

ATTACHMENT A



EPA IPM Summary Run Results

Projections for Continental U.S.

2023 Reference Case

All costs and prices are in 2022-year dollars

Values in red are rounded to zero, not equal to zero

NATIONWIDE EMISSIONS	2028	2030	2035	2040	2045	2050	2055
SO2 (million tons)	0.5	0.3	0.2	0.1	0.1	0.1	0.2
NOx (million tons)	0.5	0.4	0.3	0.2	0.1	0.1	0.2
CO2 (million metric tons)	1159	1098	724	459	307	454	584
Hg (tons)	3	3	2	2	1	2	2
HCL (Mtons)	2	2	1	1	0	1	1

TOTAL COSTS	2028	2030	2035	2040	2045	2050	2055
Total Costs (billion \$)	134.48	140.90	144.90	149.45	161.82	172.77	190.11

PRICES	2028	2030	2035	2040	2045	2050	2055
National Wholesale Electricity Price (mills/kWh)	36.14	41.60	34.33	33.02	27.71	35.78	40.87
Natural Gas Prices (2022 \$/MMBtu)							
Henry Hub	3.15	3.27	3.25	3.19	3.34	3.93	4.54
Delivered	3.22	3.34	3.27	3.16	3.33	3.92	4.55
Minemouth Coal Prices (2022 \$/MMBtu)							
Appalachia	1.49	1.53	1.54	1.55	1.88	1.83	1.78
Imports	4.73	4.45	4.30				
Interior	1.56	1.58	1.73	1.78	1.87	1.96	1.96
Waste Coal	0.80	0.97	0.83	0.98	0.98	1.36	1.74
West	0.84	0.88	0.94	1.04	1.32	1.15	1.12
National	1.10	1.15	1.21	1.33	1.56	1.46	1.42

TOTAL CAPACITY (Cumulative GW)	2028	2030	2035	2040	2045	2050	2055
Hydro	102	104	107	112	112	112	112
Non-Hydro Renewables	394	440	699	943	1,232	1,257	1,292
Biomass	0	0	0	0	0	0	0
Geothermal	3	3	3	3	3	3	3
Landfill Gas	3	3	3	3	3	4	5
Solar	180	182	298	345	494	512	528
Wind	207	252	394	592	732	738	756
Distributed Solar PV	81	92	121	152	185	224	274
Coal	106	85	52	42	30	28	28
Coal without CCS	105	84	41	31	29	28	27
IGCC without CCS	1	1	0	0	0	0	0
Coal with CCS	0	0	11	11	1	1	1
Energy Storage	47	59	114	139	176	177	179
Nuclear	94	91	84	79	65	45	29
Natural Gas	471	479	476	516	566	674	750
CC without CCS	313	314	312	312	306	326	358
CC with CCS	0	0	0	0	0	0	0
CT	158	165	163	204	259	347	392
Oil/Gas Steam	63	64	55	54	54	52	52
Other	7	7	7	7	7	7	7
Grand Total	1,283	1,328	1,592	1,893	2,241	2,353	2,448

NEW MODELED CAPACITY (Cumulative GW)	2028	2030	2035	2040	2045	2050	2055
Hydro	0	1	5	9	9	9	9
Non-Hydro Renewables	45	91	349	594	883	908	943
Biomass	0	0	0	0	0	0	0
Geothermal	1	1	1	1	1	1	1
Landfill Gas	1	1	1	1	1	2	3
Solar	10	11	127	174	323	341	357
Wind	33	78	220	418	558	564	582

Coal	0	0	0	0	0	0	0
Coal without CCS	0	0	0	0	0	0	0
IGCC without CCS	0	0	0	0	0	0	0
Coal with CCS	0	0	0	0	0	0	0
Energy Storage	3	15	70	96	133	134	135
Nuclear	0	0	0	0	0	0	0
Natural Gas	26	34	34	75	141	261	339
CC without CCS	19	20	20	20	20	48	80
CC with CCS	0	0	0	0	0	0	0
CT	7	14	14	55	121	213	258
Other	0	0	0	0	0	0	0
Grand Total	74	142	459	775	1,167	1,313	1,427

NEW HARDWIRED CAPACITY (Cumulative GW)	2028	2030	2035	2040	2045	2050	2055
Hydro	0	0	0	0	0	0	0
Non-Hydro Renewables	34	34	34	34	34	34	34
Biomass	0	0	0	0	0	0	0
Geothermal	0	0	0	0	0	0	0
Landfill Gas	0	0	0	0	0	0	0
Solar	27	27	27	27	27	27	27
Wind	7	7	7	7	7	7	7
Coal	0	0	0	0	0	0	0
Coal without CCS	0	0	0	0	0	0	0
IGCC without CCS	0	0	0	0	0	0	0
Coal with CCS	0	0	0	0	0	0	0
Energy Storage	13	13	13	13	13	13	13
Nuclear	0	0	0	0	0	0	0
Natural Gas	8	8	8	8	8	8	8
CC without CCS	6	6	6	6	6	6	6
CC with CCS	0	0	0	0	0	0	0
CT	2	2	2	2	2	2	2
Other	0	0	0	0	0	0	0
Grand Total	55	55	55	55	55	55	55

RETIREMENTS (GW)	2028	2030	2035	2040	2045	2050	2055
CC Retirements	1	1	2	3	9	16	17
Coal Retirements	38	56	83	92	105	106	107
CT Retirements	0	1	2	2	13	18	18
Nuclear Retirements	0	3	10	15	29	48	65
O/G Retirements	12	12	23	24	24	26	26
IGCC Retirements	0	0	1	1	1	1	1
Biomass Retirements	3	3	3	3	3	3	3
Fuel Cell Retirements	0	0	0	0	0	0	0
Fossil_Other Retirements	0	0	0	0	0	0	0
Geothermal Retirements	0	0	0	0	0	0	0
Hydro Retirements	0	0	0	0	0	0	0
Landfill Gas Retirements	0	0	0	0	0	0	0
Non Fossil_Other Retirements	0	0	0	0	0	0	0
Energy Storage Retirements	0	0	0	0	0	0	0
Grand Total	54	76	124	139	183	218	236

GENERATION MIX (thousand GWh)	2028	2030	2035	2040	2045	2050	2055
Hydro	293	298	319	336	343	344	346
Non-Hydro Renewables	1,141	1,329	2,229	3,097	4,032	4,094	4,200
Biomass	0	1	0	0	0	0	0
Biomass Co-firing	0	0	0	0	0	0	0
Geothermal	21	21	21	21	21	21	21
Landfill Gas	20	20	19	18	17	24	31
Solar	398	401	705	821	1,194	1,230	1,268
Wind	701	885	1,483	2,236	2,800	2,818	2,880
Distributed Solar PV	121	138	180	226	277	335	410
Coal	472	410	236	137	49	100	143
Coal without CCS (Biomass Co-firing is included)	469	403	160	61	45	96	140
IGCC without CCS	4	4	0	0	0	0	0
Coal with CCS	0	3	76	76	4	4	4
Energy Storage	53	69	148	195	282	287	292

Nuclear	751	729	667	614	471	352	224
Natural Gas	1,652	1,670	1,344	936	617	871	1,107
CC without CCS	1,612	1,635	1,302	909	589	825	1,050
CC with CCS	0	0	3	3	3	3	3
CT	40	35	39	24	25	42	53
Oil/Gas Steam	26	25	8	5	4	4	5
Other	31	31	31	29	28	28	28
Grand Total	4,418	4,560	4,981	5,348	5,825	6,080	6,345

FUEL SUPPLY AND CONSUMPTION	2028	2030	2035	2040	2045	2050	2055
Coal Use by Region (million tons)	77	69	66	72	70	71	71
Power Sector							
Appalachia	40	39	32	19	4	7	10
Imports	0	0	0				
Interior	38	35	19	10	1	6	9
Waste Coal	7	7	7	3	3	3	3
West	166	141	89	61	20	40	60
Non-Power Sector	77	69	66	72	70	71	71
Appalachia	5	5	5	4	4	3	3
Interior	21	17	15	28	29	29	28
West	51	47	47	40	37	39	39
Power Sector Coal Use by Rank (million tons)	250	218	141	90	26	54	78
Bituminous	72	63	42	26	4	7	10
Subbituminous	145	126	74	46	19	39	58
Lignite	32	29	24	18	3	7	11
Natural Gas Use (Trillion cubic feet)	12	12	9	6	4	6	7

Note: Distributed Solar PV are not included in the Grand Total of "Total Capacity" and "Generation Mix"