# The Clean Energy Group
## Clean Air Policy Initiative

November 17, 2011

MJB & A
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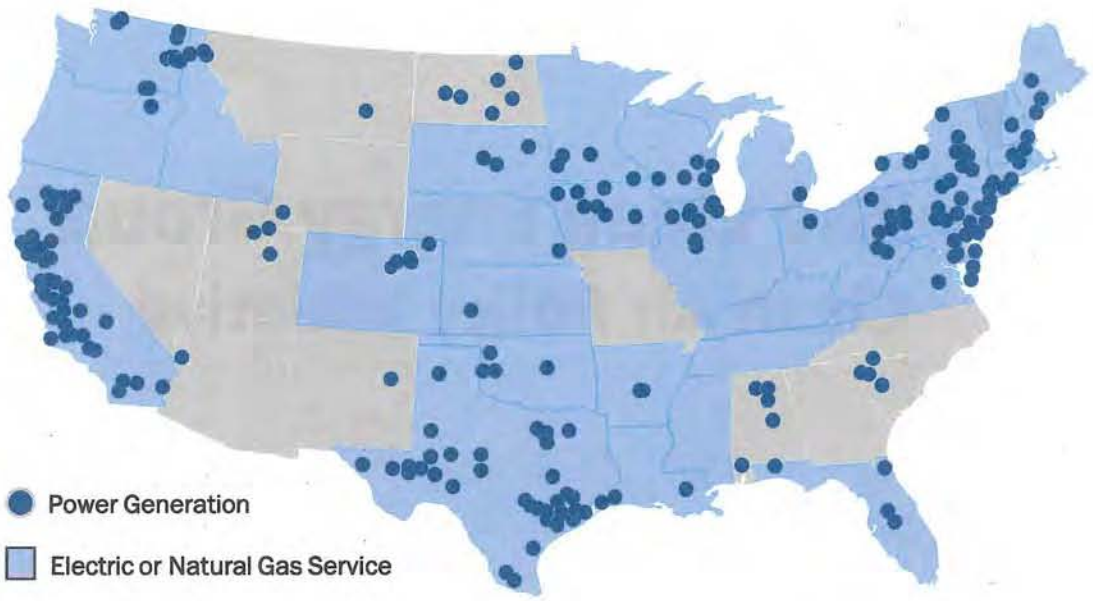
# The Clean Energy Group's Clean Air Policy Initiative

A coalition of electric power companies dedicated to responsible energy and environmental stewardship

Our members serve electricity to more than 52 million people

We have nearly 150,000 megawatts of generating capacity throughout the U.S.

Our members deliver natural gas to more than 10 million customers

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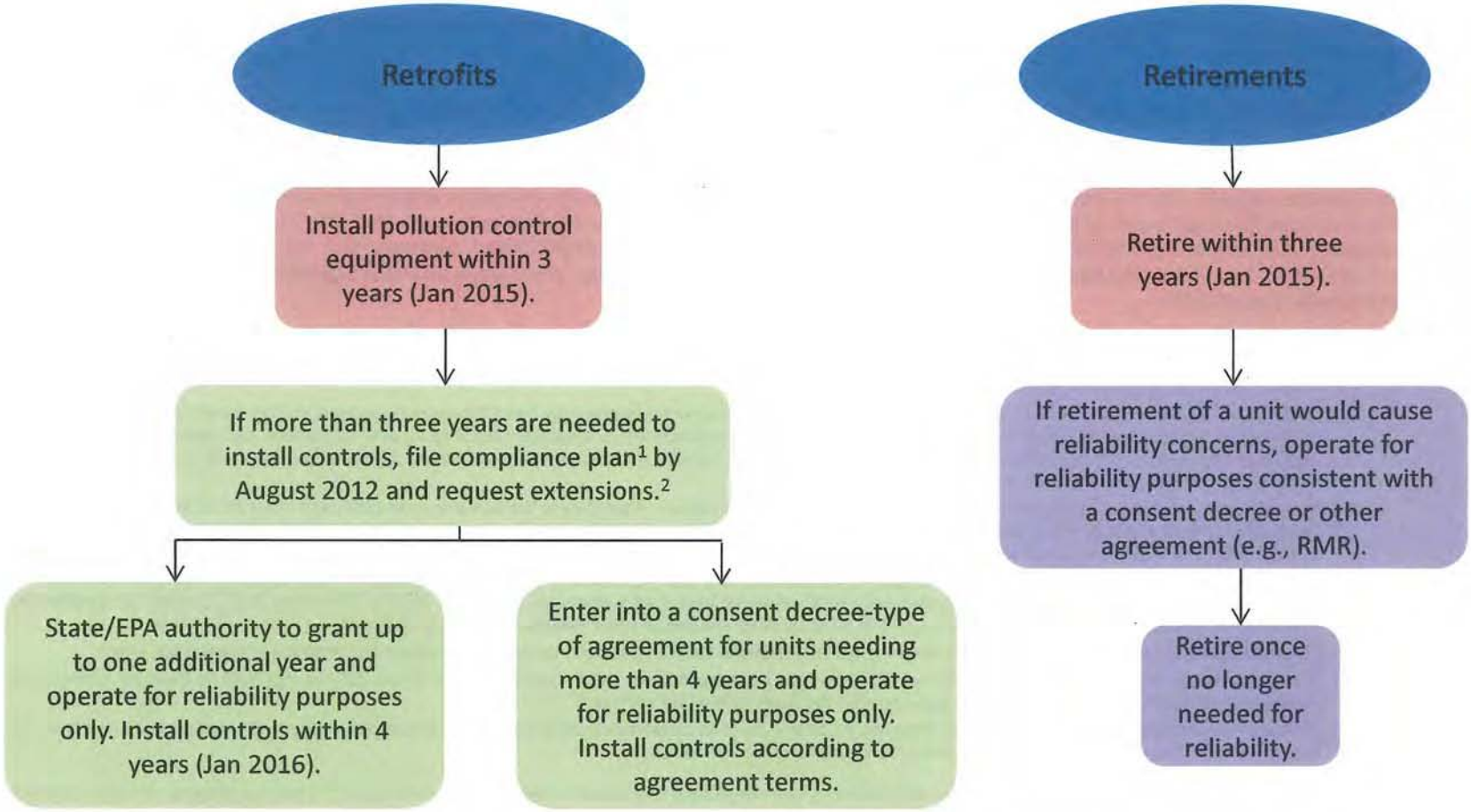
# Compliance Options for Utility Toxics Rule and Existing Authority for Extensions




[1]In order to facilitate market responses and ensure reliability, companies requesting additional time beyond 3 years should be required to submit a fleet-wide compliance plan that identifies which units will retire and which units will be retrofitted, explains the need for any additional time beyond 3 years to install controls, and that includes appropriate milestones for compliance.

[2] In the preamble for the final rule, EPA should clearly define the process and criteria for units to obtain any additional time.

# Dry Sorbent Injection (DSI)

- Dry Sorbent Injection (DSI) reduces $SO_2$ and other acid gases through the injection of a chemical reagent and with a downstream PM control device to capture the reaction products.

- Reagents used in DSI systems include sodium bicarbonate, hydrated lime, and a natural occurring mixture of sodium carbonate and sodium bicarbonate called *Trona*.

- Relative to a scrubber, DSI is a low capital cost alternative for controlling $SO_2$ and acid gas emissions, and can generally be installed within 12 months. DSI costs have been estimated at $55/kW.[2] Midwest Generation estimates that it can retrofit its entire coal fleet with DSI and fabric filters within 12 to 24 months (of decision) at a cost of $232/kW.[3] By contrast, a scrubber alone can cost over $400/kW.[4] Generally, DSI will be considered for coal units burning low sulfur PRB coal. Other factors that will drive the deployment of DSI include unit size, percentage reduction of emissions required, plant economics, and site specific characteristics.

- DSI has been deployed in a range of applications for acid gas control, including the electric generating sector. Additionally, companies have announced plans to install DSI technology after detailed research and testing.
  - In 2010, NRG's Dunkirk and Huntley power plants installed DSI systems that simultaneously inject Trona and powder-activated carbon (PAC). Performance tests indicate that emissions of $SO_2$ have been reduced by over 55 percent, mercury levels have been reduced by over 90 percent, and particulate levels have been reduced to less than 0.010 lbs/MMBtu. The company considers these installations sufficient and expects no additional environmental capex requirements to comply with the Toxics and Transport rule.[5]
  - Duke Energy installed DSI systems in 2010 at its Gallagher generating station. According to the company, the estimated total cost of the DSI system, to be installed at Units 2 and 4, is $11.6 million or about $41/kW. The system will reduce $SO_2$ emissions by 50 percent and achieve an emission rate no greater than 0.800 lb/MMBtu. Duke Energy expects the DSI system to help the company comply with the requirements of the Toxics and Transport Rule.[6]
  - Midwest Generation is another company that is seeking to retrofit its coal fleet (12 coal-fired units in the Midwest with total capacity of about 5 GW) with DSI technology and upgrading their particulate systems at a total estimated cost of $1.2 billion.[7] In November 2010 and February 2011, Midwest Generation obtained construction permits from the Illinois EPA to install DSI systems at its Waukegan and Powerton generating stations.[8]
  - Southern Company's E C Gaston and PPL's Ghent generating stations have also chosen to install and operate DSI systems in the last few years.
  - Conectiv Energy installed a Trona based DSI system at its Edge Moor plant (Units 3 and 4) and operated it from 2009 to mid-2010 on bituminous coal. The plant has since been converted to run on natural gas obviating the need for the DSI system.[4]
  - Portland General Electric is in the process of installing a DSI system at its Boardman plant in Oregon. The company expects the system to be online in July 2014 to comply with Oregon Department of Environmental Quality's BART standards.

- The basic reagent injection technology underlying DSI systems is mature and has been in service for more than 20 years at dozens of other coal-fired power plants.[9,10]

[1]Institute of Clean Air Companies, *Letter to Senator Thomas Carper, U.S. Senate*. November 2010
[2]U.S. EPA, *Documentation Supplement for EPA Base Case v4.10_PTox- Updates for Proposed Toxics Rule*, March 2011
[3]Bernstein Research, *U.S. Utilities: The EPA's Mercury and Air Toxics Standards Are Tougher Than They Appear*, March 2011
[4]James E. Staudt, *Control Technologies to Reduce Conventional and Hazardous Air Pollutants from Coal-fired Power Plants*. March, 2011
[5]NRG Energy, *Q1 2011 Earnings Conference Call*. May 5, 2011
[6]Indiana Utility Regulatory Commission, *Petition of Duke Energy Indiana, Inc,, for Issuance of a Certificate of Public Convenience and Necessity for use of Clean Coal Technology for a project, Dry Sorbent Injection, at Petitioner's Gallagher Generating Station*. Sep 8, 2010.
[7]Edison International, *Q2 2010 Earnings Call Transcript (http://www.morningstar.com/earnings/16355020-edison-international-eix-q2-2010.aspx)*. Accessed May 4, 2011.
[8]Midwest Generation LLC, *Form 10-K*. Feb, 2011.
[9]Babcock and Wilcox, *Dry Sorbent Injection Systems for Acid Gas Control*.
[10]EPA NEEDS v 4.10

## Based on emission rates reported by companies to EPA, many existing U.S. coal-fired units are already compliant with all of EPA's proposed limits for coal-fired electric generating units.

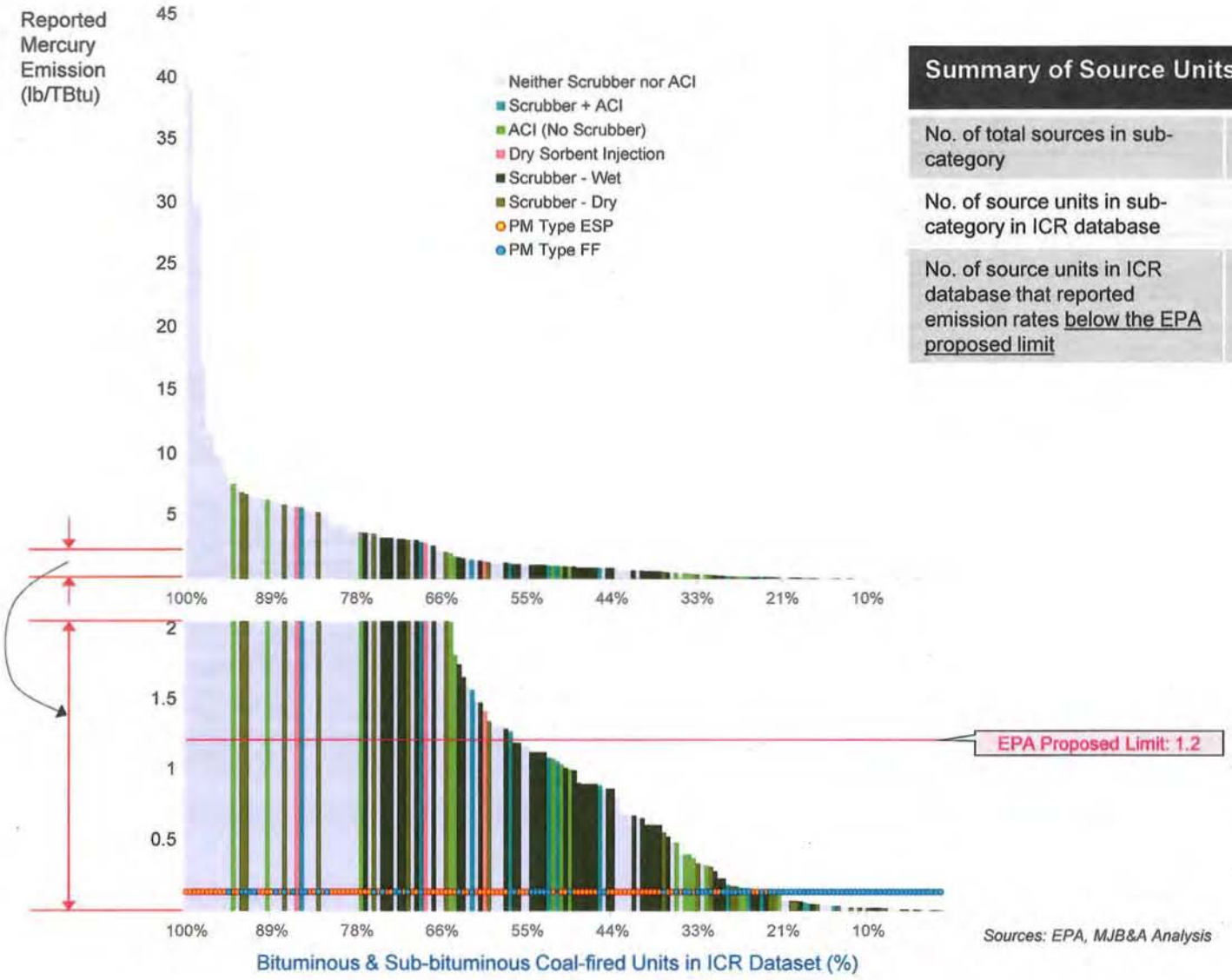
| Plant Name | State | Unit | Owner | MW | Coal Rank | PM Control | NOx | $SO_2$ | Hg | Compliance Status: Mercury | HCl | PM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G G Allen | NC | 3 | Duke | 282 | bituminous | ESP | SNCR | Wet | | ✓ | ✓ | ✓ |
| G G Allen | NC | 4 | Duke | 297 | bituminous | ESP | SNCR | Wet | | ✓ | ✓ | ✓ |
| East Bend Station | KY | 2 | Duke (69%), DPL (31%) | 651 | bituminous | ESP | SCR | Wet | | ✓ | ✓ | ✓ |
| Hammond | GA | 1 | Southern | 115 | bituminous | ESP | | Wet | | ✓ | ✓ | ✓ |
| Hammond | GA | 2 | Southern | 115 | bituminous | ESP | | Wet | | ✓ | ✓ | ✓ |
| Hammond | GA | 3 | Southern | 115 | bituminous | ESP | | Wet | | ✓ | ✓ | ✓ |
| Hammond | GA | 4 | Southern | 520 | bituminous | ESP | SCR | Wet | | ✓ | ✓ | ✓ |
| Hayden | CO | 2 | Xcel (53%), SRP (30%), MidAmerican (17%) | 285 | bituminous | FF | | Dry | | ✓ | ✓ | ✓ |
| Hayden | CO | 1 | Xcel (53%), SRP (30%), MidAmerican (17%) | 202 | bituminous | FF | | Dry | | ✓ | ✓ | ✓ |
| Bridgeport Station | CT | 2 | PSEG | 403 | subbituminous | ESP + FF | | | ACI | ✓ | ✓ | ✓ |
| San Juan | NM | 1 | PNM Resources (47%), UniSource (20%) | 370 | subbituminous | FF | | Wet | ACI | ✓ | ✓ | ✓ |
| San Juan | NM | 2 | PNM Resources (47%), UniSource (20%) | 370 | subbituminous | FF | | Wet | ACI | ✓ | ✓ | ✓ |
| San Juan | NM | 3 | PNM Resources (47%), UniSource (20%) | 544 | subbituminous | FF | | Wet | ACI | ✓ | ✓ | ✓ |
| San Juan | NM | 4 | PNM Resources (47%), UniSource (20%) | 544 | subbituminous | FF | | Wet | ACI | ✓ | ✓ | ✓ |
| Clover | VA | 2 | Dominion | 434 | bituminous | FF | SNCR | Wet | | ✓ | ✓ | ✓ |
| Chambers Cogeneration LP | NJ | 2 | Atlantic Power Corporation | 285 | bituminous | FF | SCR | Dry | | ✓ | ✓ | ✓ |
| Chambers Cogeneration LP | NJ | 1 | Atlantic Power Corporation | 285 | bituminous | FF | SCR | Dry | | ✓ | ✓ | ✓ |
| Birchwood Power Facility | VA | 1 | J-Power | 222 | bituminous | FF | SCR | Dry | | ✓ | ✓ | ✓ |
| Spruance Genco, LLC | VA | 4 | Cogentrix | 57 | bituminous | FF | | Dry | | ✓ | ✓ | ✓ |
| Spruance Genco, LLC | VA | 2 | Cogentrix | 57 | bituminous | FF | | Dry | | ✓ | ✓ | ✓ |
| INDIANTOWN COGENERATION L.P. | FL | 1 | Indiantown Cogeneration LP | 361 | bituminous | FF | SCR | Dry | | ✓ | ✓ | ✓ |
| Logan Generating Plant | NJ | 1 | Keystone Urban Renewal LP | 242 | bituminous | FF | SCR | Dry | | ✓ | ✓ | ✓ |
| Oak Grove | TX | 1 | Energy Future Holdings | 817 | lignite | ESP + FF | SCR | Wet | ACI | ✓ | ✓ | ✓ |
| Elrama Power Plant | PA | 1 | GenOn | 100 | bituminous | ESP + FF | SNCR | Wet | | ✓ | ✓ | ✓ |
| Elrama Power Plant | PA | 2 | GenOn | 100 | bituminous | ESP + FF | SNCR | Wet | | ✓ | ✓ | ✓ |
| Elrama Power Plant | PA | 3 | GenOn | 125 | bituminous | ESP + FF | SNCR | Wet | | ✓ | ✓ | ✓ |
| Elrama Power Plant | PA | 4 | GenOn | 185 | bituminous | ESP + FF | SNCR | Wet | | ✓ | ✓ | ✓ |
| Colstrip | MT | 3 | PPL (30%), Puget (25%), PGE(20%), Avista (15%), MidAmerican (10%) | 805 | subbituminous | Venturi | | Wet | ACI | ✓ | ✓ | ✓ |
| PSEG Mercer Generating Station* | NJ | 2 | PSEG | 343 | bituminous | ESP + FF | SCR | Dry | ACI | ✓ | ✓ | ✓ |
| PSEG Mercer Generating Station* | NJ | 1 | PSEG | 343 | bituminous | ESP + FF | SCR | Dry | ACI | ✓ | ✓ | ✓ |
| Brandon Shores* | MD | 1 | Constellation | 643 | bituminous | ESP + FF | SCR | Wet | ACI | ✓ | ✓ | ✓ |
| Brandon Shores* | MD | 2 | Constellation | 643 | bituminous | ESP + FF | SCR | Wet | ACI | ✓ | ✓ | ✓ |
| PSEG Hudson Generating Station* | NJ | 2 | PSEG | 608 | bituminous | FF | SCR | Dry | ACI | ✓ | ✓ | ✓ |
| | | | | 11,468 | | | | | | | | |

*Sources: EPA, Plant Owners, MJB&A Analysis*

*these units are not present in the ICR database. Information from their owners, however, indicate that they would be able to comply with the proposed standards without the need for any additional controls.

## Among coal-fired units that submitted emission data under EPA's most recent ICR*, nearly 60% of units are compliant with EPA's proposed limit for mercury

**Information Collection Request*

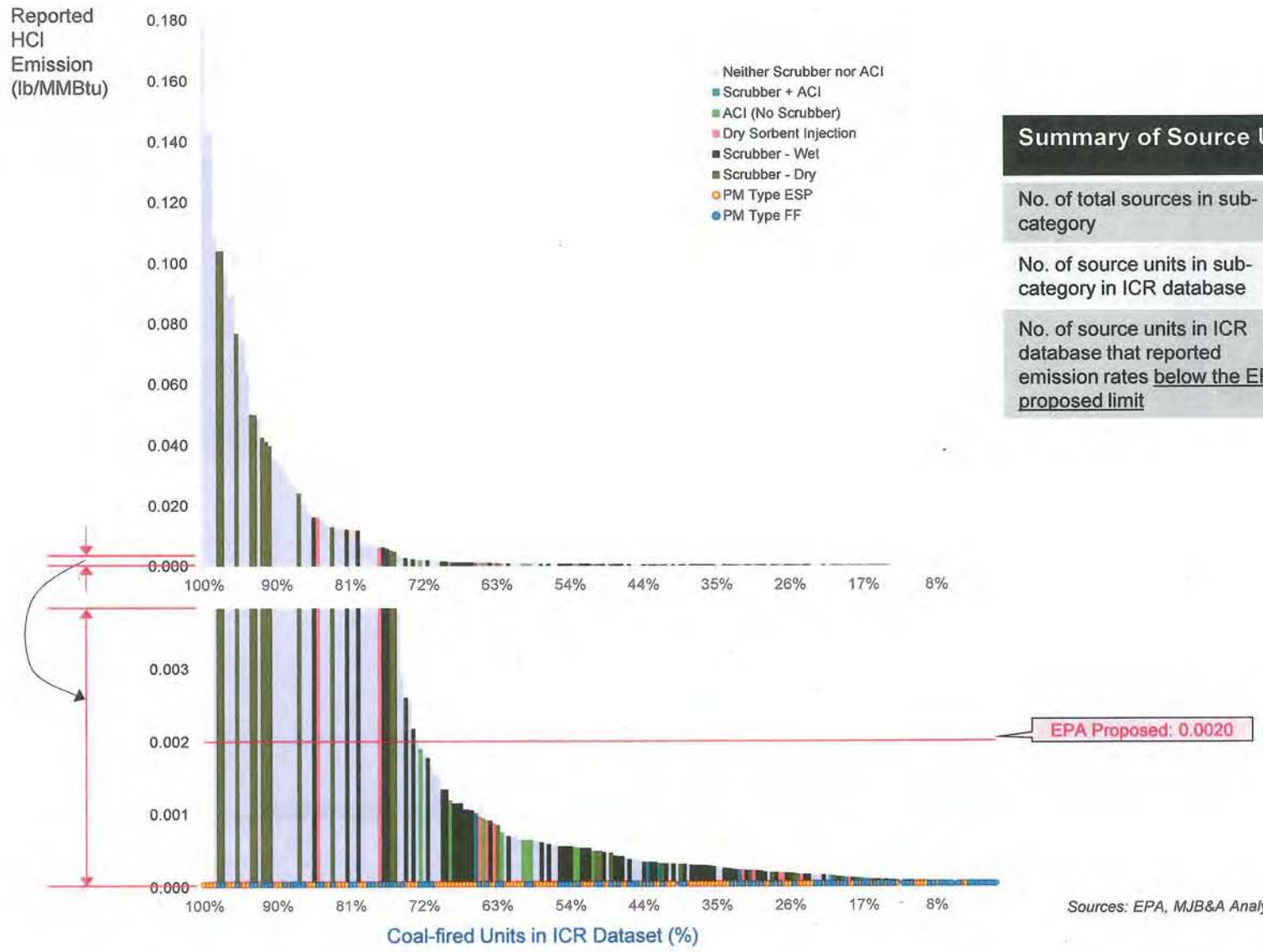



| Summary of Source Units | |
|---|---|
| No. of total sources in sub-category | 1,061 |
| No. of source units in sub-category in ICR database | 178 |
| No. of source units in ICR database that reported emission rates below the EPA proposed limit | 101 |

*Sources: EPA, MJB&A Analysis*

# Among coal-fired units that submitted emission data under EPA's most recent ICR*, 73% of units are compliant with EPA's proposed limit for HCl

**Information Collection Request*

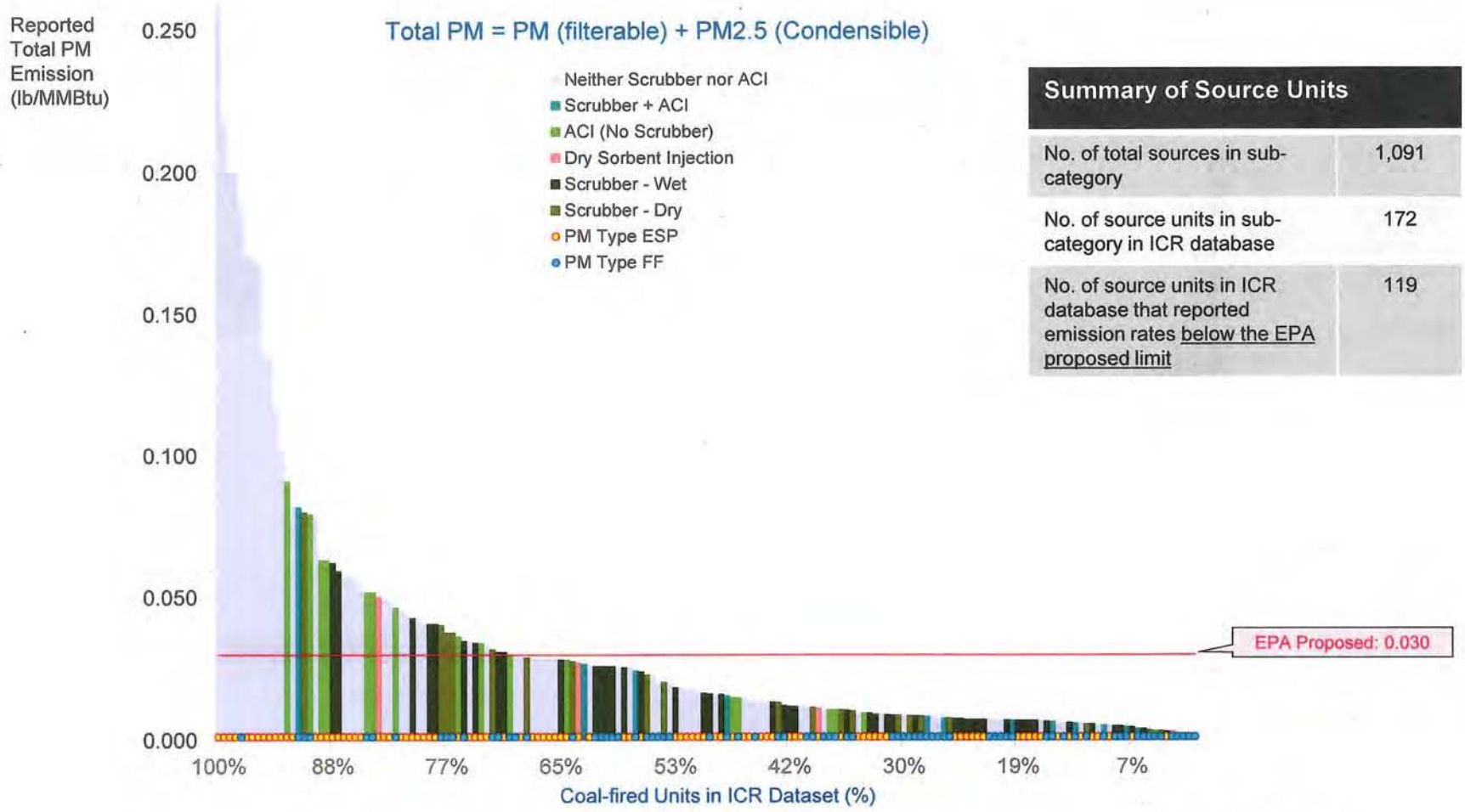



| Summary of Source Units | |
|---|---|
| No. of total sources in sub-category | 1,091 |
| No. of source units in sub-category in ICR database | 217 |
| No. of source units in ICR database that reported emission rates below the EPA proposed limit | 158 |

*Sources: EPA, MJB&A Analysis*

## Among coal-fired units that submitted emission data under EPA's most recent ICR*, almost 70% of units are compliant with EPA's proposed limit for PM

**Information Collection Request*




| Summary of Source Units | |
|---|---|
| No. of total sources in sub-category | 1,091 |
| No. of source units in sub-category in ICR database | 172 |
| No. of source units in ICR database that reported emission rates below the EPA proposed limit | 119 |

*Sources: EPA, MJB&A Analysis*