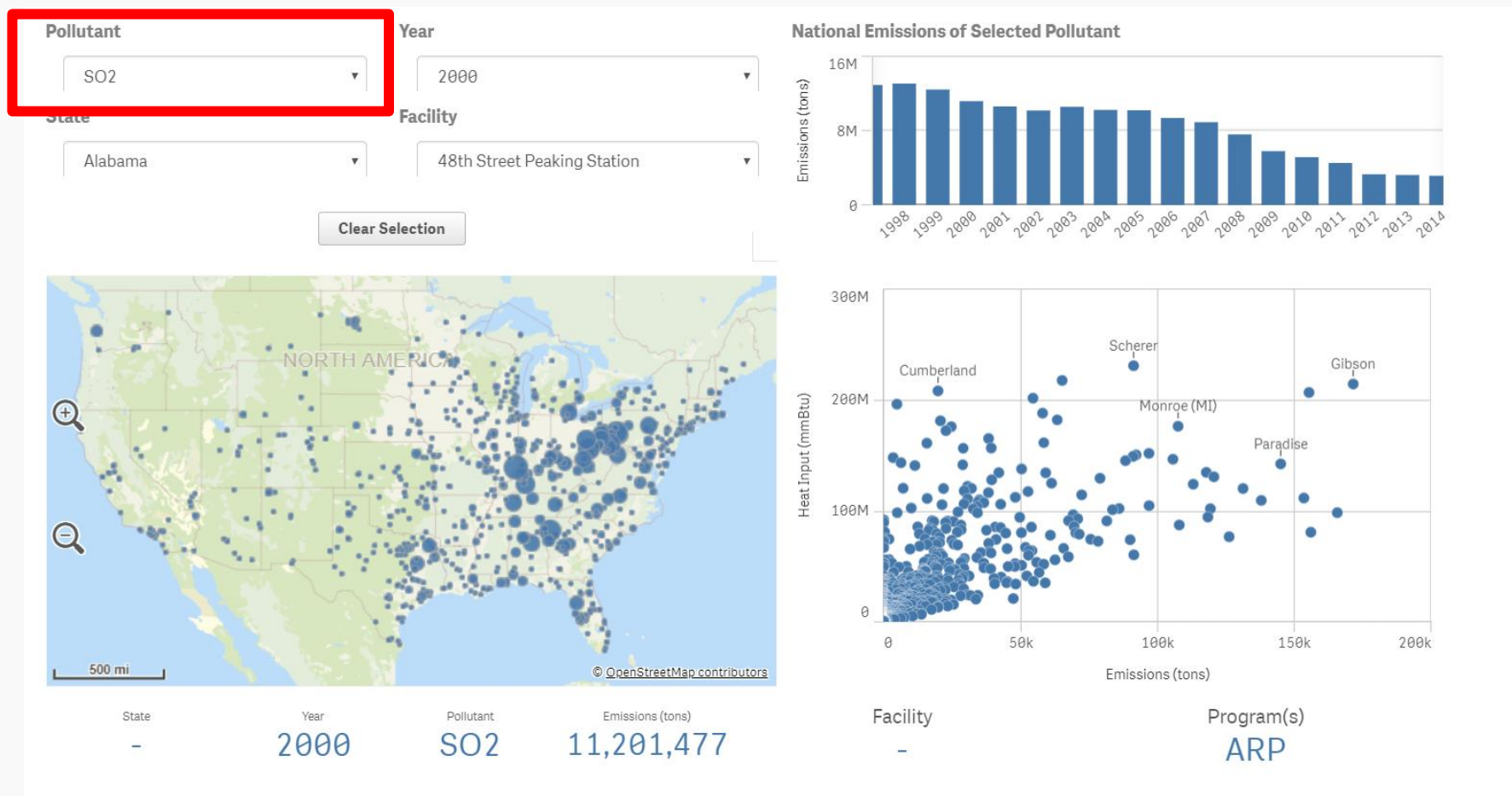


# Overview

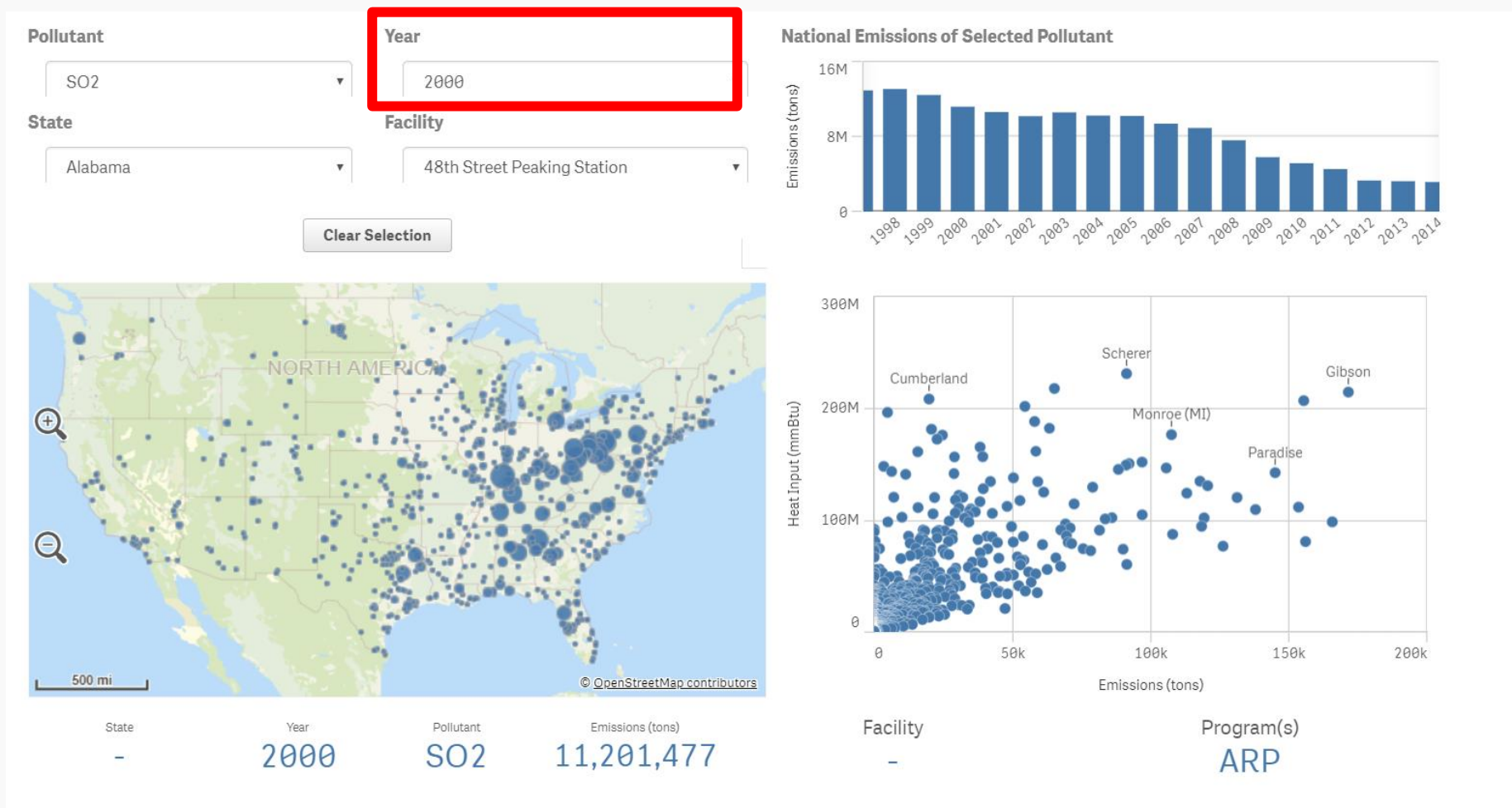


- Use the Power Plant Data Viewer to interactively explore emissions from power plants across the United States
- Click, zoom, and use selection tools to see different data perspectives
- Data are displayed at the facility level. A facility may contain multiple units, and individual units may be covered under different programs.

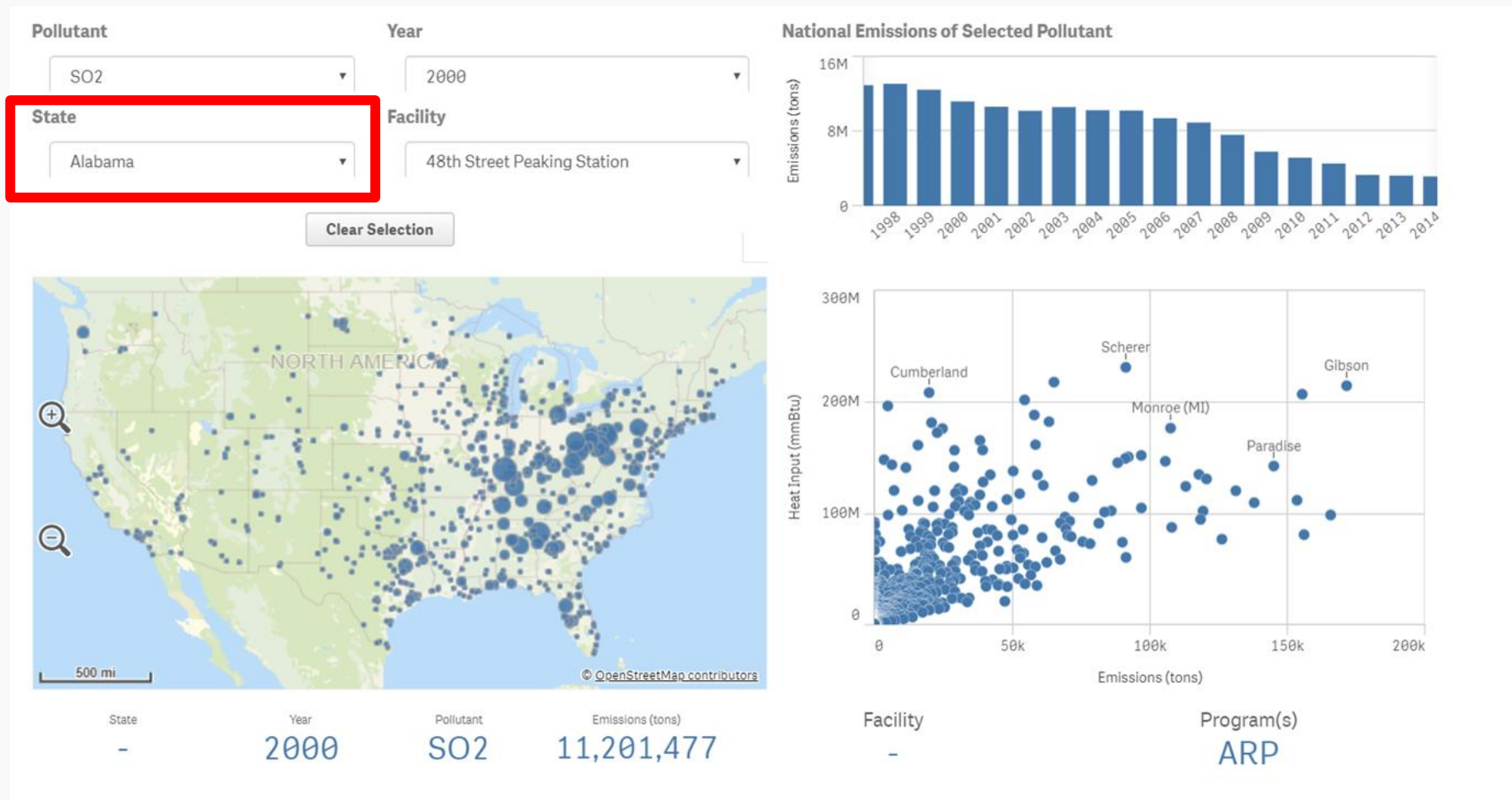
Select a pollutant from the pulldown list. Available choices are SO<sub>2</sub>, NO<sub>x</sub>, ozone season NO<sub>x</sub>, and CO<sub>2</sub>. The default choice is SO<sub>2</sub>.



Select a year from the second pulldown list. Options include 1990 to 2019. Note that only SO<sub>2</sub> is available for 1990 and ozone season NO<sub>x</sub> is not available until 1997. The default choice is 2000.



**Select a state** from the pulldown list. The default is all states.



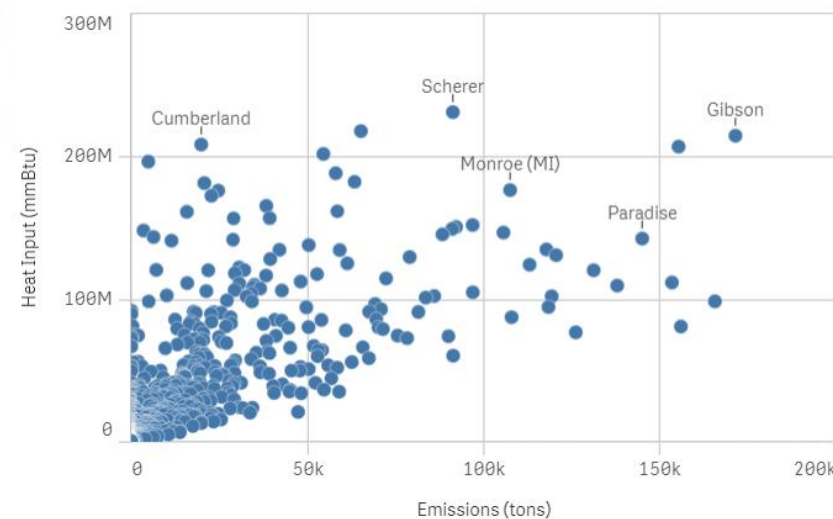
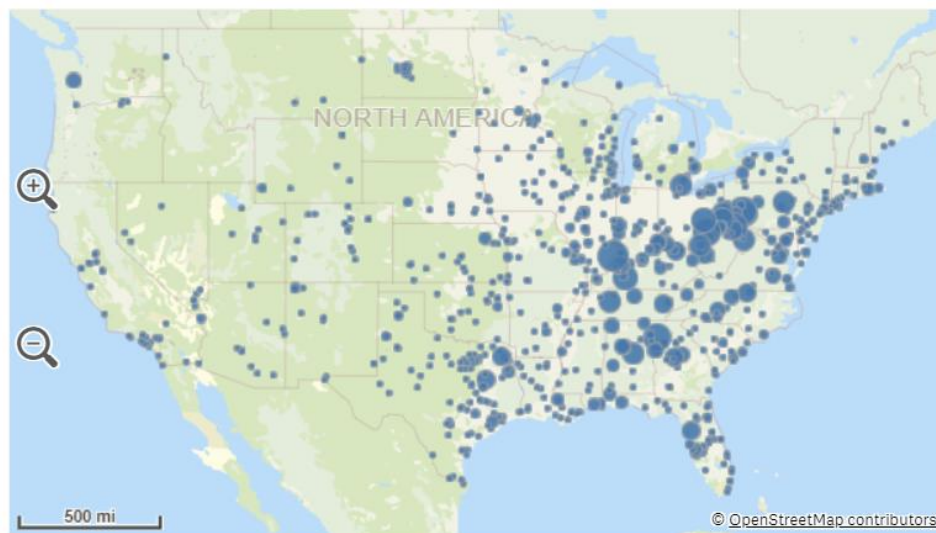
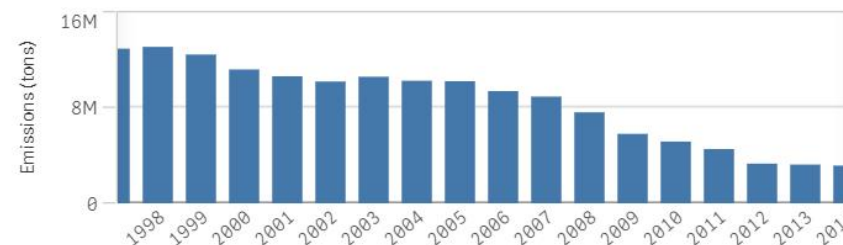


**Select a facility** from the pulldown list. The default is all facilities.

Pollutant: 
 Year:

State: 
 Facility:

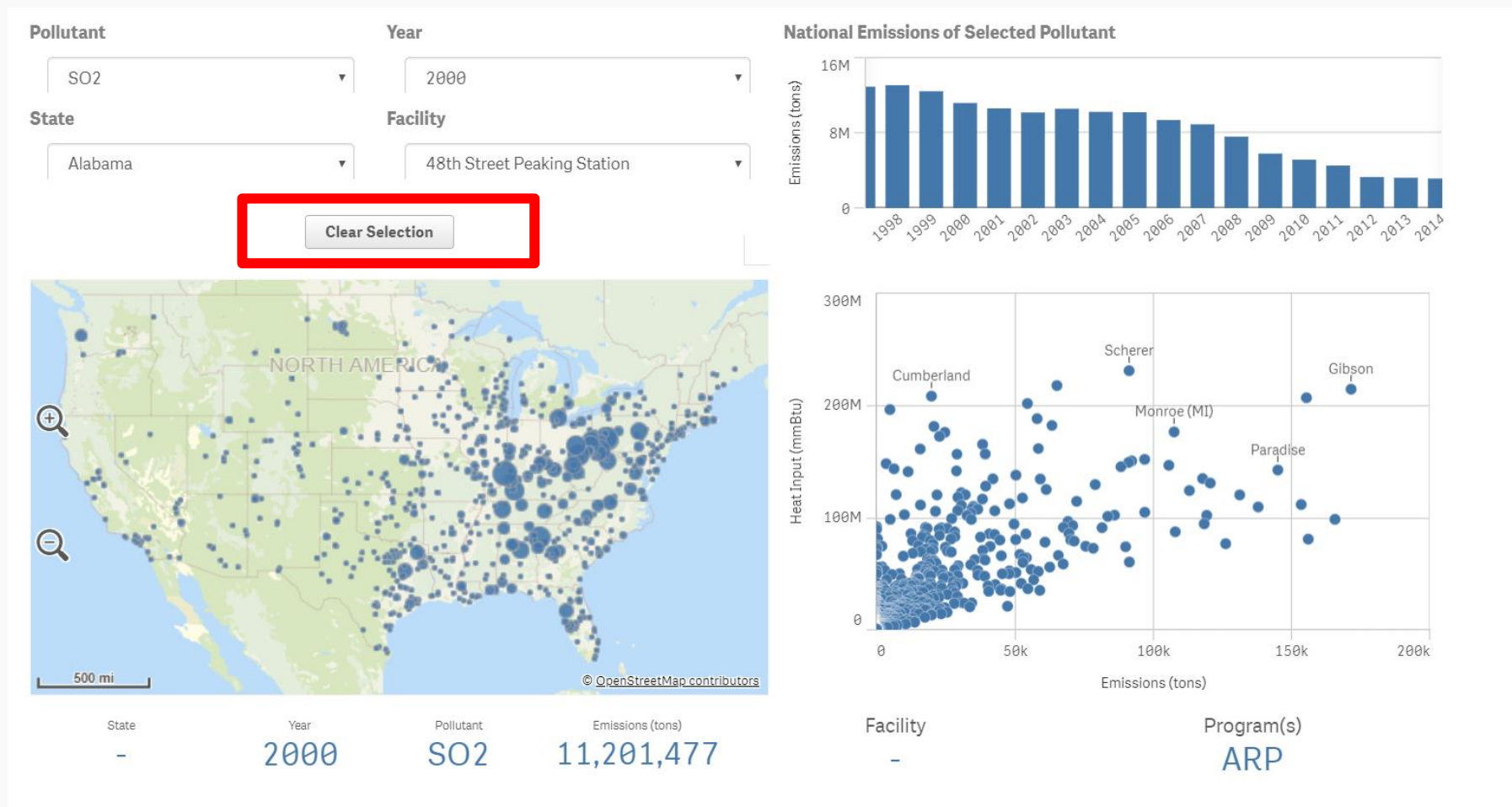
National Emissions of Selected Pollutant



State: -      Year: 2000      Pollutant: SO2      Emissions (tons): 11,201,477

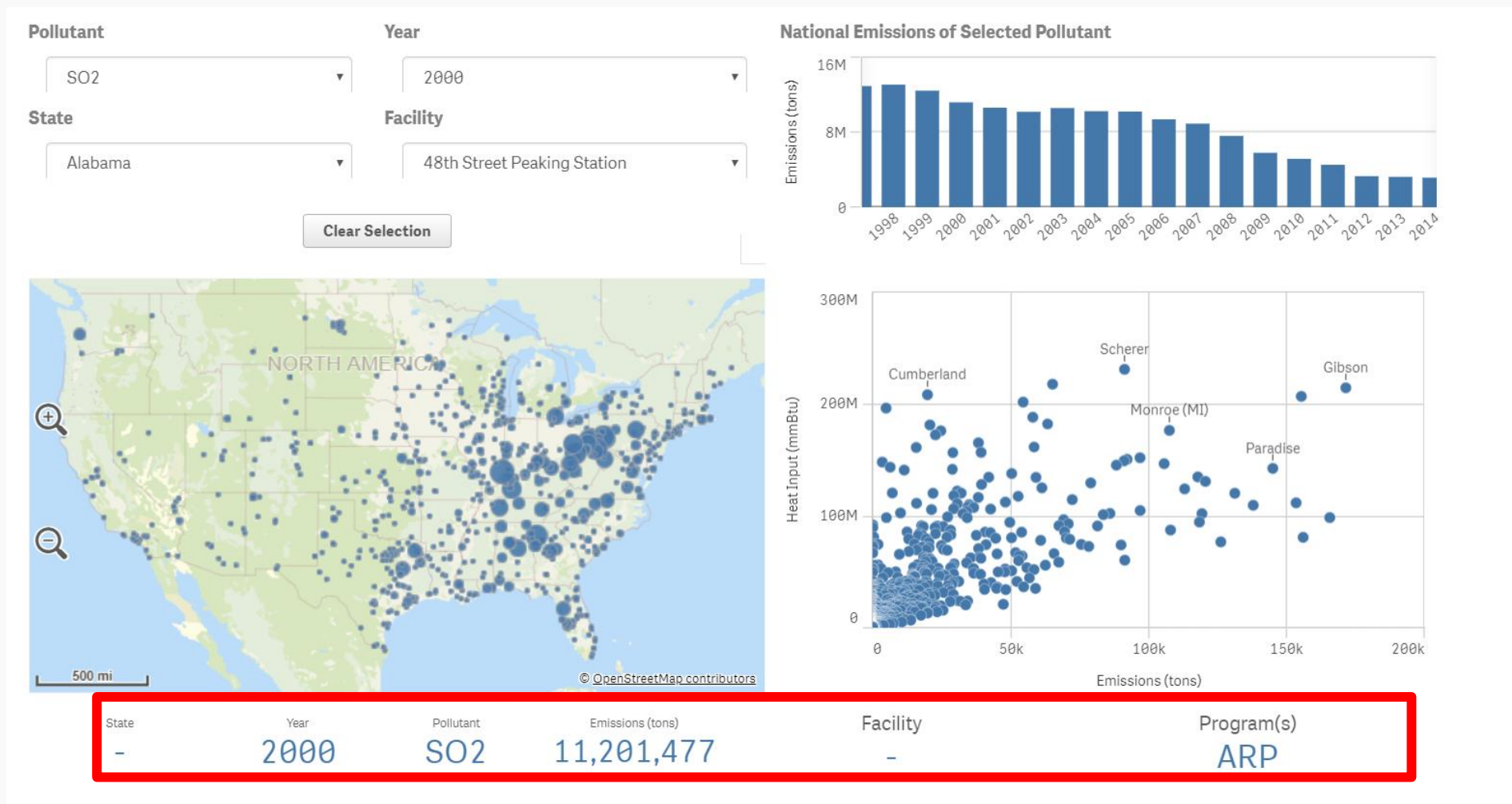
Facility: -      Program(s): ARP

**Click the Clear Selection button at any time to reset all selections to their defaults.**

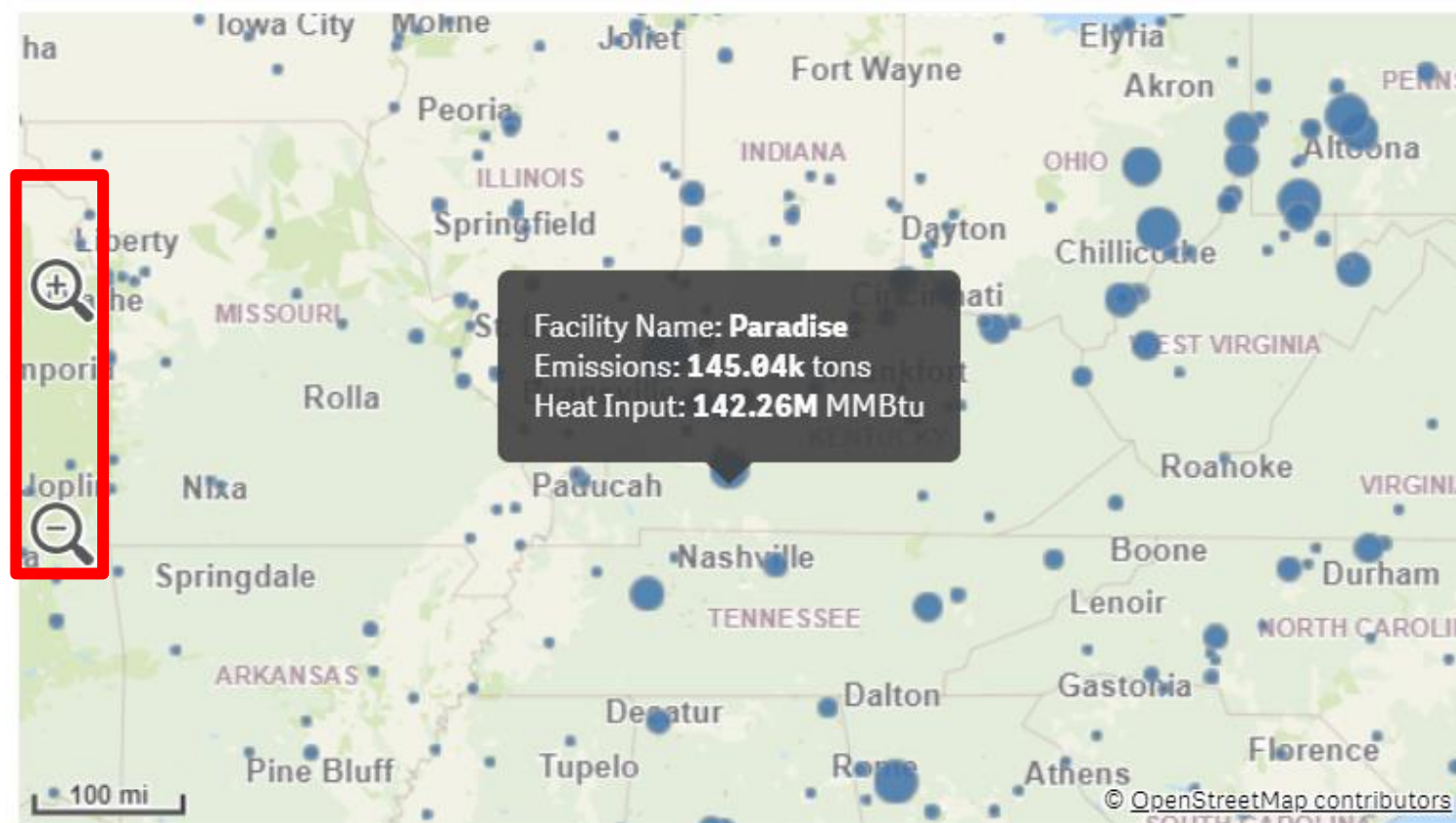




The selection summary is displayed at the bottom of the page.

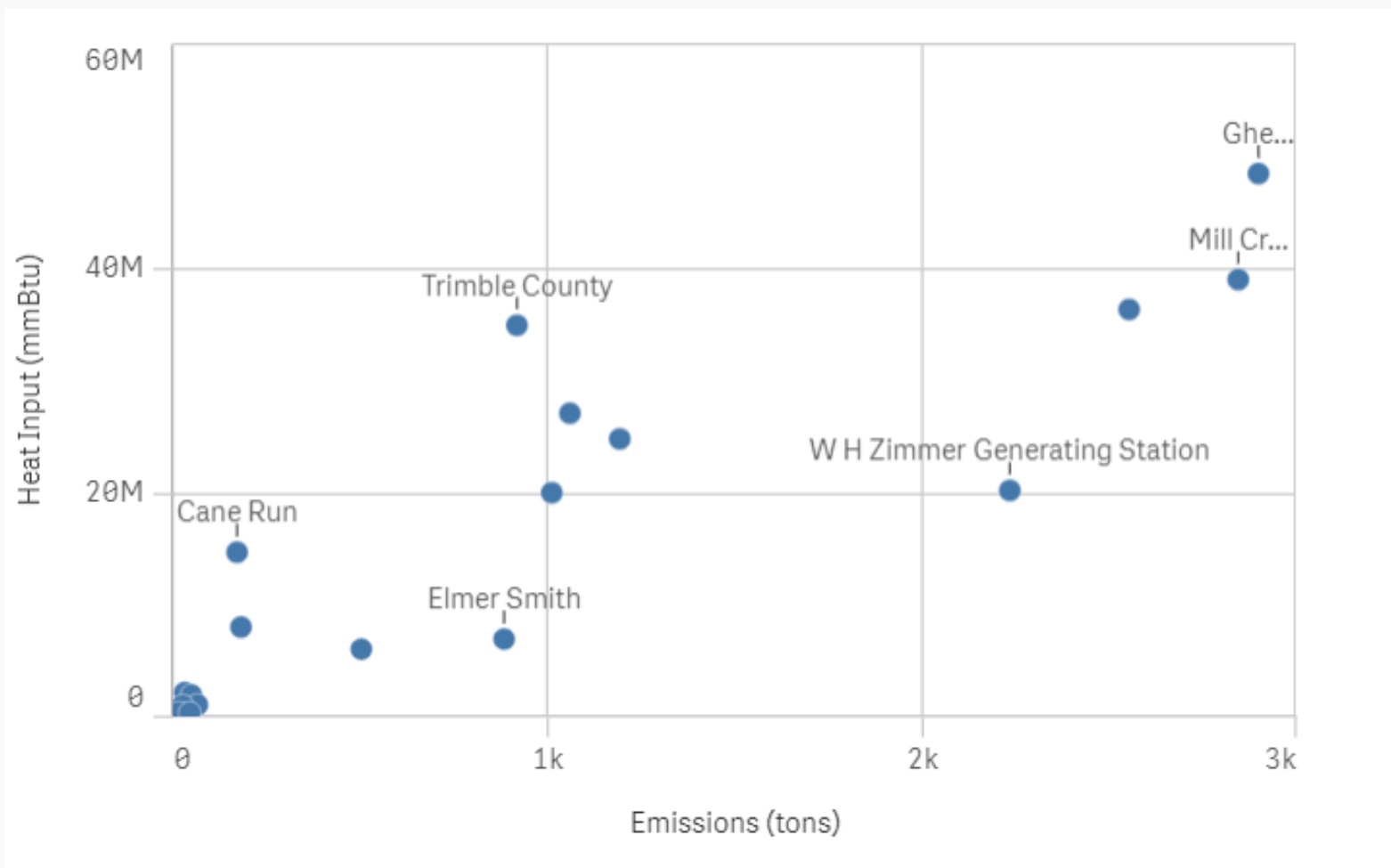



**Explore the interactive map** to navigate your area of interest by clicking and dragging. To zoom, click the + or – on the map or use your mouse scroll wheel.

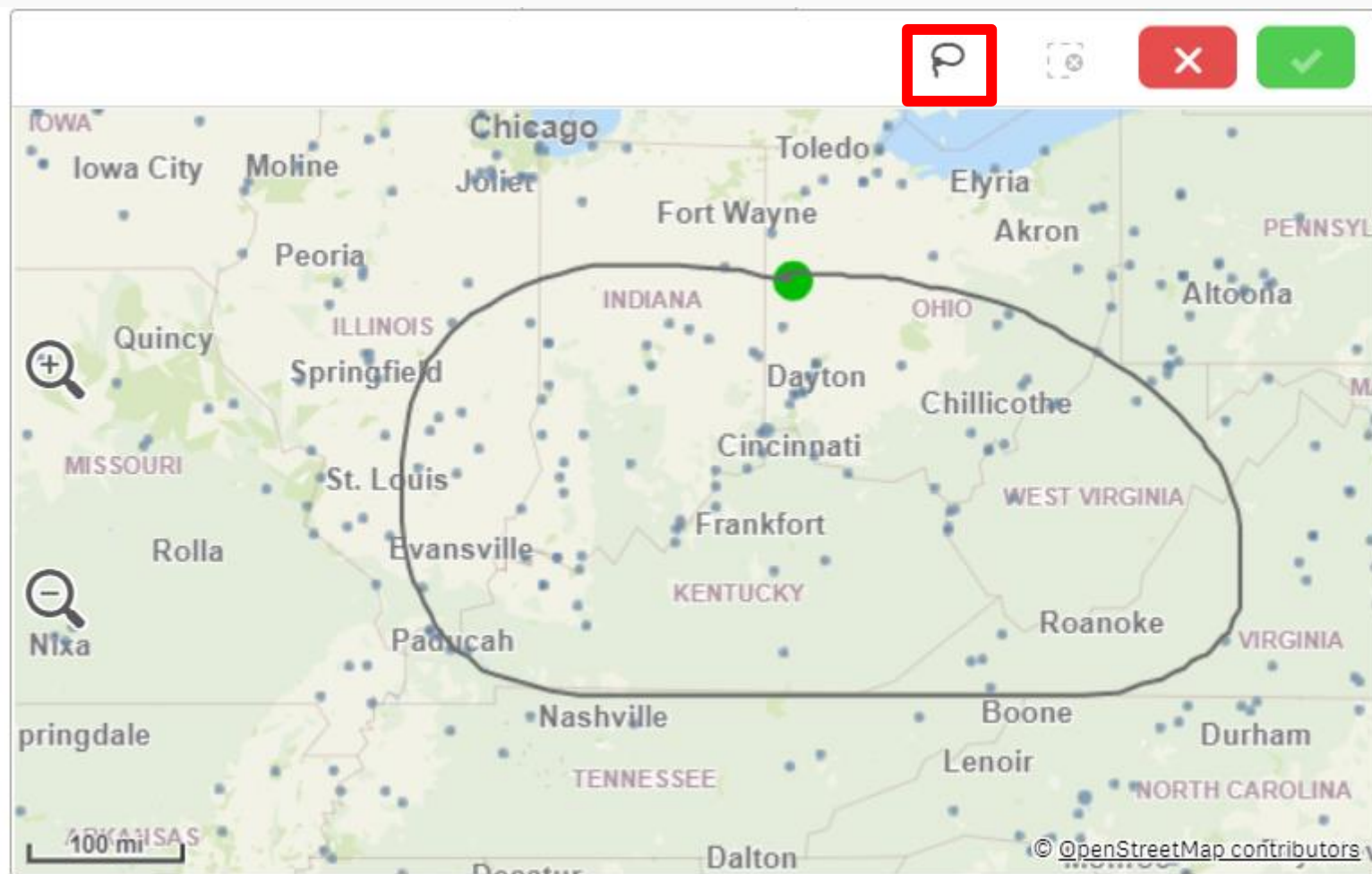




**Explore the scatterplot** of facilities by clicking and dragging. To zoom, use your mouse scroll wheel.



Click on the map or the scatterplot and **select the lasso tool**  to draw a freehand circle around specific areas for which you would like to see data.





# IPM Results Viewer

# IPM Results Viewer: What is it?



- The IPM Results Viewer is a tool to quickly visualize and explore IPM results.
- Data Types: Emissions, capacity, generation, and heat input; natural gas, coal, and electricity prices.
  - Does Not Include: Inputs, data on individual units (model plants only).
- Includes both national and state level data.
- Offers multiple options to display data:
  - State Map, Whisker Plot, Time Series, Stacked Bar.
- Calculates:
  - Absolute and percent changes between years and cases.
  - Emission rates and capacity factors.
- Filter Data by: fuel and plant type; existing, new, and retired status; controls and retrofits; and if fossil > 25 MW.
- Includes historic data for context and comparison.



# IPM Results Viewer: Layout

## User Controls

Jan 2020 Ref Case

PRIMARY YEAR: 2021

Regional Aggregation: State

PRIMARY DIMENSIONS

|                          |                  |
|--------------------------|------------------|
| Fuel Type                | All Units        |
| Fossil >25 MW            | All Units        |
| Existing/New/Retired     | Existing and New |
| Plant Type               | All Units        |
| Plant Category           | All Units        |
| Control/Retrofit Types   | All Units        |
| Existing or New Controls | All Controls     |

PRIMARY MEASURE: NOX Emissions Summer Thousand

DISPLAY VALUE TYPE: Actual

COMPARISON CASE: Jan 2020 Ref Case

COMPARISON YEAR: 2021

COMPARISON DIMENSIONS

|                          |                  |
|--------------------------|------------------|
| Fuel Type                | All Units        |
| Fossil >25 MW            | All Units        |
| Existing/New/Retired     | Existing and New |
| Plant Type               | All Units        |
| Plant Category           | All Units        |
| Control/Retrofit Types   | All Units        |
| Existing or New Controls | All Controls     |

COMPARISON MEASURE: NOX Emissions Summer Thousand

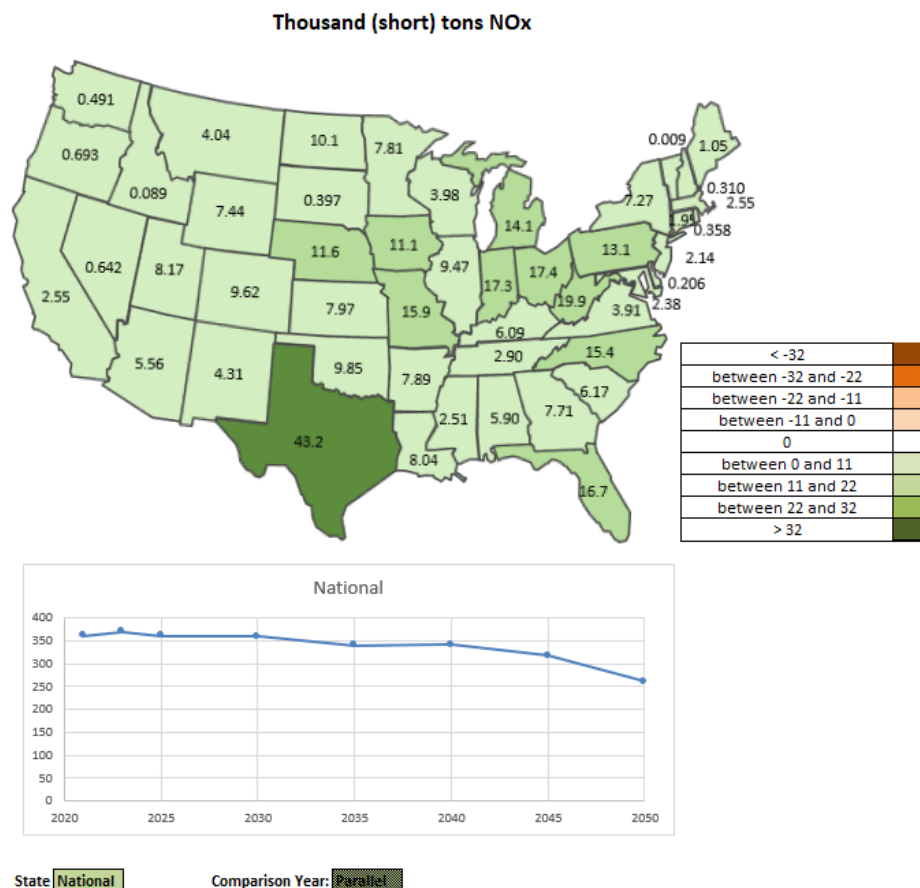
**Update** **Reset** **Export Data**

\*\*\*You must click the update button to update the map

**Map** **Whisker** **Emissions**

GWWh, TBtu, MW **All Run** **Read Me**

## Graphical Output



\*Historical data is still under development. It is approximate and may not always provide an apples-to-apples comparison to IPM outputs. See READ ME worksheet for more info.

# User Controls: Overview



|   |                               |
|---|-------------------------------|
| PRIMARY RUN   | Initial v6                    |
| PRIMARY YEAR  | 2021                          |
| Regional Aggregation  | State                         |
| PRIMARY DIMENSIONS  |                               |
| Fuel Type   | All Units                     |
| Fossil >25 MW   | All Units                     |
| Existing/New/Retired  | Existing and New              |
| Plant Type  | All Units                     |
| Plant Category  | All Units                     |
| Control/Retrofit Types  | All Units                     |
| Existing or New Controls  | All Controls                  |
| PRIMARY MEASURE   | NOX Emissions Summer Thousand |
| DISPLAY VALUE TYPE  | Actual                        |
| COMPARISON RUN  |                               |
| COMPARISON YEAR   | 2050                          |
| COMPARISON DIMENSIONS   |                               |
| Fuel Type   | All Units                     |
| Fossil >25 MW   | All Units                     |
| Existing/New/Retired  | Existing and New              |
| Plant Type  | All Units                     |
| Plant Category  | All Units                     |
| Control/Retrofit Types  | All Units                     |
| Existing or New Controls  | All Controls                  |
| COMPARISON MEASURE  | Generation Total GWh          |
| <div>Update Reset Export Data</div>                                       |                               |
| ***You must click the update button to update map colors                  |                               |
| <div>Map Whisker Emissions</div> <div>GWh, TBtu, MW All Run Read Me</div> |                               |

Case / Year

Data Filters

- Fuel Type
- Plant type
- Existing/New/Retired
- Controls/Retrofits

Metric to Display

Actual or Compared to Something

- Use the set of blue controls/filter to calculate comparisons
- Absolute or Percent Change, Fractions, Emission Rates, Capacity Factors

Update Graph, Reset Filters, Export Data

controls to navigate to other graphs



# Sample Outputs

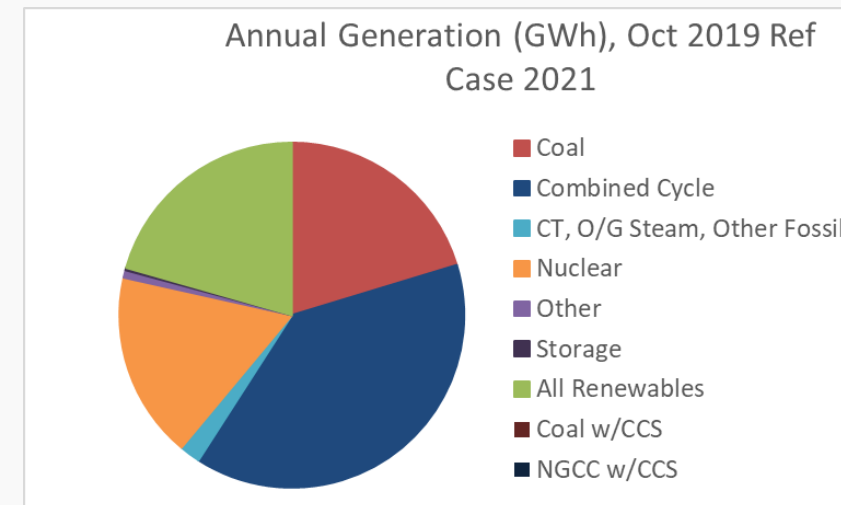
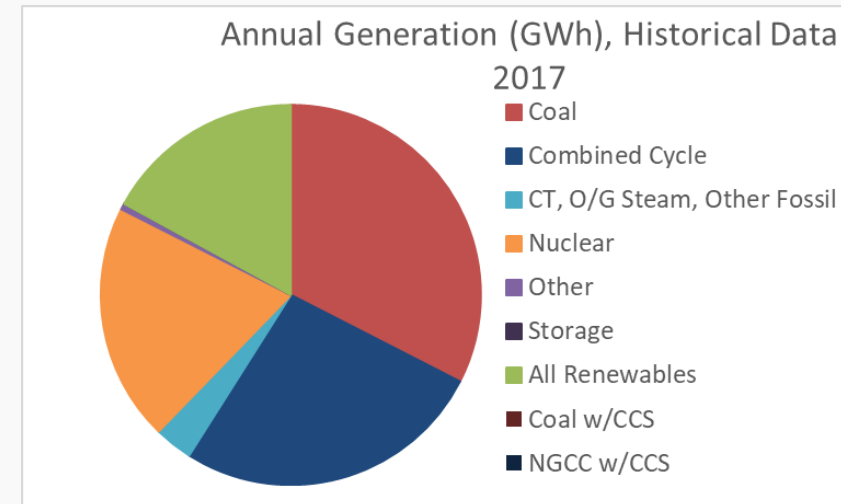
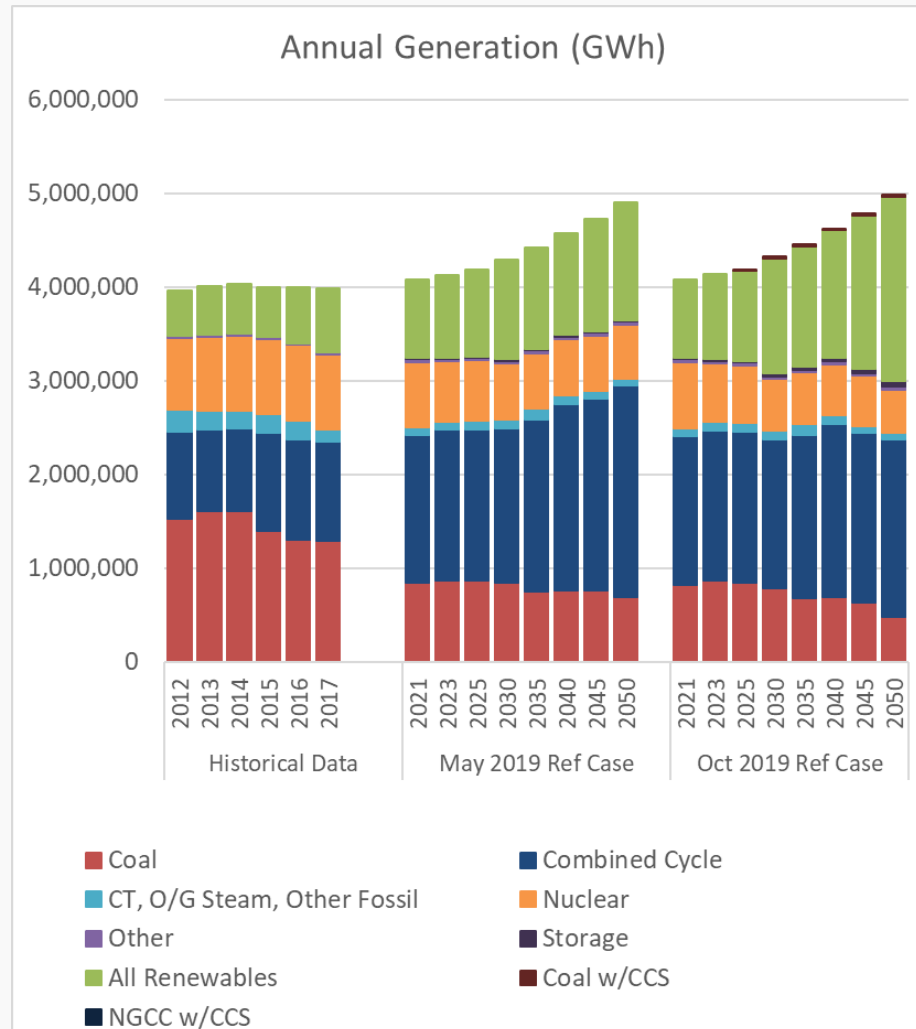


- The next few slides contain some samples of Results Viewer output to demonstrate its capabilities.
  - **These example are not intended to highlight or indicate the importance of any specific results; they simply illustrate functionality of the viewer.**
- October 2019 Reference Case has the following updated from the May 2019 Reference Case:
  - Updated Renewable Costs and Capacity Credits
    - May 2019 Reference Case with battery storage, solar PV, solar CSP and onshore wind technology cost assumptions from NREL ATB 2019 mid case. The offshore wind technology cost assumptions from NREL ATB 2019 mid case are approximately modeled by scaling the capital costs and FOM in May 2019 Reference Case . The capacity credit assumptions for solar and wind technologies were also updated.
  - Implemented the following mandates.
    - Offshore wind requirements in MD, NJ, CT, MA and NY.
    - Clean energy standards in CA, NM, NV, NY and WA,
    - RPS updates in CA, DC, MD, ME, NM, NV, NY, OH and WA.
  - Implemented ACE rule and 45Q.
  - Implemented NEEDS updates from “NEEDS Quarterly Update for September 2019”.

# Sample Output: Bar and Pie Charts



## National Annual Generation (Historic, May 2019 Ref Case, and Oct 2019 Ref Case)

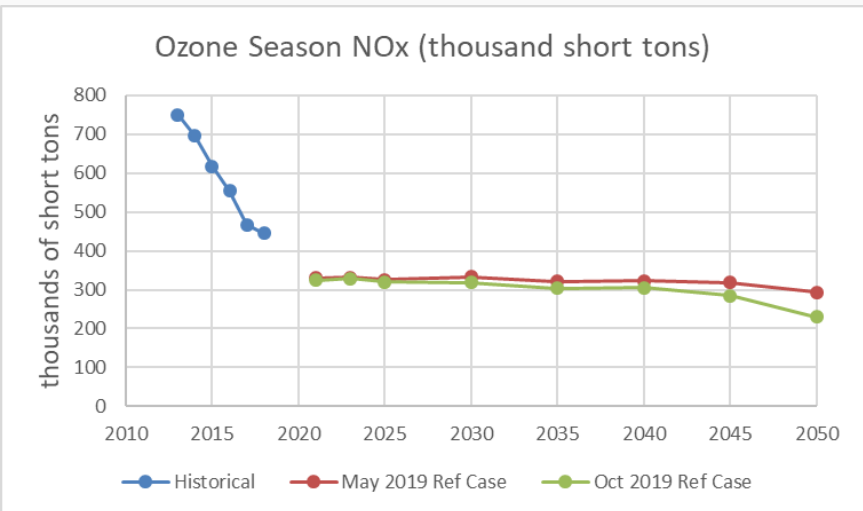
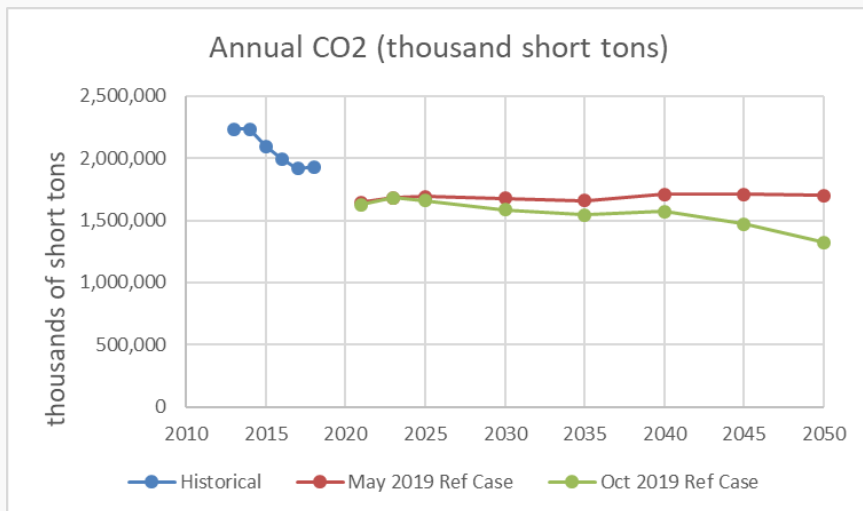
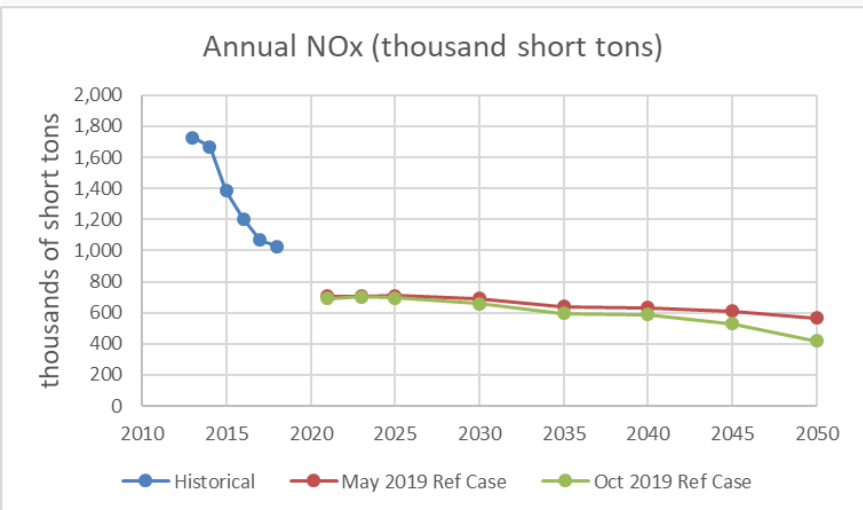
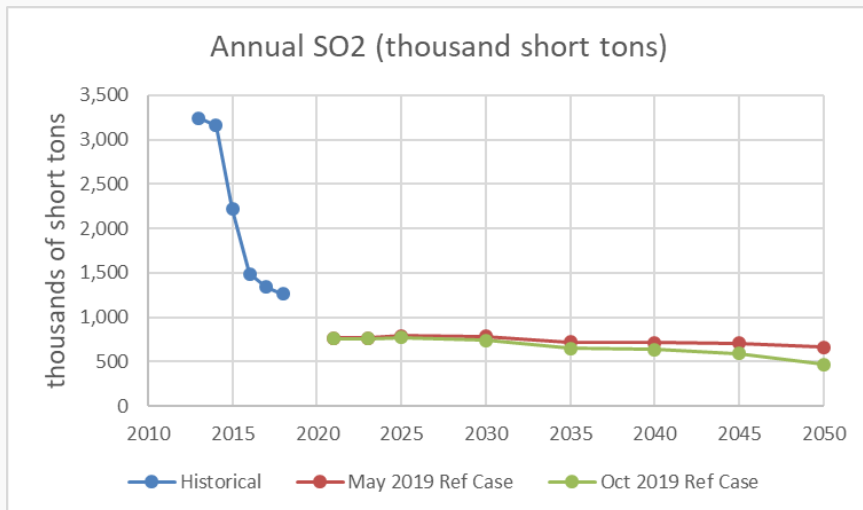




# Sample Output: Emissions Time Series



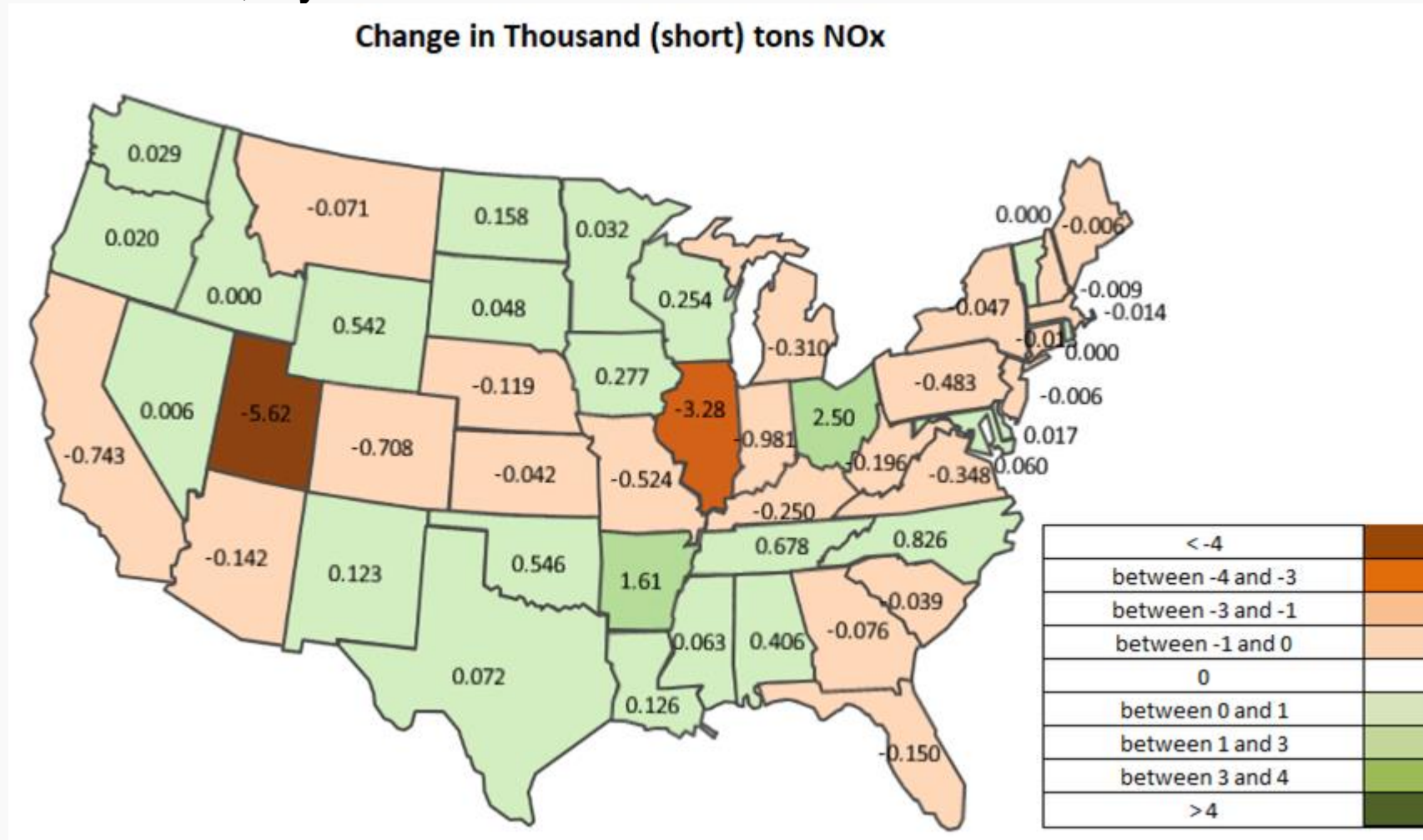
## SO<sub>2</sub>, NO<sub>x</sub>, and CO<sub>2</sub> Emissions for the May and Oct 2019 Ref Cases



# Sample Output: Map



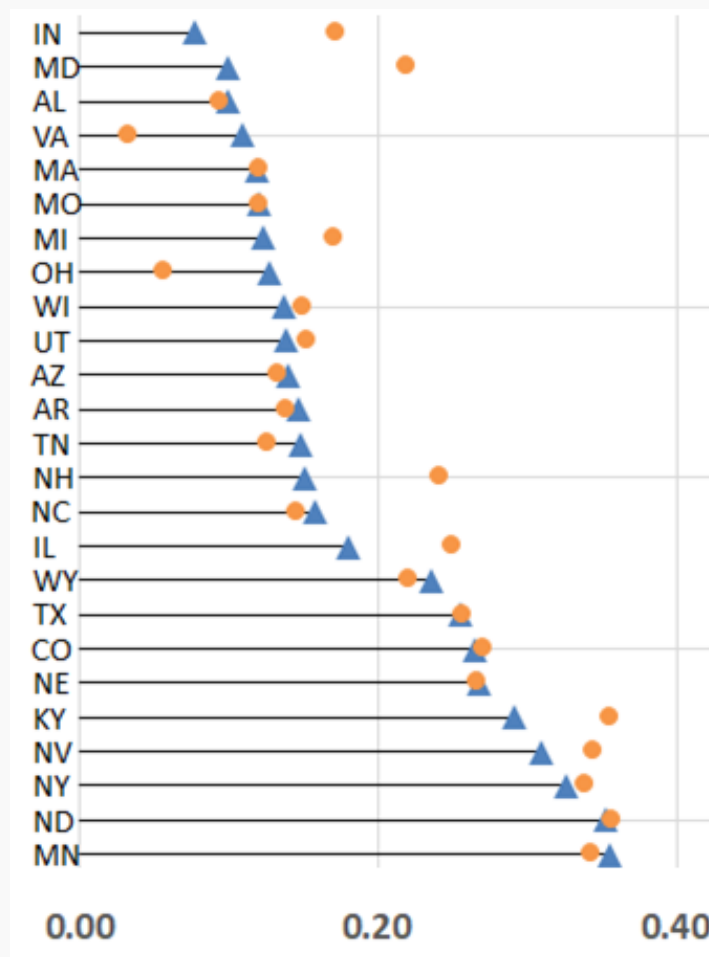
Change in Ozone Season  $\text{NO}_x$  in 2025 between the Oct 2019 Ref Case and the May 2019 Ref Case, by state





# Sample Output: Whisker Plot

Fraction of generation in 2025 from renewable sources in the May (blue) and Oct (orange) 2019 Ref Cases.



*\*Chart clipped for display purposes*

# Power Plant Data Highlights



Power Plant Data Highlights can be found on CAMD's main web page in the Progress section

epa.gov/airmarkets

An official website of the United States government.

EPA United States Environmental Protection Agency

Environmental Topics Laws & Regulations About EPA Search EPA.gov

Clean Air Markets CONTACT US SHARE

### Reducing Power Plant Emissions and Improving Air Quality

- [Eight Things To Know: Program Highlights](#)

1 2 3 4


Tweets by @EPAairmarkets

U. S. EPA Air Markets @EPAairmarkets

What is a Power Profiler? It's an innovative, interactive tool that lets you know how the electricity you use every day is produced. Enter your zip code into the Power Profiler to learn more. [epa.gov/energy/power-p...](http://epa.gov/energy/power-p...)

Embed View on Twitter


EPA's Clean Air Markets Division (CAMD) runs programs that reduce air pollution from power plants to address several environmental problems, including [acid rain](#), [ozone](#) and [particle pollution](#), and [interstate transport of air pollution](#). CAMD programs include the [Acid Rain Program](#) (ARP), the [Cross-State Air Pollution Rule](#) (CSAPR), and the [CSAPR Update](#).



**Programs**

[Learn About Our Programs »](#)


- [Air Transport](#)
- [Final Cross-State Air Pollution Rule Close-Out](#)
- [Final Cross-State Air Pollution Rule Update](#)
- [Cross-State Air Pollution Rule \(CSAPR\)](#)



**Progress**

[Review Our Progress »](#)


- [Eight Things to Know: Program Highlights](#)
- [Progress Reports](#)
- [Power Plant Emission Trends](#)
- [Power Plant Data Highlights](#)



**Participants**

[Information for Participants »](#)

- [Emissions Monitoring](#)
- [Allowance Markets](#)
- [Business Center](#)



**Data Resources**

[Explore Data Resources »](#)

- [Air Markets Program Data \(AMPD\)](#)
- [Clean Air Status & Trends Network \(CASTNET\)](#)
- [Emissions & Generation Integrated Database \(eGRID\)](#)

# Power Plant Data Highlights



EPA posts quarterly updates of SO<sub>2</sub>, NO<sub>x</sub>, CO<sub>2</sub>, and Hg emissions data from power plants.

epa.gov/airmarkets/power-plant-data-highlights

An official website of the United States government.

**EPA** United States Environmental Protection Agency

Environmental Topics   Laws & Regulations   About EPA   Search EPA.gov

Clean Air Markets   CONTACT US   SHARE   f   t   e

Clean Air Markets Home

Basic Info

Programs

Progress

Participants

Data Resources

## Power Plant Data Highlights

- [Annual Data: 2018 vs. 2019](#)
- [Quarterly Data: 2018 vs. 2019 \(all four quarters\)](#)
- [Ozone Season Data: 2018 vs. 2019](#)
- [Facility Level Emission Changes: 2009 vs. 2019](#)
- [Coal-fired Characteristics and Controls: 2019](#)
- [Changes in Control Technologies at Coal-Fired Units: 2000-2019](#)

EPA regularly posts updates of quarterly sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), carbon dioxide (CO<sub>2</sub>), and mercury (Hg) emissions data from power plants subject to the [Acid Rain Program](#) (ARP), the [Cross-State Air Pollution Rule](#) (CSAPR), the [CSAPR Update](#), and the [Mercury and Air Toxics Standards](#) (MATS) to make it easy for the public to track changes in emissions from these sources. All of the data presented here are also available in [Air Markets Program Data](#) (AMPD). More summary level data is available in our [Progress Reports](#) and also in our [Power Plant Emission Trends](#).

### Annual Data: 2018 vs. 2019

The data presented here compare emissions, emission rates, and heat input from power plant units in the ARP, CSAPR, and CSAPR Update. These files compare annual emission data from 2018 with 2019 and longer term data at the facility level.

- [Table of Emissions, Emission Rates, Heat Input: 2018 vs. 2019](#) (1 MB)

↑ Top of Page

### Quarterly Data: 2018 vs. 2019 (through all four quarters 2019)

The data presented here compare emissions, emission rates, and heat input from power plant units in the ARP, CSAPR, CSAPR Update, and MATS. These files compare quarterly emission data from 2018 with data for the same quarter from 2019.



# Quarterly Data



- The **Quarterly Data** file compares each facility, for the respective quarter, for 2018 vs 2019
- This file is updated each quarter
- The **Annual Data** and **Ozone Season Data** files contain similar information and are updated annually

| Facility Name           | State | Calendar Quarter | 2018 Heat Input (mmBtu) | 2019 Heat Input (mmBtu) | 2018 vs 2019 Heat Input (mmBtu) | 2018 vs 2019 Heat Input (%) | 2018 SO <sub>2</sub> Emissions (tons) | 2019 SO <sub>2</sub> Emissions (tons) | 2018 vs 2019 SO <sub>2</sub> Emissions (tons) | 2018 vs 2019 SO <sub>2</sub> Emissions (%) | 2018 SO <sub>2</sub> Emission Rate (lb/mmBtu) | 2019 SO <sub>2</sub> Emission Rate (lb/mmBtu) | 2018 vs 2019 SO <sub>2</sub> Emission Rate (lb/mmBtu) | 2018 vs 2019 SO <sub>2</sub> Emission Rate (%) |
|-------------------------|-------|------------------|-------------------------|-------------------------|---------------------------------|-----------------------------|---------------------------------------|---------------------------------------|---|--|---|---|---|--|
| Healy Power Plant       | AK    | 1                |                         | 495,590                 |                                 |                             |                                       |                                       |   |  |   |   |   |  |
| Healy Power Plant       | AK    | 2                |                         | 426,459                 |                                 |                             |                                       |                                       |   |  |   |   |   |  |
| Healy Power Plant       | AK    | 3                |                         |                         |                                 |                             |                                       |                                       |   |  |   |   |   |  |
| Healy Power Plant       | AK    | 4                |                         |                         |                                 |                             |                                       |                                       |   |  |   |   |   |  |
| Barry                   | AL    | 1                | 12,532,850              | 10,582,276              | -1,950,574                      | -16%                        | 1,256.4                               | 979.8                                 | -276.6  | -22%                                       | 0.20  | 0.19  | -0.02   | -8   |
| Barry                   | AL    | 2                | 13,960,788              | 11,746,445              | -2,214,343                      | -16%                        | 1,613.0                               | 681.6                                 | -931.5  | -58%                                       | 0.23  | 0.12  | -0.12   | -50  |
| Barry                   | AL    | 3                | 15,439,673              | 11,552,603              | -3,887,070                      | -25%                        | 1,856.1                               | 1,079.4                               | -776.6  | -42%                                       | 0.24  | 0.19  | -0.05   | -22  |
| Barry                   | AL    | 4                | 1,923,817               | 12,125,128              | 10,201,311                      | 530%                        | 509.9                                 | 734.1                                 | 224.2   | 44%  | 0.53  | 0.12  | -0.41   | -77  |
| Charles R Lowman        | AL    | 1                | 2,880,448               | 1,681,188               | -1,199,261                      | -42%                        | 240.4                                 | 87.0                                  | -153.4  | -64%                                       | 0.17  | 0.10  | -0.06   | -38  |
| Charles R Lowman        | AL    | 2                | 1,552,813               | 2,650,467               | 1,097,655                       | 71%                         | 63.5                                  | 166.5                                 | 103.0   | 162%                                       | 0.08  | 0.13  | 0.04  | 54   |
| Charles R Lowman        | AL    | 3                | 7,061,973               | 3,462,682               | -3,599,292                      | -51%                        | 372.5                                 | 183.7                                 | -188.8  | -51%                                       | 0.11  | 0.11  | 0.00  | 1  |
| Charles R Lowman        | AL    | 4                | 2,780,101               | 2,661,499               | -118,602                        | -4%                         | 131.9                                 | 120.4                                 | -11.5   | -9%  | 0.09  | 0.09  | 0.00  | -5   |
| E C Gaston              | AL    | 1                | 12,882,310              | 10,935,165              | -1,947,146                      | -15%                        | 744.8                                 | 430.4                                 | -314.4  | -42%                                       | 0.12  | 0.08  | -0.04   | -32  |
| E C Gaston              | AL    | 2                | 11,460,636              | 11,087,804              | -372,832                        | -3%                         | 623.8                                 | 276.2                                 | -347.6  | -56%                                       | 0.11  | 0.05  | -0.06   | -54  |
| E C Gaston              | AL    | 3                | 6,950,540               | 10,709,212              | 3,758,672                       | 54%                         | 420.9                                 | 262.5                                 | -158.4  | -38%                                       | 0.12  | 0.05  | -0.07   | -60  |
| E C Gaston              | AL    | 4                | 2,294,567               | 2,126,214               | -168,353                        | -7%                         | 142.9                                 | 64.7                                  | -78.2   | -55%                                       | 0.12  | 0.06  | -0.06   | -51  |
| Gorgas                  | AL    | 1                | 17,438,696              | 5,833,139               | -11,605,557                     | -67%                        | 514.8                                 | 142.7                                 | -372.1  | -72%                                       | 0.06  | 0.05  | -0.01   | -17  |
| Gorgas                  | AL    | 2                | 16,425,974              |                         |                                 |                             | 453.6                                 |                                       |   |  | 0.06  |   |   |  |
| Gorgas                  | AL    | 3                | 16,469,164              |                         |                                 |                             | 444.6                                 |                                       |   |  | 0.05  |   |   |  |
| Gorgas                  | AL    | 4                | 10,326,593              |                         |                                 |                             | 282.2                                 |                                       |   |  | 0.05  |   |   |  |
| James H Miller Jr       | AL    | 1                | 45,214,712              | 48,937,792              | 3,723,080                       | 8%                          | 183.7                                 | 229.7                                 | 46.1  | 25%  | 0.01  | 0.01  | 0.00  | 16   |
| James H Miller Jr       | AL    | 2                | 44,288,371              | 38,535,885              | -5,752,486                      | -13%                        | 180.5                                 | 204.8                                 | 24.3  | 13%  | 0.01  | 0.01  | 0.00  | 30   |
| James H Miller Jr       | AL    | 3                | 56,233,173              | 57,774,377              | 1,541,204                       | 3%                          | 243.2                                 | 245.5                                 | 2.2   | 1%   | 0.01  | 0.01  | 0.00  | -2   |
| James H Miller Jr       | AL    | 4                | 46,442,770              | 54,648,501              | 8,205,731                       | 18%                         | 242.0                                 | 286.0                                 | 44.0  | 18%  | 0.01  | 0.01  | 0.00  | 0  |
| Flint Creek Power Plant | AR    | 1                | 6,130,936               | 9,078,072               | 2,947,136                       | 48%                         | 234.0                                 | 264.9                                 | 30.9  | 13%  | 0.08  | 0.06  | -0.02   | -24  |
| Flint Creek Power Plant | AR    | 2                | 4,286,681               | 4,627,048               | 340,368                         | 8%                          | 118.6                                 | 123.1                                 | 4.6   | 4%   | 0.05  | 0.06  | 0.01  | 20   |

# Power Plant Data Highlights



- **Facility Level Emission Changes** shows facility level changes of SO<sub>2</sub> and NO<sub>x</sub> over a longer time period.
- **Coal-fired Characteristics and Controls** provides a compiled set of information on all coal units
- **Changes in Control Technologies at Coal-Fired Units** the progress of SO<sub>2</sub> and NO<sub>x</sub> controls on a mapped time series

## Facility Level Emission Changes: 2009 vs. 2019

The data presented here compare emissions and emission rates from power plants in the ARP, CSAPR, and CSAPR Update. These files compare longer-term annual data at the facility level.

- [Table of Long-term Emission Changes: 2009 vs. 2019](#)

[↑ Top of Page](#)

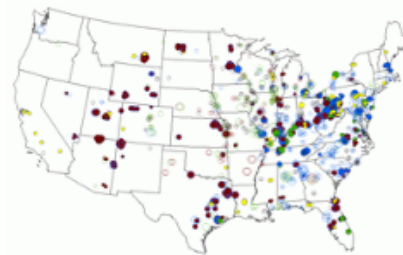
## Coal-fired Characteristics and Controls: 2019

The data presented here provide detailed information about coal-fired power plants, including emissions of SO<sub>2</sub>, NO<sub>x</sub>, and CO<sub>2</sub>; heat input; capacity; on-line year; and emission controls.

- [Table of Coal Unit Characteristics: 2019](#) (250 K)

[↑ Top of Page](#)

## Changes in Control Technologies at Coal-Fired Units: 2000–2019



The following figures display where particular control technologies have been installed between 2000 and 2019 based on the information obtained from major company contacts and industry sources.

- [Control technologies installed, 2000-2019 \(Figures 1-5\)](#)

[↑ Top of Page](#)



# Deposition and Environmental Effects Data





# **CLEAN AIR STATUS AND TRENDS NETWORK (CASTNET) DATA**

Provides ambient air quality data from 97 monitoring sites across the U.S.  
to assess regional air quality and deposition

# Overview of the Clean Air Status and Trends Network (CASTNET)

- What is CASTNET?
- What data are available?
- Downloading CASTNET data

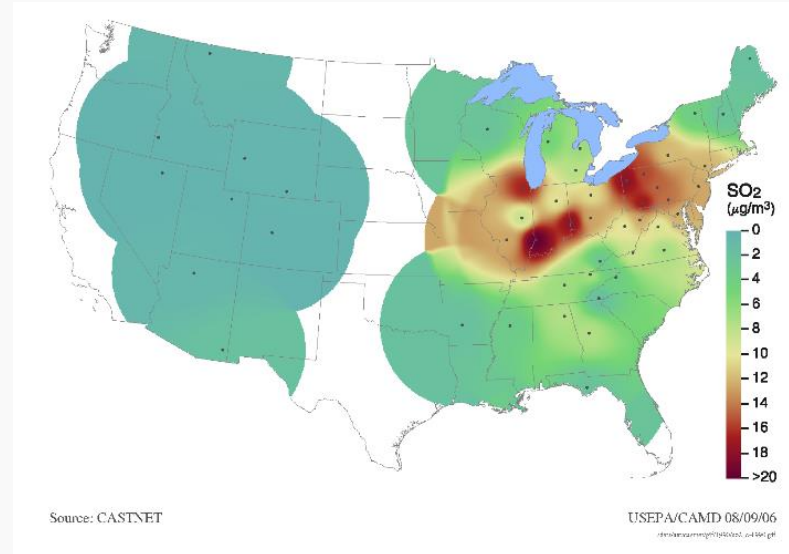


Palo Duro Canyon (PAL190), TX is located between the Palo Duro Canyon State Park to the east and agricultural land to the west. The site is operated by Texas A&M Agrilife Research & Extension Center at Amarillo.

# CASTNET Monitoring

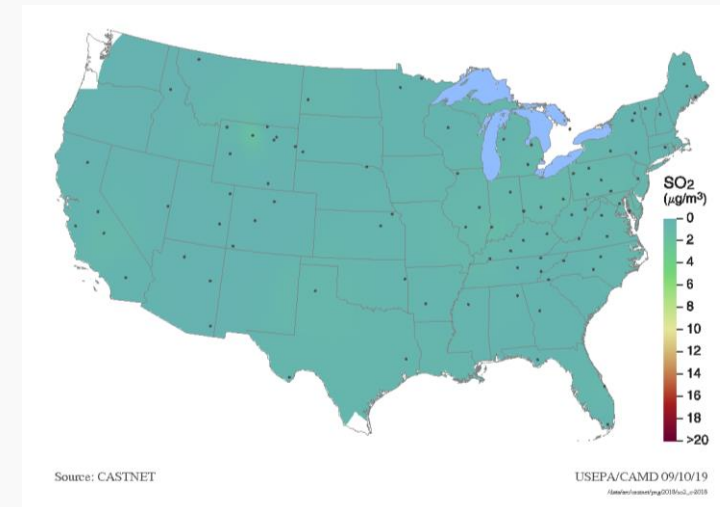


- CASTNET is managed by EPA's CAMD. Sites are operated by EPA, National Park Service and BLM-WY.
- 39 sites have operated continuously for 30+ years. Sites are located in rural areas, typically away from emission point sources.
- Most sites measure concentrations of sulfur and nitrogen, ozone, and temperature.
- Data are used by EPA to assess long-term trends in air quality and deposition, determine NAAQS compliance, evaluate stratospheric ozone intrusion events, and calculate critical load exceedances.



**SO<sub>2</sub> concentrations measured at CASTNET in 1990 (left) and 2018 (below). Large reductions in SO<sub>2</sub> concentrations are a direct result of SO<sub>2</sub> EGU emission reductions.**

## [2019 CASTNET Factsheet](#)





# CASTNET Sites



- Site operators visit each site every Tuesday morning to change filter packs, perform routine quality assurance checks, and maintain site (i.e. mowing).
- A contractor prepares, ships, receives, and analyzes the filters.
- Most sites are co-located with the National Atmospheric Deposition Program's National Trends Network (precipitation chemistry) and Ammonia Monitoring Network (ambient ammonia concentrations).



Centennial, WY CASTNET site (CNT169)

**Temperature controlled shelter and 10m tower shown (left) and O<sub>3</sub> analyzer + transfer standard, site laptop and data logger/telemetry shown (below)**

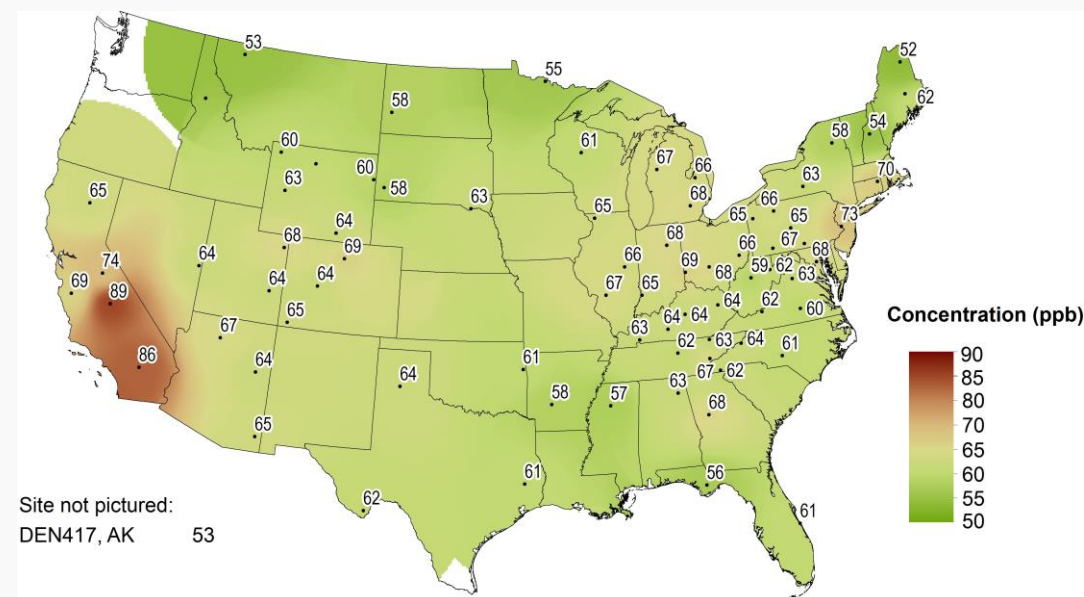


# CASTNET O<sub>3</sub> Data



- 79 sites measure ground-level O<sub>3</sub> concentrations
- Data are reported as hourly averages (ppb)
- Nightly quality control checks are run with zero air and transfer standard (NIST traceable) to verify instrument is operating within criteria
- Systems are operated following 40 CFR Part 58 regulations to support NAAQS decisions
- Raw data are loaded into CAMD's database nightly and posted to the website ~2 days after
- Validated data are posted ~6 months after

CASTNET O<sub>3</sub> concentrations shown as average (2015-2017) 4<sup>th</sup> highest daily maximum 8-hour average



The 2015 O<sub>3</sub> NAAQS is set at 70 ppb. Areas with the 3-year average of the 4<sup>th</sup> highest daily maximum 8-hour average concentrations greater than 70 ppb are exceeding the current standard.

# CASTNET Filter Pack Data



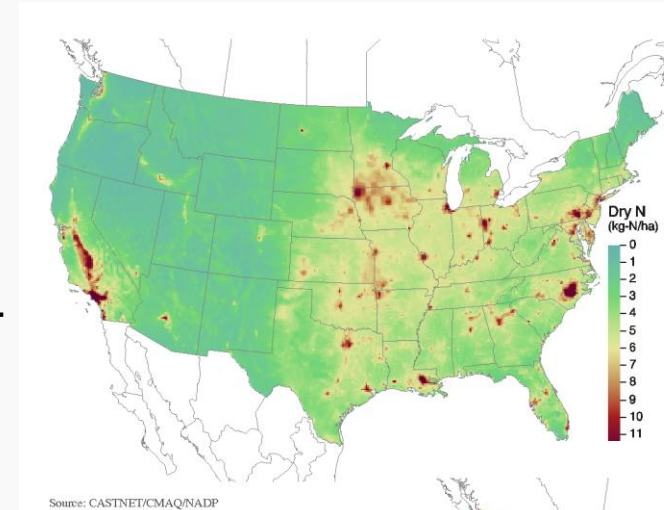
- 91 sites collect sulfur and nitrogen measurements with a filter pack
- Filter packs are changed weekly (Tuesday – Tuesday)
- CASTNET utilizes a 3-stage, open-face filter pack for measuring particles and gases.
  - Filter pack is located at 10m.
- Concentrations are calculated as measured flow rate (calculated from STP to local conditions) \* mass of analyte and reported as  $\mu\text{g m}^{-3}$
- Concentration data are reported with flags as final ~6-months after laboratory analysis
  - Invalid flags include: **I** (invalid chemistry data and/or less than 75% valid flow for the week), **M** (Missing or completely invalid flow for the week), **N** (Sample not analyzed)

| Filters              | Analytes  |
|----------------------|---|
| Teflon               | SO <sub>4</sub> , NO <sub>3</sub> ,<br>NH <sub>4</sub> , Ca, Mg,<br>Na, K, Cl |
| Nylon                | SO <sub>2</sub> , HNO <sub>3</sub>  |
| Whatman<br>Cellulose | SO <sub>2</sub>   |

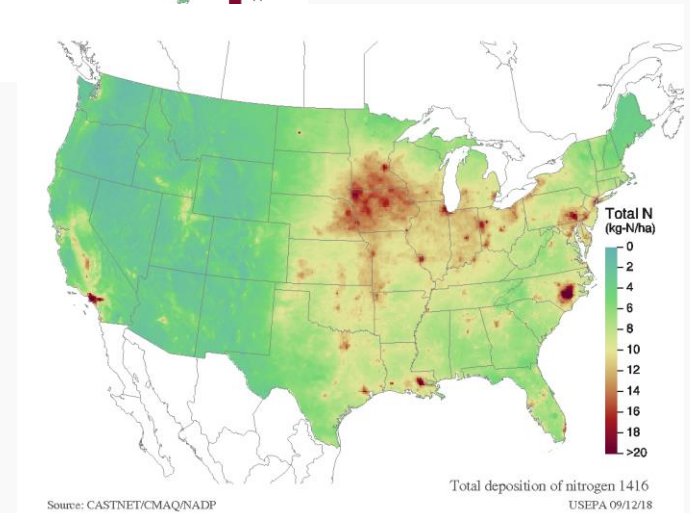
# Dry and Total Deposition



- Deposition flux = concentration \* deposition velocity
- Total deposition = Wet deposition + dry deposition
- Wet deposition is measured by [NADP/NTN](#)
- Dry deposition is expensive and labor intensive to measure
  - Meteorology, vegetation impact deposition velocities on a short time scale
  - Some pollutants (i.e.  $\text{NH}_3$ ) may be deposited or emitted (bi-directional flux)
- CAMD produces annual deposition gridded surface maps
  - calculate dry deposition by combining CASTNET concentrations with modeled output from [CMAQ](#) (deposition velocities and concentrations where measurements are not available)
  - Dry deposition surfaces are combined with wet deposition surfaces to provide total deposition surfaces
- Data for CAMD annual dry and total deposition estimates are provided as gridded Arc files and images, and as a data table of estimates at CASTNET site locations



Dry (left) and total (below) nitrogen deposition from 2014-2016





# CASTNET Website

- Data may be downloaded for individual sites or time periods using the query tool
- Data may be downloaded for entire period or by year using prepackaged data
  - Prepackaged zip files include data, column and table metadata (3 csv files)

**EPA** U.S. Environmental Protection Agency

Learn the Issues | Science & Technology | Laws & Regulations | About EPA

Search EPA.gov

CASTNET

Contact Us | Share

You are here: EPA Home » Air & Radiation » CAMD » CASTNET

## Download Data

What type of report would you like to download?

**Measurement (Raw Data)**

Filter pack data are reported for the time interval that the filter was exposed. Continuous measurements of gases (O<sub>3</sub>, SO<sub>2</sub>, NO, NO<sub>y</sub>, and CO) and meteorological parameters are reported as hourly averages. All data are reported in local standard time (i.e. times are not adjusted for daylight savings). Daily zero, span, and precision checks are reported for ozone and trace gases.

**Aggregate Concentration Data**

Data are measured concentrations for each pollutant averaged over weekly, seasonal, or annual time periods. In addition, users can download ozone 8-hour daily maximum or W126 values.

**Annual Deposition Data**

Annual total (wet + dry) deposition estimates calculated by a measurement/model hybrid method (for more details on the methodology see Schwede and Lear, 2014). Annual total deposition fluxes are calculated as the sum of wet and dry deposition using measured data (from NADP/NTN, NADP/AIRMoN, and CASTNET) and modeled results (from CMAQ and PRISM). Historical dry deposition results from the MLM can be found under the Historical Deposition Data report.

**Factual Data**

Data include site details and parameters used as input to the Multi-Layer Model (MLM). The MLM is used to estimate deposition rates at by parameter for each CASTNET site.

**Prepackaged Data**

These prepackaged datasets contain the same data as the previous four report types, but as raw csv data files for intensive data analysis.

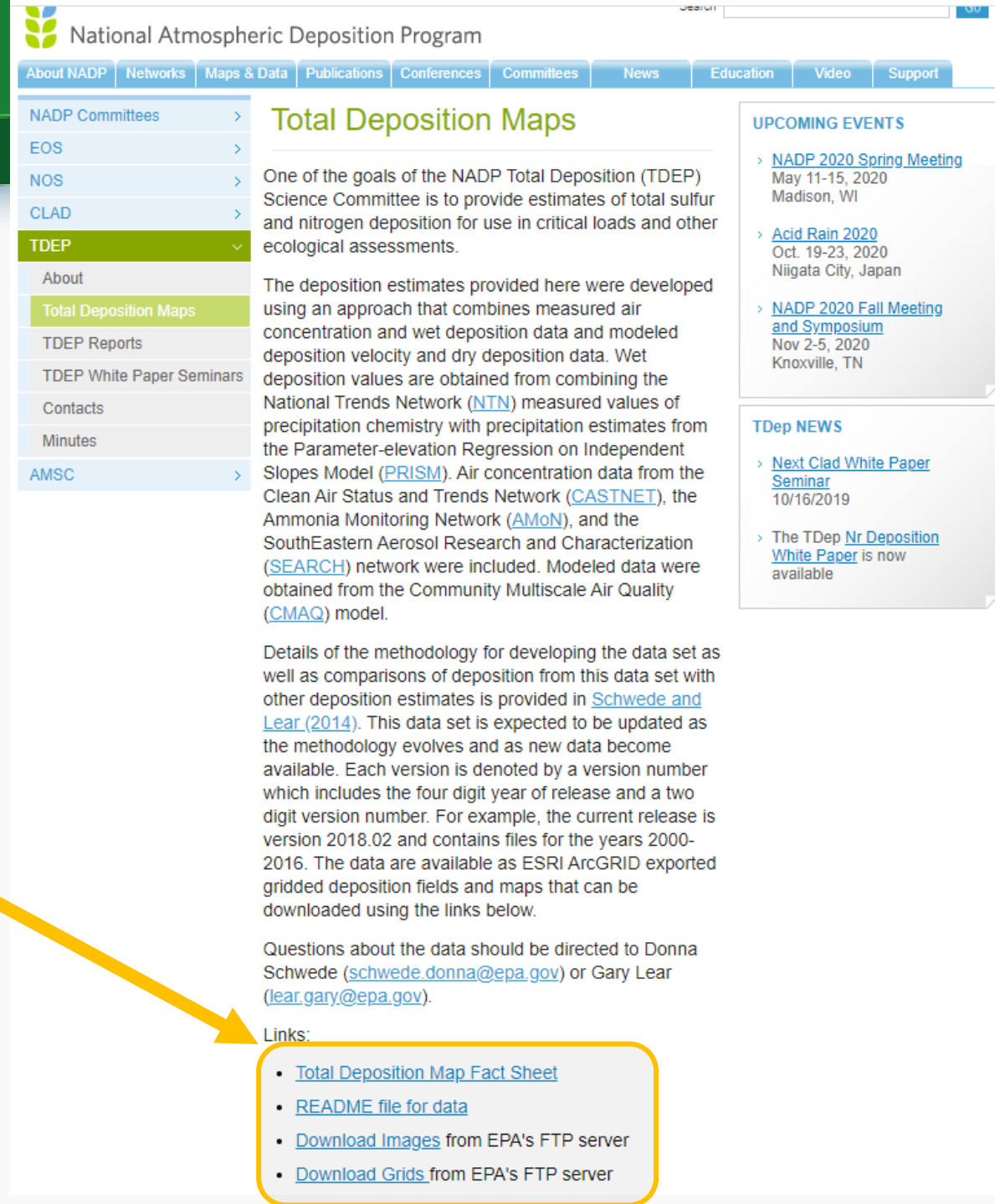
**Historical Deposition Data**

Data include historical MLM dry and total deposition results and cloud deposition model results. Deposition velocities are calculated using meteorological measurements or historical average deposition velocities are used when meteorological measurements are not available. The MLM is no longer supported by CASTNET (as of 2017). See the Annual Deposition Data report for current deposition estimates. The CLOUD deposition model provides cloud deposition results during warm weather sampling seasons. Additional information about the cloud deposition monitoring program can be found under the Documents tab.



# Total Deposition Grids

- Documentation information, the grids (.e00 files), and images of the grids can be downloaded from the NADP Total Deposition page



National Atmospheric Deposition Program

About NADP Networks Maps & Data Publications Conferences Committees News Education Video Support

NADP Committees >  
EOS >  
NOS >  
CLAD >  
TDEP ▾  
About  
Total Deposition Maps  
TDEP Reports  
TDEP White Paper Seminars  
Contacts  
Minutes  
AMSC >

## Total Deposition Maps

One of the goals of the NADP Total Deposition (TDEP) Science Committee is to provide estimates of total sulfur and nitrogen deposition for use in critical loads and other ecological assessments.

The deposition estimates provided here were developed using an approach that combines measured air concentration and wet deposition data and modeled deposition velocity and dry deposition data. Wet deposition values are obtained from combining the National Trends Network ([NTN](#)) measured values of precipitation chemistry with precipitation estimates from the Parameter-elevation Regression on Independent Slopes Model ([PRISM](#)). Air concentration data from the Clean Air Status and Trends Network ([CASTNET](#)), the Ammonia Monitoring Network ([AMoN](#)), and the SouthEastern Aerosol Research and Characterization ([SEARCH](#)) network were included. Modeled data were obtained from the Community Multiscale Air Quality ([CMAQ](#)) model.

Details of the methodology for developing the data set as well as comparisons of deposition from this data set with other deposition estimates is provided in [Schwede and Lear \(2014\)](#). This data set is expected to be updated as the methodology evolves and as new data become available. Each version is denoted by a version number which includes the four digit year of release and a two digit version number. For example, the current release is version 2018.02 and contains files for the years 2000-2016. The data are available as ESRI ArcGRID exported gridded deposition fields and maps that can be downloaded using the links below.

Questions about the data should be directed to Donna Schwede ([schwede.donna@epa.gov](mailto:schwede.donna@epa.gov)) or Gary Lear ([lear.gary@epa.gov](mailto:lear.gary@epa.gov)).

Links:

- [Total Deposition Map Fact Sheet](#)
- [README file for data](#)
- [Download Images](#) from EPA's FTP server
- [Download Grids](#) from EPA's FTP server

### UPCOMING EVENTS

- > [NADP 2020 Spring Meeting](#)  
May 11-15, 2020  
Madison, WI
- > [Acid Rain 2020](#)  
Oct. 19-23, 2020  
Niigata City, Japan
- > [NADP 2020 Fall Meeting and Symposium](#)  
Nov 2-5, 2020  
Knoxville, TN

### TDep NEWS

- > [Next Clad White Paper Seminar](#)  
10/16/2019
- > The TDep [Nr Deposition White Paper](#) is now available



# LONG-TERM MONITORING (LTM) DATA

Provides ambient air quality data from 97 monitoring sites across the U.S. to assess regional air quality and deposition

# Water Quality Data



- EPA has been monitoring changes in water quality parameters (chemical and physical) related to deposition since the early 1990's



## Chemical Parameters

- Nitrate ( $\text{NO}_3$ )
- Ammonium ( $\text{NH}_4^+$ )
- Sulfate ( $\text{SO}_4^{2-}$ )
- Base Cations:
  - Calcium (Ca)
  - Magnesium (Mg)
  - Sodium (Na)
  - Potassium (K)
- Chloride ( $\text{Cl}^-$ )
- Acid Neutralizing Capacity (ANC)
- pH
- Dissolved Organic Carbon (DOC)

## Physical Parameters

- Water Temperature
- Water Color
- Water Clarity
- Flow

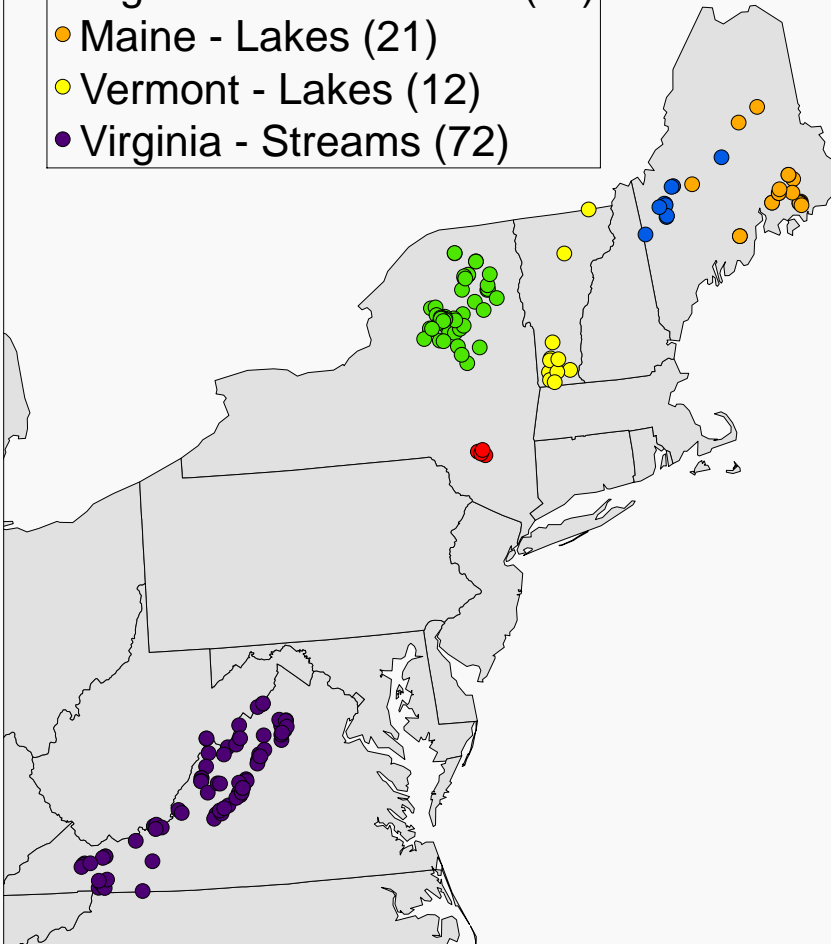


# Current LTM Network



## Legend

- Adirondacks - Lakes (50)
- Catskills - Streams (4)
- High Elevation - Lakes (11)
- Maine - Lakes (21)
- Vermont - Lakes (12)
- Virginia - Streams (72)



- 170 locations, ~1200 samples annually
- 220 peer-reviewed publications (and counting)
- Accomplished cooperatively through our network partners:

**Vermont Lakes** – 12 lakes , VT Department of Environmental Protection

**Maine + High Elevation Lakes** – 32 lakes, US Geological Survey (USGS) and the University of New Hampshire and University of Maine

**Adirondack Lakes** – 50 lakes, USGS, Adirondacks Lakes Survey Corporation (ALSC), the New York State Department of Environmental Conservation (NYSDEC), & New York State Energy and Research Development Authority (NYSERDA)

**Catskills Streams** – 4 streams, USGS

**Ridge and Blue Ridge (VA) Streams** –72 streams, Shenandoah National Park and the University of Virginia



# Data Available Online



| SITE_ID | PROGRAM_ID | DATE_SMP  | PARAMETER | SAMPLE_LOCATION | WATERBODY_TYPE | SAMPLE_DEPTH | VALUE | UNITS | METHOD        | METHOD_DESCRIPTION |                            |            |               |              |               |
|---------|------------|-----------|-----------|-----------------|----------------|--------------|-------|-------|---------------|--------------------|----------------------------|------------|---------------|--------------|---------------|
| 20059   | LTM_ME     | 7/30/1991 | AL_ORG    | EPI             | Lake           |              | 28    | ug/L  | Unknown       | Unknown            |                            |            |               |              |               |
| 20059   | LTM_ME     | 7/30/1991 | AL_TD     | EPI             | Lake           |              | 79    | ug/L  | Hillman et al | Perkin-Elmer D.C.  | J. Potter                  | and S. Sin | 1986. Anal    | Eastern Lake | EPA Las Vegas |
| 20059   | LTM_ME     | 7/30/1991 | ANC       | EPI             | Lake           |              | 32.9  | ueq/L | EPA 1983      | Gran plot          | EPA 600/4-90-010           | 1979       | Revised 1983. |              |               |
| 20059   | LTM_ME     | 7/30/1991 | CA        | EPI             | Lake           |              | 70.9  | ueq/L | EPA 1983      | AAS with ICP       | EPA 600/4-90-010           | 1979       | Revised 1983. |              |               |
| 20059   | LTM_ME     | 7/30/1991 | CL        | EPI             | Lake           |              | 30    | ueq/L | Hillman et al | Dionex 2100 D.C.   | J. Potter                  | and S. Sin | 1986. Anal    | Eastern Lake | EPA Las Vegas |
| 20059   | LTM_ME     | 7/30/1991 | COLOR_TRU | EPI             | Lake           |              | 45    | PtCo  | EPA 1983      | Bausch & Lomb      | EPA 600/4-90-010           | 1979       | Revised 1983. |              |               |
| 20059   | LTM_ME     | 7/30/1991 | DIC       | EPI             | Lake           |              | 0.5   | mg/L  | Unknown       | Unknown            |                            |            |               |              |               |
| 20059   | LTM_ME     | 7/30/1991 | DOC       | EPI             | Lake           |              | 7.9   | mg/L  | OI Standard   | OI Corporation     | College Station, TX 77841. |            |               |              |               |
| 20059   | LTM_ME     | 7/30/1991 | K         | EPI             | Lake           |              | 14.1  | ueq/L | EPA 1983      | AAS with ICP       | EPA 600/4-90-010           | 1979       | Revised 1983. |              |               |
| 20059   | LTM_ME     | 7/30/1991 | MG        | EPI             | Lake           |              | 37    | ueq/L | EPA 1983      | AAS with ICP       | EPA 600/4-90-010           | 1979       | Revised 1983. |              |               |
| 20059   | LTM_ME     | 7/30/1991 | N_TD      | EPI             | Lake           |              | 365   | ueq/L | Unknown       | Unknown            |                            |            |               |              |               |
| 20059   | LTM_ME     | 7/30/1991 | NA        | EPI             | Lake           |              | 43.1  | ueq/L | EPA 1983      | AAS with ICP       | EPA 600/4-90-010           | 1979       | Revised 1983. |              |               |
| 20059   | LTM_ME     | 7/30/1991 | NO3       | EPI             | Lake           |              | 0.1   | ueq/L | Hillman et al | Dionex 2100 D.C.   | J. Potter                  | and S. Sin | 1986. Anal    | Eastern Lake | EPA Las Vegas |
| 20059   | LTM_ME     | 7/30/1991 | P_TL      | EPI             | Lake           |              | 14.3  | ug/L  | Unknown       | Unknown            |                            |            |               |              |               |
| 20059   | LTM_ME     | 7/30/1991 | PH_EQ     | EPI             | Lake           |              | 6.41  | Units | Hillman et al | Aeration vial D.C. | J. Potter                  | and S. Sin | 1986. Anal    | Eastern Lake | EPA Las Vegas |
| 20059   | LTM_ME     | 7/30/1991 | PH_STVL   | EPI             | Lake           |              | 6.13  | Units | Unknown       | Unknown            |                            |            |               |              |               |
| 20059   | LTM_ME     | 7/30/1991 | SIO2      | EPI             | Lake           |              | 0.09  | mg/L  | Hillman et al | EPA 1983 Technicon | D.C.                       | J. Potter  | and S. Sin    | 1986. Anal   | Eastern Lake  |
| 20059   | LTM_ME     | 7/30/1991 | SO4       | EPI             | Lake           |              | 76    | ueq/L | Hillman et al | Dionex 2100 D.C.   | J. Potter                  | and S. Sin | 1986. Anal    | Eastern Lake | EPA Las Vegas |
| 20059   | LTM_ME     | 7/30/1991 | COND      | EPI             | Lake           |              | 22.3  | uS/cm | EPA 1983      | YSI model 33       | EPA 600/4-90-010           | 1979       | Revised 1983. |              |               |
| 20059   | LTM_ME     | 7/26/1995 | AL_TD     | EPI             | Lake           |              | 46    | ug/L  | Hillman et al | Perkin-Elmer D.C.  | J. Potter                  | and S. Sin | 1986. Anal    | Eastern Lake | EPA Las Vegas |
| 20059   | LTM_ME     | 7/26/1995 | ANC       | EPI             | Lake           |              | 25.7  | ueq/L | EPA 1983      | Gran plot          | EPA 600/4-90-010           | 1979       | Revised 1983. |              |               |

Metadata

Data

Site Information

<



# **POWER SECTOR PROGRESS REPORT**

Summarizes results from the many amazing tools/databases that you just learned about

# Web-Based Tool and Document

Provides overview of:

1. Program Basics
2. Covered Units
3. Emission Reductions
4. Emissions Controls and Monitoring
5. Program Compliance
6. Market Activity
7. Air Quality
8. Acid Deposition
9. Ecosystem Response

# POWER SECTOR PROGRAMS PROGRESS REPORT



17 states are covered by CSAPR Update for ozone (seasonal NO<sub>x</sub>) and by CSAPR for fine particles (SO<sub>2</sub> and annual NO<sub>x</sub>).

5 states are covered by CSAPR Update for ozone (seasonal NO<sub>x</sub>) only.

4 states are covered by CSAPR for fine particles (SO<sub>2</sub> and annual NO<sub>x</sub>) only.

Georgia is covered by CSAPR for both fine particles (SO<sub>2</sub> and annual NO<sub>x</sub>) and ozone (seasonal NO<sub>x</sub>).

The ARP covers sources in the lower 48 states.

The MATS covers sources in all 50 states and US territories.

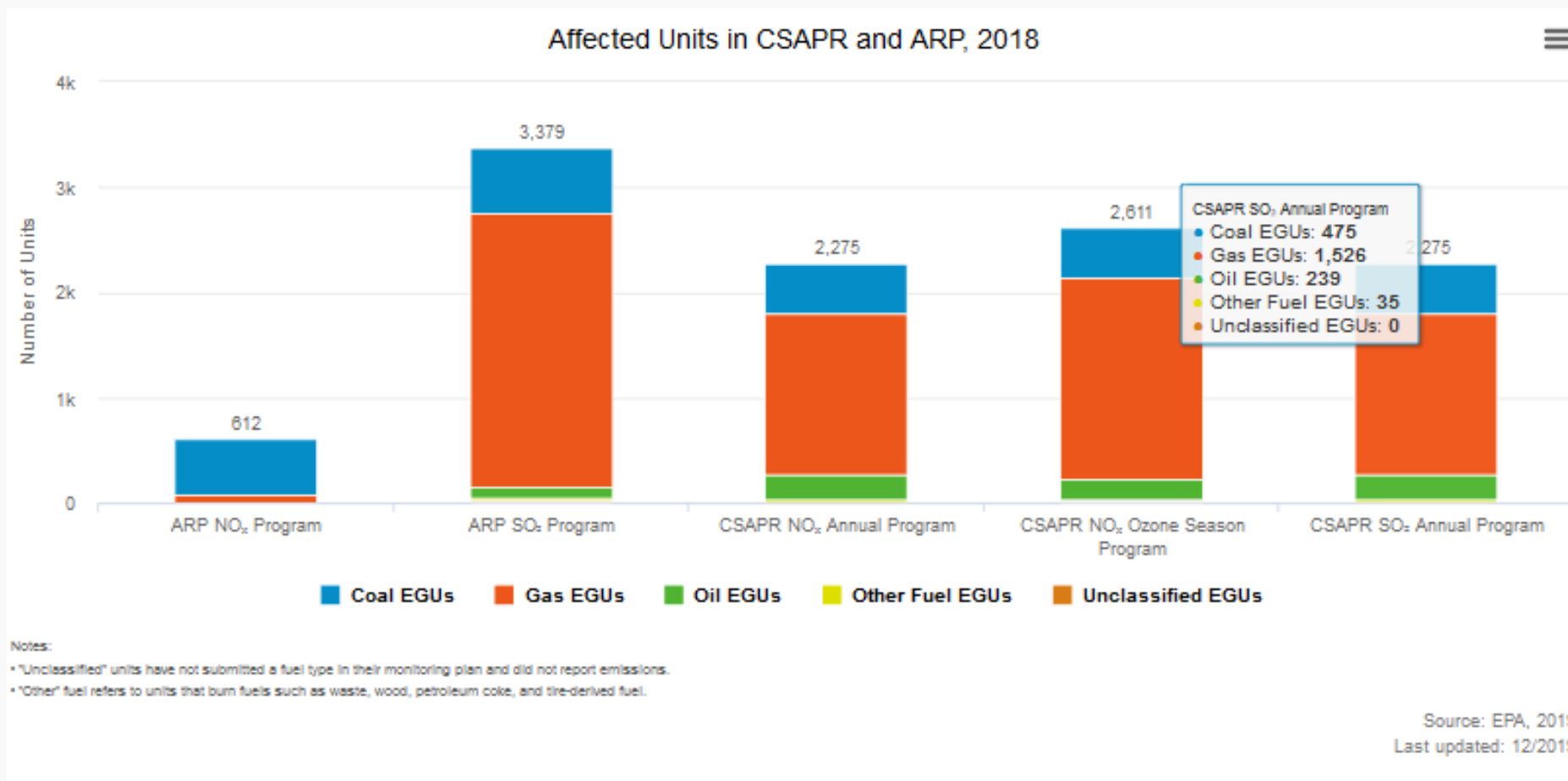
## 2018 ARP, CSAPR and MATS at a Glance

- **Annual SO<sub>2</sub> emissions:**  
CSAPR - 0.8 million tons (91 percent below 2005)  
ARP - 1.2 million tons (92 percent below 1990)
- **Annual NO<sub>x</sub> emissions:**  
CSAPR - 0.6 million tons (73 percent below 2005)  
ARP - 1.0 million tons (84 percent below 1990)
- **CSAPR ozone season NO<sub>x</sub> emissions:** 297,000 tons (53 percent below 2005)
- **Compliance:** 100 percent compliance for power plants in the market-based ARP and CSAPR allowance-trading programs.
- **Emissions reported under MATS:**  
Mercury - 3.7 tons (87 percent below 2010)
- **Ozone NAAQS attainment:** Based on 2016–2018 data, 88 of the 92 areas in the East originally designated as nonattainment for the 1997 ozone NAAQS are now meeting the standard, while the remaining 4 areas had incomplete data.
- **PM<sub>2.5</sub> NAAQS attainment:** Based on 2016–2018 data, 35 of the 39 areas in the East originally designated as nonattainment for the 1997 PM<sub>2.5</sub> NAAQS are now meeting the standard (one area has incomplete data).
- **Wet sulfate deposition:** All areas of the eastern United States have shown significant improvement with an overall 66 percent reduction in wet sulfate deposition from 2000–2002 to 2016–2018.
- **Levels of acid neutralizing capacity (ANC):** This indicator of recovery improved (i.e., increased) significantly from 1990 levels at lake and stream monitoring sites in the Adirondack region, New England and the Catskill mountains.



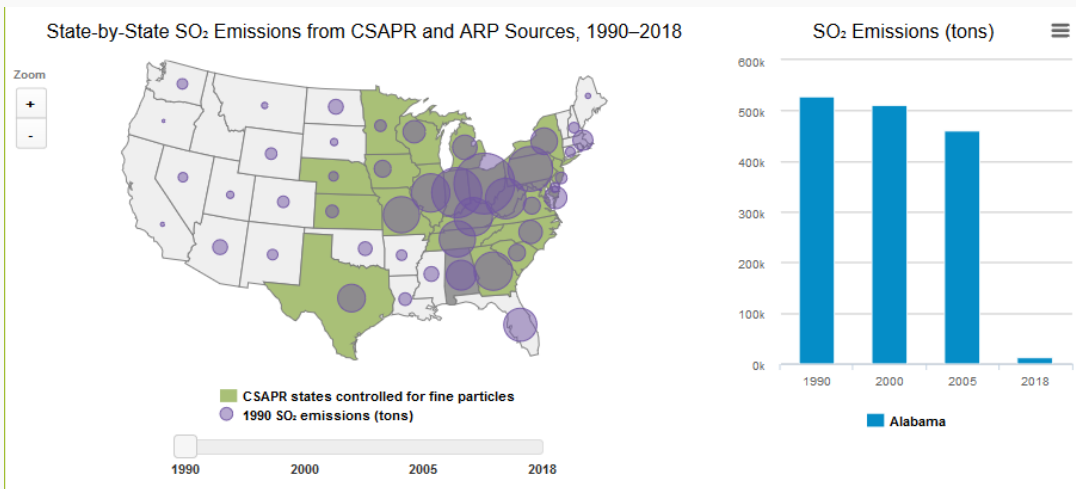


- Data gathered from Air Markets Program Data (AMPD)
- Summarizes number of units in each CSAPR and ARP program
- Data available in Excel sheets for easy download



# Emissions Reductions

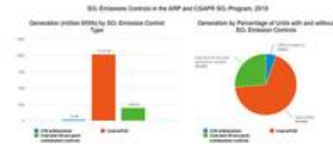
- Data gathered from Air Markets Program Data (AMPD)
- Data available in Excel sheets for easy download
- Provides emission trends, state-by-state trends, and emissions/generation data for the following pollutants:
  - sulfur dioxide,
  - annual nitrogen oxides,
  - ozone season nitrogen oxides, and
  - mercury



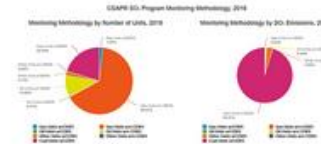
# Emissions Controls and Monitoring

- Data gathered from AMPD
- Summarizes types of controls used and how many units are monitoring with Continuous Emissions Monitoring Systems (CEMS)

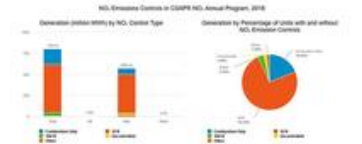
SO<sub>2</sub> Controls



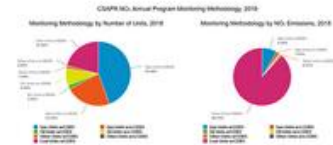
CSAPR SO<sub>2</sub> Program Monitoring Methodology



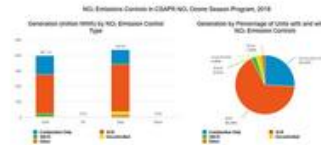
NO<sub>x</sub> Annual Program Controls



CSAPR NO<sub>x</sub> Annual Program Monitoring Methodology



NO<sub>x</sub> Ozone Season Controls

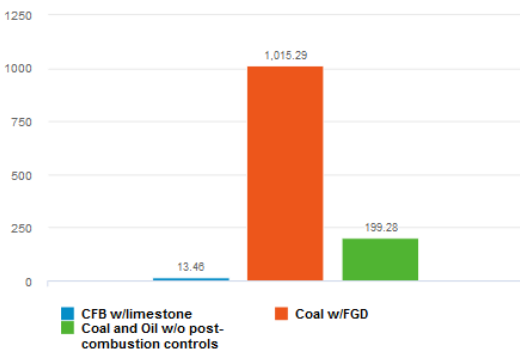


CSAPR NO<sub>x</sub> Ozone Season Program Monitoring Methodology

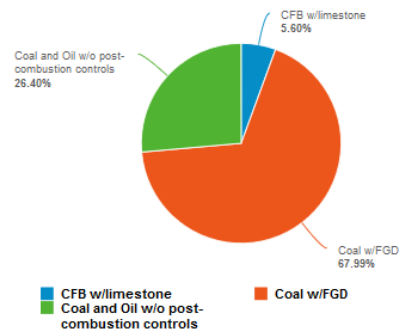


SO<sub>2</sub> Emissions Controls in the ARP and CSAPR SO<sub>2</sub> Program, 2018

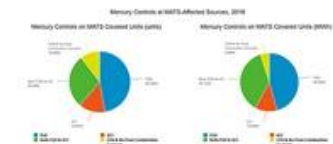
Generation (million MWh) by SO<sub>2</sub> Emission Control Type



Generation by Percentage of Units with and without SO<sub>2</sub> Emission Controls



Mercury Controls at MATS-Affected Sources



Mercury Compliance and Monitoring Methods



# Program Compliance

- Data gathered by AMPD
- Summarizes program allowance reconciliation data for each program under ARP and CSAPR

## Acid Rain Program SO<sub>2</sub> Program Allowance Reconciliation Summary, 2018

|  |                   |   |                   |
|--|-------------------|---|-------------------|
| <b>Total Allowances Held (1995 - 2018 Vintage)</b> | <b>53,451,159</b> | Held by Affected Facility Accounts                                  | <b>34,991,787</b> |
|  |                   | Held by Other Accounts (General and Non-Affected Facility Accounts) | <b>18,459,372</b> |
| Allowances Deducted for Acid Rain Compliance*      | 1,275,351         |   |                   |
| Penalty Allowance Deductions                       | 0                 |   |                   |
| <b>Banked Allowances</b>                           | <b>52,175,808</b> | Held by Affected Facility Accounts                                  | <b>33,716,436</b> |
|  |                   | Held by Other Accounts (General and Non-Affected Facility Accounts) | <b>18,459,372</b> |

\* Allowances deducted for ARP Compliance Includes 29,696 allowances deducted from opt-ins for reduced utilization.

### ARP SO<sub>2</sub> Program Compliance Results

|   |                  |
|---|------------------|
| Reported Emissions (tons)   | <b>1,245,696</b> |
| Compliance issues, rounding, and report resubmission adjustments (tons) | <b>-41</b>       |
| Emissions not covered by allowances (tons)                              | <b>0</b>         |
| Total allowances deducted for emissions                                 | <b>1,245,655</b> |

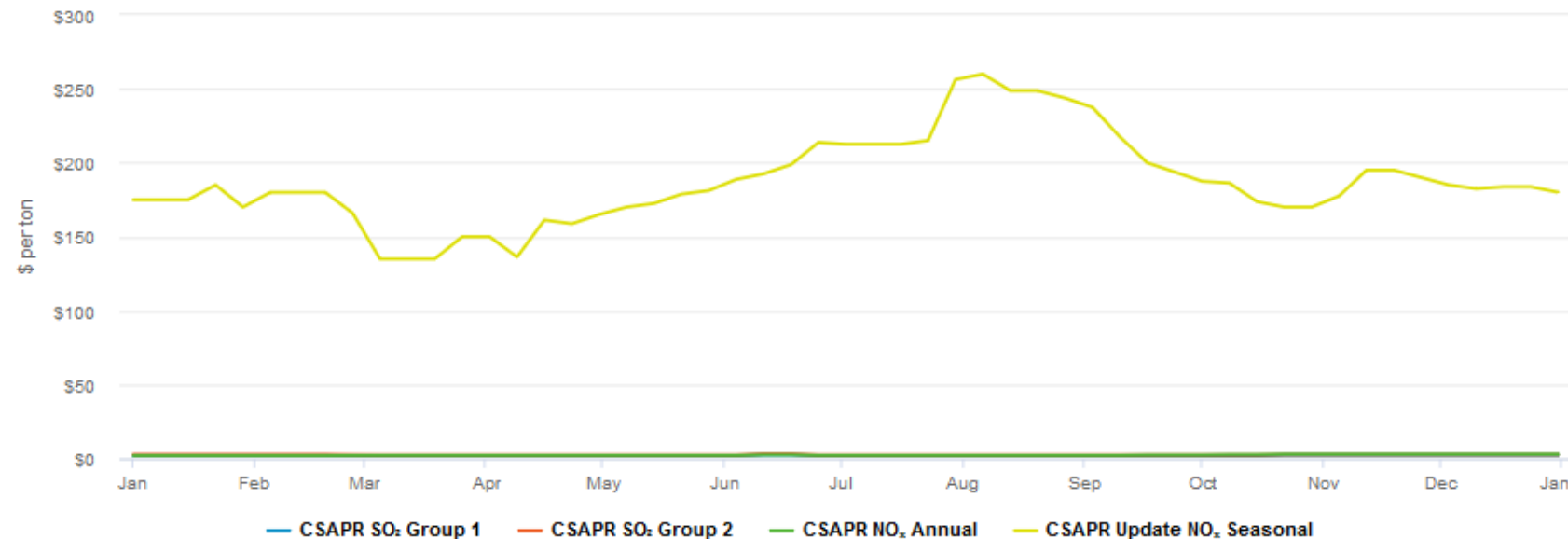
# Market Activity

- Data gathered from AMPD and a non-EPA source
- Summarizes allowance transfers under each program as well as allowance spot price data

2018 Allowance Transfers under CSAPR and ARP

|  | Transactions Conducted | Allowances Transferred | Share of Program's Allowances Transferred |              |
|--|------------------------|------------------------|---|--------------|
|  |                        |                        | Related (%)                               | Distinct (%) |
| ARP SO <sub>2</sub>                        | 754                    | 9,433,556              | 89%                                       | 11%          |
| CSAPR SO <sub>2</sub> Group 1              | 254                    | 350,962                | 80%                                       | 20%          |
| CSAPR SO <sub>2</sub> Group 2              | 65                     | 48,995                 | 48%                                       | 52%          |
| CSAPR NO <sub>x</sub> Annual               | 572                    | 105,855                | 71%                                       | 29%          |
| CSAPR NO <sub>x</sub> Ozone Season Group 1 | 20                     | 1,463                  | 98%                                       | 2%           |
| CSAPR NO <sub>x</sub> Ozone Season Group 2 | 708                    | 94,622                 | 60%                                       | 40%          |

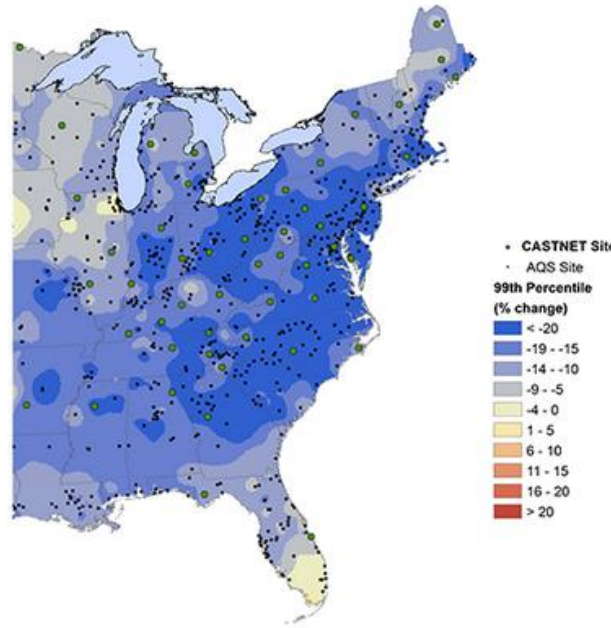
Allowance Spot Price (Prompt Vintage), January–December 2018





# Air Quality

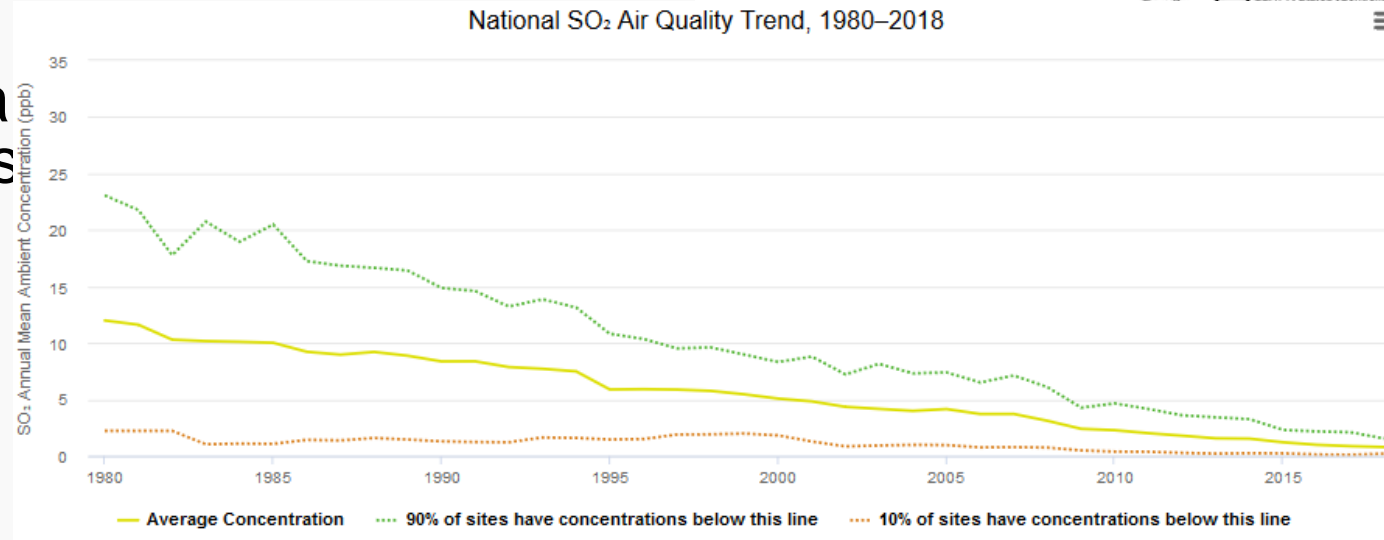
- Data gathered from the Clean Air Status and Trends Network (CASTNET) and another EPA office
- Summarizes trends in regional air quality, trends in ozone, and trends in PM<sub>2.5</sub>



Changes in the 1997 Annual PM<sub>2.5</sub> NAAQS Nonattainment Areas in CSAPR States, 2001–2003 (Original Designation) versus 2016–2018

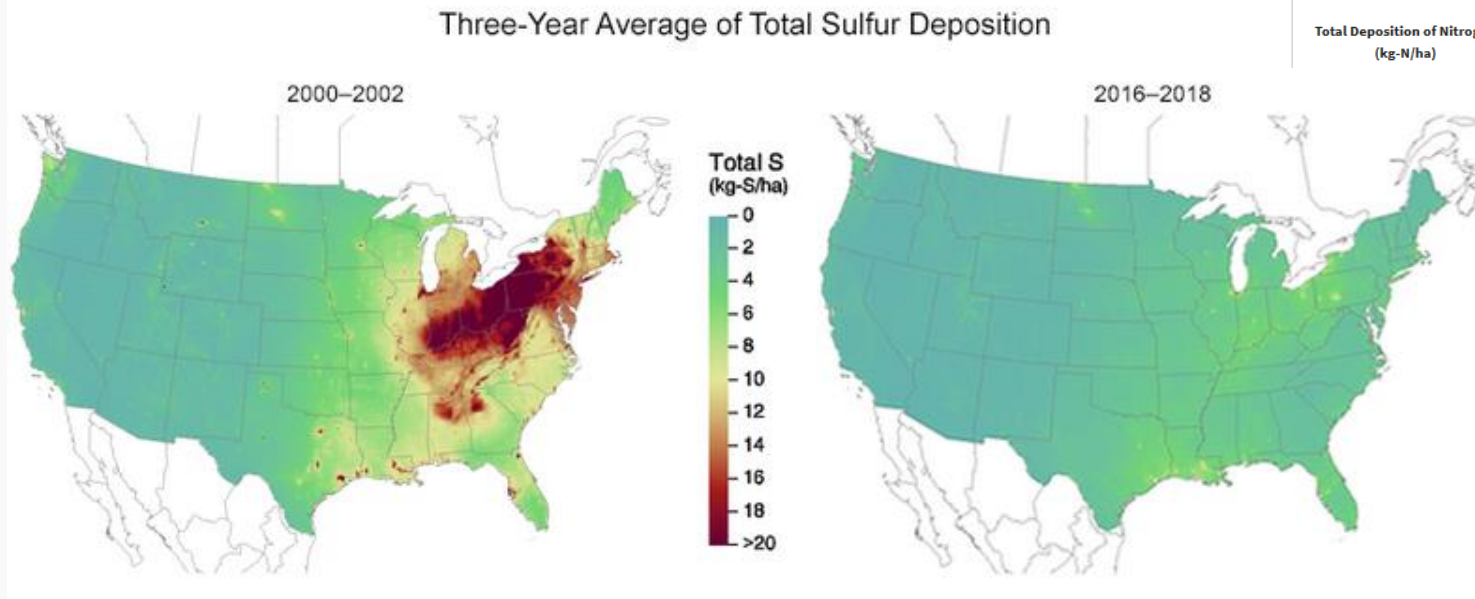


National SO<sub>2</sub> Air Quality Trend, 1980–2018



# Acid Deposition

- Data gathered from CASTNET and a partner monitoring program
- Summarizes wet, dry, and total deposition for sulfur and nitrogen species

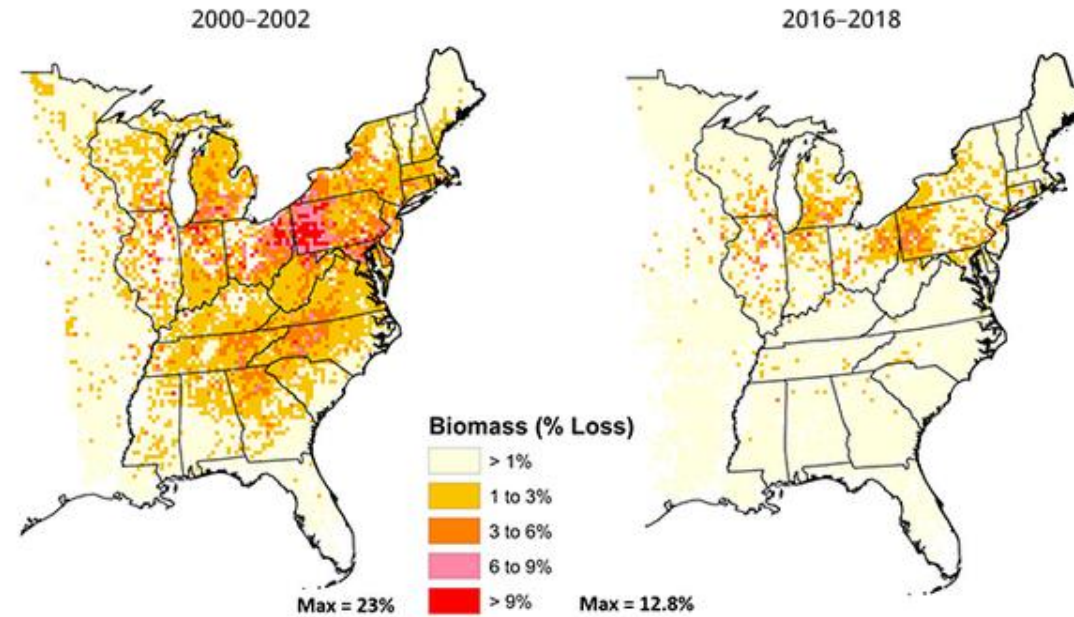


| Measurement                            | Region         | Annual Average, 2000–2002 | Annual Average, 2016–2018 | Percent Change |
|--|----------------|---------------------------|---------------------------|----------------|
| Dry Nitrogen Deposition (kg-N/ha)      | Mid-Atlantic   | 9.9                       | 6.1                       | -38            |
|  | Midwest        | 7.0                       | 5.0                       | -29            |
|  | North Central  | 4.7                       | 4.7                       | 0              |
|  | Northeast      | 6.1                       | 3.4                       | -44            |
|  | Pacific        | 2.7                       | 2.2                       | -19            |
|  | Rocky Mountain | 2.3                       | 2.0                       | -13            |
|  | South Central  | 5.8                       | 4.9                       | -16            |
|  | Southeast      | 6.7                       | 4.5                       | -33            |
| Wet Nitrogen Deposition (kg-N/ha)      | Mid-Atlantic   | 4.8                       | 4.0                       | -17            |
|  | Midwest        | 5.9                       | 5.4                       | -8.0           |
|  | North Central  | 4.5                       | 5.1                       | 13             |
|  | Northeast      | 4.8                       | 3.3                       | -31            |
|  | Pacific        | 1.0                       | 1.1                       | 10             |
|  | Rocky Mountain | 1.5                       | 1.6                       | 7.0            |
|  | South Central  | 4.0                       | 4.0                       | 0              |
|  | Southeast      | 4.0                       | 3.5                       | -13            |
| Total Deposition of Nitrogen (kg-N/ha) | Mid-Atlantic   | 14.7                      | 10                        | -32            |
|  | Midwest        | 12.9                      | 10.4                      | -19            |
|  | North Central  | 9.2                       | 9.8                       | 7.0            |
|  | Northeast      | 10.9                      | 6.7                       | -39            |
|  | Pacific        | 3.7                       | 3.3                       | -11            |



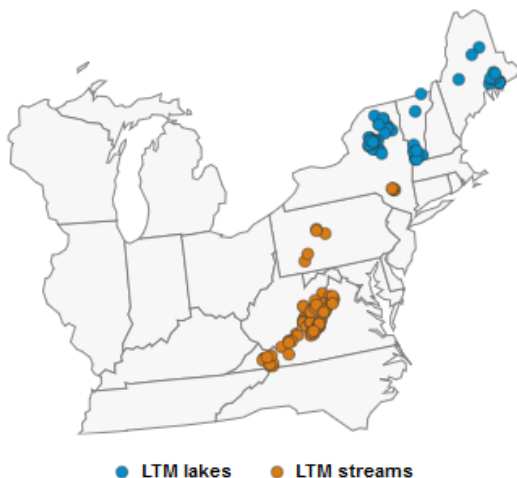
# Ecosystem Response

- Data gathered from our divisions' Long-Term Monitoring program, which monitors surface water chemistry
- Summarizes trends in regional water bodies as well as trends in critical loads



Long-term Monitoring Program Sites and Trends, 1990-2018

(hover over a site for more information)



Regional Trends in Sulfate, Nitrate, ANC, and Base Cations at Long-term Monitoring Sites, 1990-2018

| Region                            | Water Bodies Covered     | % of Sites with Improving Sulfate Trend | % of Sites with Improving Nitrate Trend | % of Sites with Improving ANC Trend | % of Sites with Improving Base Cations Trend |
|-----------------------------------|--------------------------|---|---|-------------------------------------|--|
| Adirondack Mountains              | 38 lakes in NY*          | 100%                                    | 81%                                     | 86%                                 | 92%  |
| New England                       | 26 lakes in ME and VT    | 100%                                    | 32%                                     | 82%                                 | 67%  |
| Catskills/ N. Appalachian Plateau | 9 streams in NY and PA** | 80%                                     | 78%                                     | 70%                                 | 90%  |
| Central Appalachians              | 66 streams in VA         | 52%                                     | 59%                                     | 6%                                  | 41%  |



## Wrap-Up

A full video and audio recording of this session along with this PowerPoint will be made available on <https://ecmps.camdsupport.com/webinars.shtml>.  
Materials from previous Ask CAMD sessions are also located there.

Thank you for joining us! If you have any questions, please review the full agenda and direct your questions to the appropriate contact person.