

Updates in May 2019 Reference Case

1. Introduction

This document describes the updates in the May 2019 Reference Case and are incremental to the EPA's Power Sector Modeling Platform v6 using IPM November 2018 Reference Case. These updates are detailed below.

2. National Electric Energy Data System (NEEDS) Updates (Section 4.1 in EPA Platform v6 Documentation)

NEEDS was updated with the comments (retirement and non-retirement) from the NEEDS Comment Tracker. Unretired units have been included. To facilitate the use of the 2030 projections of emissions as a proxy for the 2028 year, the retirement years for NEEDS units with retirement years of 2029 and 2030 were pushed back to 2035 run year. Incremental units including committed units for all fossil and non-fossil units > 25 MW based on a comparison of February 2019 and October 2017 versions of EIA Form 860M were hardwired.

Table 4-1 Data Sources for NEEDS v6 for EPA Platform v6

Data Source ¹	Data Source Documentation
EIA Form 860	<p>EIA Form 860 is an annual survey of utility and non-utility power plants at the generator level. It contains data such as summer, winter, and nameplate capacity, location (state and county), operating status, prime mover, energy sources and in-service date of existing and proposed generators. NEEDS v6 uses the annual 2015 EIA Form 860, annual 2016 Early Release EIA Form 860, 2017 Early Release EIA Form 860, May 2017 EIA Form 860M, October 2017 EIA Form 860M, July 2018 EIA Form 860M and the February 2019 EIA Form 860M as the primary generator data inputs.</p> <p>EIA Form 860 also collects data of steam boilers such as energy sources, boiler identification, location, operating status and design information; and associated environmental equipment such as NO_x combustion and post-combustion controls, FGD scrubber, mercury control and particulate collector device information. Note that boilers in plants with less than 10 MW do not report all data elements. The association between boilers and generators is also provided. Note that boilers and generators are not necessarily in a one-to-one correspondence. NEEDS v6 uses 2015 EIA Form 860 and 2016 Early Release EIA Form 860 as the primary boiler data inputs.</p>
EIA's Annual Energy Outlook (AEO)	The Energy Information Administration (EIA) Annual Energy Outlook presents annually updated forecasts of energy supply, demand and prices covering a 30-year time horizon. The projections are based on results from EIA's National Energy Modeling System (NEMS). Information from AEO 2017 such as heat rates and planned-committed units were used in NEEDS v6.
EPA's Emission Tracking System	The Emission Tracking System (ETS) database is updated quarterly. It contains information including primary fuel, heat input, SO ₂ , NO _x , Mercury, and HCl controls, and SO ₂ and NO _x emissions. NEEDS v6 uses annual and seasonal ETS (2017) data as one of the primary data inputs for NO _x rate development and environmental equipment assignment.
Utility and Regional EPA Office Comments	Comments from utilities, regional EPA offices and other stakeholders regarding the prior versions of NEEDS.

Note:

¹ Shown in Table 4-1 are the primary issue dates of the indicated data sources used. Other vintages of these data sources were also used in instances where data were not available for the indicated issued date, or where there were methodological reasons for using other vintages of the data.

Table 4-3 Summary Population (through 2017) of Existing Units in NEEDS v6

Plant Type	Number of Units	Capacity (MW)
Biomass	183	3,792
Coal Steam	582	222,730
Combined Cycle	1,823	245,663
Combustion Turbine	5,364	142,998
Energy Storage	81	659
Fossil Waste	81	1,049
Fuel Cell	72	130
Geothermal	164	2,396
Hydro	3,802	79,177
IGCC	5	815
Landfill Gas	1,569	1,843
Municipal Solid Waste	163	2,113
Non-Fossil Waste	216	2,027
Nuclear	90	92,260
O/G Steam	448	75,046
Offshore Wind	1	29
Onshore Wind	1,184	86,954
Pumped Storage	148	22,196
Solar PV	2,452	24,144
Solar Thermal	16	1,754
Tires	2	52
US Total	18,466	1,007,828

Table 4-7 Aggregation Profile of Model Plants as Provided at Set up of EPA Platform v6

Existing and Planned/Committed Units		
Plant Type	Number of Units	Number of IPM Model Plants
Biomass	300	165
Coal Steam	677	527
Combined Cycle	2,032	891
Combustion Turbine	5,994	2,535
Energy Storage	85	41
Fossil Waste	86	25
Fuel Cell	72	35
Geothermal	174	31
Hydro	5,455	252
IGCC	5	2
IMPORT	1	1
Landfill Gas	1,643	307
Municipal Solid Waste	166	60
Non-Fossil Waste	268	140
Nuclear	115	115
O/G Steam	590	399
Offshore Wind	1	1
Onshore Wind	1,570	89

Pumped Storage	155	27
Solar PV	2,532	98
Solar Thermal	17	5
Tires	2	1
Total	21,940	5,747
New Units		
Plant Type	Number of IPM Model Plants	
New Battery Storage	168	
New Biomass	134	
New Combined Cycle	456	
New Combined Cycle with Carbon Capture	228	
New Combustion Turbine	456	
New Fuel Cell	150	
New Geothermal	93	
New Hydro	153	
New Landfill Gas	379	
New Nuclear	132	
New Offshore Wind	894	
New Onshore Wind	5,358	
New Solar PV	1,373	
New Solar Thermal	261	
New Ultrasupercritical Coal with 30% CCS	266	
New Ultrasupercritical Coal with 90% CCS	266	
New Ultrasupercritical Coal without CCS	138	
Total	10,905	
Retrofits		
Plant Type	Number of IPM Model Plants	
Retrofit Coal with ACI	74	
Retrofit Coal with ACI + CCS	92	
Retrofit Coal with ACI + CCS + HRI	92	
Retrofit Coal with ACI + CCS + HRI + SCR	20	
Retrofit Coal with ACI + CCS + HRI + SNCR	29	
Retrofit Coal with ACI + CCS + SCR	20	
Retrofit Coal with ACI + DSI	20	
Retrofit Coal with ACI + DSI + HRI	20	
Retrofit Coal with ACI + DSI + HRI + SCR	31	
Retrofit Coal with ACI + DSI + HRI + SCR + Scrubber	22	
Retrofit Coal with ACI + DSI + HRI + Scrubber	18	
Retrofit Coal with ACI + DSI + HRI + Scrubber + SNCR	14	
Retrofit Coal with ACI + DSI + HRI + SNCR	27	
Retrofit Coal with ACI + DSI + SCR	31	
Retrofit Coal with ACI + DSI + SCR + Scrubber	22	
Retrofit Coal with ACI + DSI + Scrubber	18	
Retrofit Coal with ACI + DSI + Scrubber + SNCR	14	
Retrofit Coal with ACI + DSI + SNCR	31	

Retrofit Coal with ACI + HRI	74
Retrofit Coal with ACI + HRI + SCR	62
Retrofit Coal with ACI + HRI + SCR + Scrubber	62
Retrofit Coal with ACI + HRI + Scrubber	53
Retrofit Coal with ACI + HRI + Scrubber + SNCR	74
Retrofit Coal with ACI + HRI + SNCR	61
Retrofit Coal with ACI + SCR	62
Retrofit Coal with ACI + SCR + Scrubber	62
Retrofit Coal with ACI + Scrubber	52
Retrofit Coal with ACI + Scrubber + SNCR	75
Retrofit Coal with ACI + SNCR	62
Retrofit Coal with C2G	454
Retrofit Coal with C2G + SCR	454
Retrofit Coal with CCS	791
Retrofit Coal with CCS + HRI	788
Retrofit Coal with CCS + HRI + SCR	252
Retrofit Coal with CCS + HRI + SCR + Scrubber	208
Retrofit Coal with CCS + HRI + Scrubber	232
Retrofit Coal with CCS + HRI + Scrubber + SNCR	152
Retrofit Coal with CCS + HRI + SNCR	180
Retrofit Coal with CCS + SCR	255
Retrofit Coal with CCS + SCR + Scrubber	212
Retrofit Coal with CCS + Scrubber	240
Retrofit Coal with CCS + Scrubber + SNCR	156
Retrofit Coal with CCS + SNCR	183
Retrofit Coal with DSI	21
Retrofit Coal with DSI + HRI	70
Retrofit Coal with DSI + HRI + SCR	75
Retrofit Coal with DSI + HRI + SCR + Scrubber	21
Retrofit Coal with DSI + HRI + Scrubber	26
Retrofit Coal with DSI + HRI + SNCR	69
Retrofit Coal with DSI + SCR	109
Retrofit Coal with DSI + SCR + Scrubber	33
Retrofit Coal with DSI + Scrubber	38
Retrofit Coal with DSI + SNCR	103
Retrofit Coal with HRI	482
Retrofit Coal with HRI + SCR	432
Retrofit Coal with HRI + SCR + Scrubber	450
Retrofit Coal with HRI + Scrubber	357
Retrofit Coal with HRI + Scrubber + SNCR	408
Retrofit Coal with HRI + SNCR	342
Retrofit Coal with SCR	242
Retrofit Coal with SCR + Scrubber	582
Retrofit Coal with Scrubber	224
Retrofit Coal with Scrubber + SNCR	544
Retrofit Coal with SNCR	203

Retrofit Combined Cycle with CCS	2787
Retrofit Oil/Gas steam with SCR	222
Total	13,691
Retirements	
Plant Type	Number of IPM Model Plants
Biomass Retirement	165
CC Retirement	891
Coal Retirement	5,394
CT Retirement	2,535
Geothermal Retirement	31
Hydro Retirement	252
IGCC Retirement	2
Landfill Gas Retirement	307
Nuke Retirement	115
Oil/Gas steam Retirement	1,075
Total	10,767
Grand Total (Existing and Planned/Committed + New + Retrofits + Retirements):41,110	

Table 4-11 Summary of Planned-Committed Units in NEEDS v6 for EPA Platform v6

Plant Type	Capacity (MW)	Year Range Described
Renewables/Non-conventional		
Biomass	12	2019 - 2019
Energy Storage	22	2018 - 2019
Hydro	244	2018 - 2020
Non-Fossil Waste	92	2018 - 2020
Onshore Wind	3,483	2018 - 2019
Solar PV	431	2018 - 2020
Subtotal	4,285	
Fossil/Conventional		
Combined Cycle	18,195	2018 - 2020
Combustion Turbine	2,302	2018 - 2021
Nuclear	2,200	2022 - 2023
O/G Steam	23	2018 - 2018
Subtotal	22,720	
Grand Total	27,004	

Table 4-12 Planned-Committed Units by Model Region in NEEDS v6 for EPA Platform v6

IPM Region	Plant Type	Capacity (MW)
ERC_PHDL	Onshore Wind	588
ERC_REST	Combustion Turbine	1,061
	Non-Fossil Waste	23
	Onshore Wind	160
ERC_WEST	Onshore Wind	660
FRCC	Biomass	12
	Combined Cycle	1,640
	Solar PV	149
MIS_AMSO	Combined Cycle	1,000
MIS_IA	Onshore Wind	66
MIS_INKY	Combined Cycle	644
MIS_LA	Non-Fossil Waste	48
MIS_MAPP	Combustion Turbine	218
MIS_MNWI	Combustion Turbine	215
	Onshore Wind	40
MIS_WUMS	Combined Cycle	700
	Solar PV	2
NENG_CT	Combined Cycle	1,230
	Combustion Turbine	90
NENG_ME	O/G Steam	23
NY_Z_C&E	Solar PV	4
NY_Z_G-I	Combined Cycle	705
	Non-Fossil Waste	19
PJM_ATSI	Combined Cycle	273
PJM_Dom	Combined Cycle	1,585
	Combustion Turbine	300
PJM_EMAC	Combined Cycle	1,368
PJM_PENE	Combined Cycle	926
	Combustion Turbine	13
PJM_SMAC	Combined Cycle	755
PJM_West	Combined Cycle	1,187
PJM_WMAC	Combined Cycle	3,472
S_C_TVA	Combined Cycle	1,052
S_SOU	Nuclear	2,200
S_VACA	Combined Cycle	1,072
SPP_N	Combustion Turbine	6
SPP_SPS	Onshore Wind	800
SPP_WAUE	Onshore Wind	98
SPP_WEST	Combustion Turbine	399
	Onshore Wind	200
WEC_CALN	Combined Cycle	586
	Non-Fossil Waste	2
	Solar PV	200
WEC_LADW	Energy Storage	20
WECC_CO	Onshore Wind	30
WECC_NM	Onshore Wind	580
WECC_PNW	Hydro	244
	Onshore Wind	60
	Solar PV	56
WECC_SCE	Energy Storage	2
	Onshore Wind	171
	Solar PV	20
WECC_WY	Onshore Wind	30

Note: Any unit in NEEDS v6 that has an online year of 2018 or later was considered a Planned/Committed Unit.

3. Storage Mandates (Section 4.4.5 in EPA Platform v6 Documentation)

May 2019 Reference Case has incorporated updated storage mandates in California, Massachusetts, and New York. The mandates related to California Assembly Bill 2868 and Senate Bill 801 were removed as these mandates did not have a specific year for implementation.

Table 4-36 Energy Storage Mandates in EPA Platform v6

State/Region	Bill	Mandate Type	Mandate Specifications	Implementation Status
California	Assembly Bill No. 2514	Target in MW	Energy storage target of 1,325 megawatts for Pacific Gas and Electric Company, Southern California Edison, and San Diego Gas & Electric by 2020, with installations required no later than the end of 2024.	2025
			LADWP adopted a resolution setting its 2021 energy storage target at 178 MW.	
New York	New York State Energy Storage Target	Target in MW	1,500 Megawatts by 2025 and up to 3,000 megawatts by 2030	2025
New Jersey	Assembly Bill No. 3723	Target in MW	600 megawatts of energy storage by 2021 and 2,000 megawatts of energy storage by 2030.	2021
Oregon	House Bill 2193	Target in MWh per electric company	An electric company shall procure one or more qualifying energy storage systems that have the capacity to store at least five megawatt hours of energy on or before January 1, 2020.	2020
Massachusetts	Chapter 188	Target in MWh	200 Megawatt hour (MWh) energy storage target for electric distribution companies to procure viable and cost-effective energy storage systems to be achieved by January 1, 2020.	2020
	House Bill 4857	Target in MWh	Goal of 1,000 MWh of energy storage by the end of 2025.	2025

4. SO₂ Floor Rates and Removal Efficiencies (Section 3.9.1 in EPA Platform v6 Documentation)

The SO₂ removal efficiencies for existing coal units with FGD's were updated based on those reported in 2017 EIA Form 860. The FGD removal efficiencies in South Carolina are based on efficiencies realized during the 2015-2018 period. In addition, the SO₂ rate floor values for existing coal units with FGD's are calculated as follows.

- Dry FGD - minimum (0.08, minimum reported ETS SO₂ rate for the 2014-2018 period)
- Wet FGD - minimum (0.06, minimum reported ETS SO₂ rate for the 2014-2018 period)

5. New Jersey ZEC Bill (Section 4.5.1 in EPA Platform v6 Documentation)

New Jersey has established a ZEC program. Salem Harbor 1 & 2 and Hope Creek nuclear units are eligible to receive payments during the year of implementation plus the three following years and may be considered for additional three-year renewal periods thereafter. May 2019 Reference Case has modeled the New Jersey ZEC bill by disabling the retirement options for Salem Harbor 1 & 2 and Hope Creek nuclear power plants in 2021 run year.