



Net-Zero America - New Jersey data

October 29, 2021 (updated January 9, 2022)

See the [Data Sheet Guide](#) for explanations of the contents of this document. The data herein underlie graphs and tables found in Princeton's Net-Zero America report:

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Table 1: E+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		110	0.076	0.076	0.071	0.046	0.003
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		81.4	60.8	41.4	40.6	27.6	11.3
Premature deaths from air pollution - Mobile - On-Road (deaths)		442	421	327	193	88.7	33.7
Premature deaths from air pollution - Gas Stations (deaths)		32.3	30.2	23.1	13.7	6.38	2.62
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		115	98.9	69.7	40.2	19.5	7.45
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		45.8	37.9	26.3	15.5	6.86	2.01
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		8.17	7.55	6.06	4.25	2.55	1.44
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.42	2.37	2.31	2.24	2.16	2.06
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		98.8	91.7	73.3	51	32.7	18.1
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		17.4	14.7	11	7.32	5.27	4.06
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		3.97	3.41	2.84	2.26	1.69	1.12
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.26	0.714	0.726	0.732	0.758	0.767
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		71.3	66.5	59	46.8	33.7	20.5
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		976	0.678	0.674	0.627	0.411	0.029
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		721	538	367	359	245	100
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		3,928	3,747	2,908	1,717	789	300
Monetary damages from air pollution - Gas Stations (million \$2019)		286	268	204	121	56.5	23.2
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		1,016	877	618	356	173	66
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		406	336	233	137	60.8	17.8
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		72.4	66.9	53.7	37.7	22.6	12.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		21.5	21	20.5	19.8	19.1	18.3
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		875	812	649	452	290	160

Table 1: *E+ scenario - IMPACTS - Health (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		154	130	97.1	64.8	46.6	35.9
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		35.1	30.2	25.1	20	14.9	9.96
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		11.1	6.3	6.4	6.46	6.69	6.77
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		633	591	524	416	300	182

Table 2: *E+ scenario - IMPACTS - Jobs*

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		81.7	209	106	83.7	63.6	47.5
By economic sector - Construction (jobs)		11,388	11,060	13,101	13,723	24,134	22,345
By economic sector - Manufacturing (jobs)		6,739	11,687	11,985	10,259	14,183	12,229
By economic sector - Mining (jobs)		3,110	2,210	1,447	893	518	276
By economic sector - Other (jobs)		1,396	1,470	1,845	2,094	2,993	4,248
By economic sector - Pipeline (jobs)		749	664	527	373	246	163
By economic sector - Professional (jobs)		4,626	4,569	5,326	5,781	9,712	9,591
By economic sector - Trade (jobs)		3,830	3,515	3,797	3,949	6,142	6,632
By economic sector - Utilities (jobs)		9,849	9,866	13,119	14,835	31,512	23,085
By resource sector - Biomass (jobs)		350	575	302	252	232	203
By resource sector - CO2 (jobs)		0	234	209	0	0	0
By resource sector - Coal (jobs)		209	70	0	0	0	0
By resource sector - Grid (jobs)		10,668	11,893	19,568	22,374	59,501	41,761
By resource sector - Natural Gas (jobs)		7,886	6,335	5,401	6,079	4,247	3,871
By resource sector - Nuclear (jobs)		1,833	1,803	1,775	1,747	1,720	1,693
By resource sector - Oil (jobs)		7,097	5,643	4,064	2,777	1,868	1,091
By resource sector - Solar (jobs)		13,659	18,009	19,383	17,222	17,610	27,119
By resource sector - Wind (jobs)		66.2	687	552	1,540	4,326	2,879
By education level - All sectors - High school diploma or less (jobs)		17,721	19,409	22,004	22,218	38,438	33,669
By education level - All sectors - Associates degree or some college (jobs)		13,119	14,285	16,417	16,806	29,244	25,634
By education level - All sectors - Bachelors degree (jobs)		8,608	9,169	10,156	10,218	17,162	15,131
By education level - All sectors - Masters or professional degree (jobs)		2,038	2,109	2,370	2,432	4,153	3,697
By education level - All sectors - Doctoral degree (jobs)		282	279	307	317	505	487
Related work experience - All sectors - None (jobs)		6,026	6,506	7,418	7,571	13,134	11,530
Related work experience - All sectors - Up to 1 year (jobs)		8,337	9,217	10,399	10,467	17,836	15,909
Related work experience - All sectors - 1 to 4 years (jobs)		15,047	16,191	18,324	18,609	32,092	28,118
Related work experience - All sectors - 4 to 10 years (jobs)		9,749	10,455	11,872	12,091	20,879	18,233
Related work experience - All sectors - Over 10 years (jobs)		2,609	2,881	3,240	3,253	5,563	4,829
On-the-Job Training - All sectors - None (jobs)		2,297	2,449	2,732	2,757	4,597	4,182
On-the-Job Training - All sectors - Up to 1 year (jobs)		27,453	30,078	33,824	34,084	58,272	51,230

Table 2: *E+ scenario - IMPACTS - Jobs (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - All sectors - 1 to 4 years (jobs)		8,821	9,448	10,864	11,142	19,518	16,969
On-the-Job Training - All sectors - 4 to 10 years (jobs)		2,776	2,802	3,312	3,496	6,294	5,489
On-the-Job Training - All sectors - Over 10 years (jobs)		422	474	522	513	823	748
On-Site or In-Plant Training - All sectors - None (jobs)		6,772	7,377	8,278	8,360	14,071	12,588
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		24,948	27,247	30,713	30,998	53,197	46,686
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		6,851	7,368	8,451	8,641	15,107	13,151
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		2,846	2,881	3,369	3,531	6,302	5,482
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		352	378	444	461	826	711
Wage income - All (million \$2019)		2,664	2,851	3,285	3,401	6,024	5,291

Table 3: *E+ scenario - IMPACTS - Fossil fuel industries*

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		160	138	108	79.4	57.2	35.6
Oil consumption - Cumulative (million bbls)							3,314
Oil production - Annual (million bbls)		0	0	0	0	0	0
Natural gas consumption - Annual (tcf)		596	503	403	303	191	132
Natural gas consumption - Cumulative (tcf)							12,141
Natural gas production - Annual (tcf)		0	0	0	0	0	0

Table 4: *E+ scenario - PILLAR 1: Efficiency/Electrification - Overview*

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	683	640	573	490	414	364	340
Final energy use - Residential (PJ)	376	351	316	265	217	183	164
Final energy use - Commercial (PJ)	306	301	289	269	251	242	241
Final energy use - Industry (PJ)	130	131	133	133	134	135	137

Table 5: *E+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		3.49	3.59	11.3	12.3	10	10.7

Table 6: *E+ scenario - PILLAR 1: Efficiency/Electrification - Transportation*

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	94.3	585	1,075	2,791	4,507	5,878	7,249
Vehicle stocks - LDV – All others (1000 units)	6,045	5,756	5,467	3,984	2,501	1,415	329
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		1,151	2,985	4,782	7,266	7,885	7,530
Public EV charging plugs - DC Fast (1000 units)	0.341		1.73		7.27		11.7
Public EV charging plugs - L2 (1000 units)	0.794		41.6		175		281

Table 7: E+ scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	4.07	17.8	67.1	90.9	93.9	94.1	94
Sales of space heating units - Electric Resistance (%)	6.87	9.53	5.27	2.94	2.62	2.66	2.75
Sales of space heating units - Gas (%)	79.3	57.7	22.7	3.87	1.37	1.23	1.23
Sales of space heating units - Fossil (%)	9.77	15	4.87	2.25	2.08	2.05	1.99
Sales of water heating units - Electric Heat Pump (%)	0	7.03	39.6	53.9	55.6	55.7	55.7
Sales of water heating units - Electric Resistance (%)	17.8	33.3	37.6	43.3	44.2	44.3	44.3
Sales of water heating units - Gas Furnace (%)	79.1	57.8	22.4	2.77	0.146	0	0
Sales of water heating units - Other (%)	3.14	1.9	0.397	0.064	0.049	0.049	0.05
Sales of cooking units - Electric Resistance (%)	33.6	47.7	91.1	99.5	100	100	100
Sales of cooking units - Gas (%)	66.4	52.3	8.94	0.45	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		7.13	8.05				

Table 8: E+ scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	0.831	16.8	53.8	78.3	81.8	82	81.9
Sales of space heating units - Electric Resistance (%)	2.64	4.45	11.2	16.1	17	17	17.2
Sales of space heating units - Gas Furnace (%)	88.4	67.1	32.7	5.5	1.14	0.906	0.899
Sales of space heating units - Fossil (%)	8.14	11.7	2.29	0.1	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.247	7.96	43.7	60.3	62.3	62.4	62.4
Sales of water heating units - Electric Resistance (%)	1.46	5.37	23	35.5	37.3	37.4	37.4
Sales of water heating units - Gas Furnace (%)	97.6	85.5	33	4.08	0.216	0	0
Sales of water heating units - Other (%)	0.649	1.16	0.372	0.184	0.175	0.176	0.176
Sales of cooking units - Electric Resistance (%)	18.5	33.7	75.3	83.5	83.9	84	84
Sales of cooking units - Gas (%)	81.5	66.3	24.7	16.5	16.1	16	16
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		41,628	45,491				

Table 9: E+ scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	527	527	0	0	0	0	0
Installed thermal - Natural gas (MW)	9,622	13,576	14,948	16,107	21,272	19,702	16,384
Installed thermal - Nuclear (MW)	3,631	3,631	3,631	3,631	3,631	3,631	3,631
Installed renewables - Rooftop PV (MW)	1,929	2,892	3,843	5,079	6,573	8,274	10,225
Installed renewables - Solar - Base land use assumptions (MW)	772	1,809	2,789	3,433	3,433	3,433	3,433
Installed renewables - Wind - Base land use assumptions (MW)	9	9	9	9	9	9	9
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	83.2	159	261	425	28,362	39,330
Installed renewables - Solar - Constrained land use assumptions (MW)	706	1,503	2,022	2,349	2,349	2,349	2,349
Installed renewables - Wind - Constrained land use assumptions (MW)	9	9	9	42.8	295	295	295

Table 9: *E+ scenario - PILLAR 2: Clean Electricity - Generating capacity (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	83.2	179	290	366	23,571	39,144
Capital invested - Solar PV - Base (billion \$2018)		1.39	1.17	0.71	0	0	0
Capital invested - Offshore Wind - Base (billion \$2018)		0.236	0.183	0.208	0.284	41.2	14.5
Capital invested - Solar PV - Constrained (billion \$2018)		3.68	0.736	0.911	0	0	0
Capital invested - Wind - Constrained (billion \$2018)		0	0	0.075	0.536	0	0
Capital invested - Offshore Wind - Constrained (billion \$2018)		0.236	0.231	0.226	0.132	34.2	20.6
Capital invested - Biomass power plant (billion \$2018)	0	0.008	0.35	0	0	0.019	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	0	0	0

Table 10: *E+ scenario - PILLAR 2: Clean Electricity - Generation*

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	1,439	3,311	5,037	6,164	6,164	6,164	6,164
Wind - Base land use assumptions (GWh)	30.5	30.5	30.5	30.5	30.5	30.5	30.5
OffshoreWind - Base land use assumptions (GWh)	0	355	677	1,118	1,823	125,140	175,860
Solar - Constrained land use assumptions (GWh)	77.8	1,539	2,459	3,029	3,029	3,029	3,029
Wind - Constrained land use assumptions (GWh)	30.5	30.5	30.5	155	939	939	939
OffshoreWind - Constrained land use assumptions (GWh)	0	355	677	1,118	1,823	125,140	175,860
Biomass power plant (GWh)	0	14.6	701	701	701	741	741
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0

Table 11: *E+ scenario - PILLAR 3: Clean fuels - Bioenergy*

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	1	1	1	1	1	1
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel (quantity)	0	0	0	1	1	1	1
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	1	1	1	1
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	1	1	1	1	1	1
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment - Cumulative 5-yr (million \$2018)		8.36	390	27.3	2.77	22.9	0
Biomass purchases (million \$2018/y)		1.81	65.2	66.1	66.2	67.3	67.3

Table 12: *E+ scenario - PILLAR 4: CCUS - CO2 capture*

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	0	0	0
Annual - BECCS (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	0	0	0
Cumulative - BECCS (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0

Table 13: *E+ scenario - PILLAR 4: CCUS - CO2 pipelines*

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	107	142	142	142	142
Spur (km)		0	0	0	0	0	0
All (km)		0	107	142	142	142	142
Cumulative investment - Trunk (million \$2018)		0	230	438	438	438	438
Cumulative investment - Spur (million \$2018)		0	0	0	0	0	0
Cumulative investment - All (million \$2018)		0	230	438	438	438	438

Table 14: *E+ scenario - PILLAR 4: CCUS - CO2 storage*

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	0	0	0	0	0
Injection wells (wells)		0	0	0	0	0	0
Resource characterization, appraisal, permitting costs (million \$2020)		0	0	0	0	0	0
Wells and facilities construction costs (million \$2020)		0	0	0	0	0	0

Table 15: *E+ scenario - PILLAR 6: Land sinks - Forests*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-34.3
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-218
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-372
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-3.43
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-57.4
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-94.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-23.3
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-161
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-963
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-51.4
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-761

Table 15: E+ scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-671
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-5.02
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-115
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-181
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-165
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-319
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-2,269
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-68.4
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,305
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-969
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-6.74
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-172
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-269
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-308
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-3,576
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-478
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							5.6
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							166
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							189
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.24
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							13.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.51
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							95.8

Table 15: *E+ scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							473
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							8.4
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							171
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							342
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1.87
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							19.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							11
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							193
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							747
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							11.2
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							177
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							494
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2.48
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							25.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							8.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							158
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							877

Table 16: E+ scenario - PILLAR 6: Land sinks - Agriculture

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-178
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-4.19
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-182
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-341
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-8.38
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-349
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							89.9
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							7.62
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							97.6
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							172
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							15.2
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							188

Table 17: E- scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		110	0.076	0.076	0.071	0.046	0.003
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		76.6	44.6	21.1	10	3.05	2.33
Premature deaths from air pollution - Mobile - On-Road (deaths)		450	467	465	427	347	243
Premature deaths from air pollution - Gas Stations (deaths)		33	34.2	33.8	30.9	24.9	17.3

Table 17: E- scenario - IMPACTS - Health (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		116	111	102	86.9	66.2	44.3
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		46.7	45.8	44.8	39.9	30.3	19.5
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		8.28	8.48	8.58	8.06	6.68	5.01
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.42	2.37	2.31	2.24	2.16	2.06
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		99.3	102	102	95.6	83.4	67.2
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		17.5	16.6	15.9	14.1	12.2	10.1
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		3.97	3.66	3.33	2.99	2.64	2.29
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.23	0.715	0.731	0.741	0.759	0.748
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		71	62.8	51.6	42.9	36.8	27.1
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		976	0.678	0.674	0.627	0.411	0.029
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		678	395	187	88.8	27.1	20.6
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		4,005	4,154	4,132	3,799	3,086	2,158
Monetary damages from air pollution - Gas Stations (million \$2019)		292	303	299	273	220	153
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		1,025	982	906	770	587	392
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		414	406	397	353	268	173
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		73.4	75.2	76	71.4	59.2	44.4
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		21.5	21	20.5	19.8	19.1	18.3
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		879	899	899	847	738	595
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		155	147	141	125	108	89.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		35.1	32.4	29.5	26.4	23.4	20.3
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		10.8	6.31	6.45	6.54	6.7	6.6

Table 17: E- scenario - IMPACTS - Health (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		631	558	458	381	327	241

Table 18: E- scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		99.4	305	128	94.1	67	47.8
By economic sector - Construction (jobs)		10,989	10,502	10,846	10,519	26,987	23,988
By economic sector - Manufacturing (jobs)		6,882	12,101	9,657	8,715	17,664	14,428
By economic sector - Mining (jobs)		3,134	2,276	1,660	1,190	819	484
By economic sector - Other (jobs)		1,375	1,438	1,666	1,852	3,149	4,328
By economic sector - Pipeline (jobs)		752	670	551	429	353	260
By economic sector - Professional (jobs)		4,424	4,380	4,469	4,547	10,733	10,108
By economic sector - Trade (jobs)		3,746	3,457	3,488	3,465	6,883	7,055
By economic sector - Utilities (jobs)		8,924	8,561	9,021	8,713	35,210	24,981
By resource sector - Biomass (jobs)		377	821	426	396	285	197
By resource sector - CO2 (jobs)		0	401	358	0	0	0
By resource sector - Coal (jobs)		209	70	0	0	0	0
By resource sector - Grid (jobs)		9,157	9,822	11,763	11,554	68,524	46,668
By resource sector - Natural Gas (jobs)		7,480	5,447	4,350	4,106	3,289	3,207
By resource sector - Nuclear (jobs)		1,833	1,803	1,775	1,747	1,720	1,693
By resource sector - Oil (jobs)		7,170	6,012	5,040	4,065	3,136	2,039
By resource sector - Solar (jobs)		14,030	18,594	17,281	16,156	18,553	27,346
By resource sector - Wind (jobs)		69.5	720	493	1,499	6,357	4,528
By education level - All sectors - High school diploma or less (jobs)		17,143	18,811	17,819	16,927	43,866	36,804
By education level - All sectors - Associates degree or some college (jobs)		12,618	13,692	13,114	12,547	33,186	27,867
By education level - All sectors - Bachelors degree (jobs)		8,329	8,888	8,347	7,925	19,553	16,491
By education level - All sectors - Masters or professional degree (jobs)		1,963	2,029	1,943	1,867	4,695	3,998
By education level - All sectors - Doctoral degree (jobs)		273	271	263	257	565	519
Related work experience - All sectors - None (jobs)		5,807	6,266	5,983	5,713	14,922	12,548
Related work experience - All sectors - Up to 1 year (jobs)		8,086	8,974	8,476	8,080	20,351	17,359
Related work experience - All sectors - 1 to 4 years (jobs)		14,519	15,617	14,840	14,135	36,516	30,643
Related work experience - All sectors - 4 to 10 years (jobs)		9,392	10,047	9,573	9,120	23,718	19,844
Related work experience - All sectors - Over 10 years (jobs)		2,523	2,787	2,613	2,476	6,358	5,285
On-the-Job Training - All sectors - None (jobs)		2,229	2,380	2,263	2,164	5,222	4,540
On-the-Job Training - All sectors - Up to 1 year (jobs)		26,562	29,182	27,482	26,130	66,513	55,961
On-the-Job Training - All sectors - 1 to 4 years (jobs)		8,476	9,033	8,681	8,286	22,130	18,448
On-the-Job Training - All sectors - 4 to 10 years (jobs)		2,646	2,631	2,628	2,536	7,059	5,913
On-the-Job Training - All sectors - Over 10 years (jobs)		412	465	431	407	942	817
On-Site or In-Plant Training - All sectors - None (jobs)		6,557	7,156	6,757	6,446	15,997	13,687
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		24,123	26,399	24,922	23,702	60,696	50,988

Table 18: E- scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		6,591	7,061	6,769	6,456	17,153	14,314
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		2,719	2,716	2,689	2,585	7,083	5,918
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		336	358	349	335	935	772
Wage income - All (million \$2019)		2,563	2,734	2,649	2,556	6,839	5,758

Table 19: E- scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	684	645	598	556	522	481	433
Final energy use - Residential (PJ)	376	353	337	317	287	250	214
Final energy use - Commercial (PJ)	306	301	299	297	292	284	276
Final energy use - Industry (PJ)	130	131	133	135	136	137	139

Table 20: E- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		2.76	2.76	4.34	4.53	9.51	10.3

Table 21: E- scenario - PILLAR 1: Efficiency/Electrification - Transportation

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	73	217	361	1,027	1,693	3,168	4,643
Vehicle stocks - LDV – All others (1000 units)	6,069	6,069	6,069	5,757	5,445	4,196	2,947
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	192	391	1,332	4,152	6,062
Public EV charging plugs - DC Fast (1000 units)	0.341		0.582		2.73		7.49
Public EV charging plugs - L2 (1000 units)	0.794		14		65.6		180

Table 22: E- scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	4.07	9.27	14.9	31.5	59.1	80.8	90.2
Sales of space heating units - Electric Resistance (%)	6.87	10.2	9.71	8.26	5.82	3.82	3.01
Sales of space heating units - Gas (%)	79.3	63.6	59.6	47.8	27.8	11.6	4.3
Sales of space heating units - Fossil (%)	9.77	16.9	15.8	12.4	7.29	3.83	2.52
Sales of water heating units - Electric Heat Pump (%)	0	1.31	5.02	15.9	33.8	47.5	53.3
Sales of water heating units - Electric Resistance (%)	17.8	32.8	33.2	34.8	38	41.5	43.4
Sales of water heating units - Gas Furnace (%)	79.1	63.7	59.7	47.8	27.4	10.7	3.19
Sales of water heating units - Other (%)	3.14	2.18	2.01	1.52	0.769	0.279	0.109
Sales of cooking units - Electric Resistance (%)	33.3	35.1	41.2	57.3	79.6	93.4	98.2
Sales of cooking units - Gas (%)	66.7	64.9	58.8	42.7	20.4	6.57	1.77
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		7.14	8.46				

Table 23: E- scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	0.831	10.8	15	27.7	49.8	69	77.8
Sales of space heating units - Electric Resistance (%)	2.64	3.4	4.18	6.57	10.9	14.6	16.6
Sales of space heating units - Gas Furnace (%)	88.4	72.3	67.9	55.8	34.4	14.9	5.15
Sales of space heating units - Fossil (%)	8.14	13.5	12.9	9.99	5	1.6	0.431
Sales of water heating units - Electric Heat Pump (%)	0.247	1.77	5.84	17.8	37.6	53.1	59.7
Sales of water heating units - Electric Resistance (%)	1.46	2.65	4.65	10.7	21.4	30.9	35.4
Sales of water heating units - Gas Furnace (%)	97.6	94.3	88.2	70.5	40.4	15.7	4.7
Sales of water heating units - Other (%)	0.649	1.31	1.29	1.01	0.586	0.311	0.212
Sales of cooking units - Electric Resistance (%)	18.5	21.6	27.5	43	64.5	77.7	82.3
Sales of cooking units - Gas (%)	81.5	78.4	72.5	57	35.5	22.3	17.7
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		41,604	45,411				

Table 24: E- scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	527	527	0	0	0	0	0
Installed thermal - Natural gas (MW)	9,622	11,427	11,246	11,125	9,022	7,630	7,372
Installed thermal - Nuclear (MW)	3,631	3,631	3,631	3,631	3,631	3,631	3,631

Table 25: E- scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-34.3
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-218
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-372
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-3.43
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-57.4
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-94.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-23.3
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-161
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-963
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-51.4
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-761
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-671
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-5.02
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-115

Table 25: E- scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-181
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-165
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-319
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-2,269
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-68.4
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,305
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-969
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-6.74
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-172
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-269
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-308
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-3,576
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-478
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							5.6
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							166
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							189
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.24
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							13.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.51
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							95.8
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							473
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							8.4

Table 25: E- scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							171
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							342
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1.87
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							19.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							11
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							193
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							747
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							11.2
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							177
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							494
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2.48
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							25.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							8.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							158
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							877

Table 26: E- scenario - PILLAR 6: Land sinks - Agriculture

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0

Table 26: E- scenario - PILLAR 6: Land sinks - Agriculture (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-178
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-4.19
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-182
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-341
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-8.38
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-349
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							89.9
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							7.62
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							97.6
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							172
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							15.2
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							188

Table 27: E+RE+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		110	0.076	0.076	0.071	0.046	0.003
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		70.8	52.2	33.4	25.6	9.52	1.77
Premature deaths from air pollution - Mobile - On-Road (deaths)		442	421	327	193	88.7	33.7
Premature deaths from air pollution - Gas Stations (deaths)		32.3	30.2	23.1	13.7	6.38	2.62
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		115	98.9	69.7	40.2	19.5	7.45
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		45.8	37.9	26.3	15.5	6.86	2.01

Table 27: E+RE+ scenario - IMPACTS - Health (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		8.17	7.55	6.06	4.25	2.55	1.44
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.42	2.37	2.31	2.24	2.16	2.06
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		98.8	91.7	73.3	51	32.7	18.1
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		17.4	14.7	11	7.32	5.27	4.06
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		3.97	3.41	2.84	2.26	1.69	1.12
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.35	0.714	0.725	0.731	0.757	0.724
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		69.5	65.1	53.8	38.9	22.3	2.11
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		976	0.678	0.674	0.627	0.411	0.029
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		628	462	296	227	84.3	15.7
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		3,928	3,747	2,908	1,717	789	300
Monetary damages from air pollution - Gas Stations (million \$2019)		286	268	204	121	56.5	23.2
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		1,016	877	618	356	173	66
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		406	336	233	137	60.8	17.8
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		72.4	66.9	53.7	37.7	22.6	12.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		21.5	21	20.5	19.8	19.1	18.3
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		875	812	649	452	290	160
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		154	130	97.1	64.8	46.6	35.9
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		35.1	30.2	25.1	20	14.9	9.96
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		11.9	6.3	6.4	6.45	6.68	6.39
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		617	578	478	345	198	18.8

Table 28: E+RE+ scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		82.1	171	102	72	55.8	44.4
By economic sector - Construction (jobs)		13,085	11,023	12,962	17,983	22,899	20,249
By economic sector - Manufacturing (jobs)		8,574	12,074	18,635	15,607	16,285	23,839
By economic sector - Mining (jobs)		3,079	2,159	1,333	741	283	42.9
By economic sector - Other (jobs)		1,780	1,482	1,836	2,433	2,981	4,878
By economic sector - Pipeline (jobs)		730	610	431	282	144	60
By economic sector - Professional (jobs)		5,136	4,581	5,365	7,437	9,146	9,093
By economic sector - Trade (jobs)		4,193	3,519	3,776	4,806	5,753	6,530
By economic sector - Utilities (jobs)		9,594	9,887	13,306	21,366	28,871	15,521
By resource sector - Biomass (jobs)		320	481	275	235	207	196
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		209	70	0	0	0	0
By resource sector - Grid (jobs)		10,629	12,350	20,442	38,128	56,509	28,491
By resource sector - Natural Gas (jobs)		7,271	6,102	4,957	4,426	3,230	3,555
By resource sector - Nuclear (jobs)		1,833	1,803	1,775	1,516	687	0
By resource sector - Oil (jobs)		7,099	5,577	3,918	2,454	973	3.25
By resource sector - Solar (jobs)		18,830	18,197	24,075	19,036	17,248	44,476
By resource sector - Wind (jobs)		63.4	926	2,305	4,931	7,564	3,536
By education level - All sectors - High school diploma or less (jobs)		19,773	19,514	24,898	30,388	37,257	34,631
By education level - All sectors - Associates degree or some college (jobs)		14,538	14,372	18,483	22,958	28,290	26,125
By education level - All sectors - Bachelors degree (jobs)		9,419	9,224	11,458	13,735	16,460	15,448
By education level - All sectors - Masters or professional degree (jobs)		2,213	2,117	2,587	3,243	3,938	3,583
By education level - All sectors - Doctoral degree (jobs)		310	279	320	401	473	470
Related work experience - All sectors - None (jobs)		6,657	6,536	8,291	10,294	12,665	11,633
Related work experience - All sectors - Up to 1 year (jobs)		9,376	9,278	11,873	14,274	17,355	16,765
Related work experience - All sectors - 1 to 4 years (jobs)		16,590	16,278	20,559	25,281	30,907	28,438
Related work experience - All sectors - 4 to 10 years (jobs)		10,739	10,510	13,289	16,418	20,095	18,361
Related work experience - All sectors - Over 10 years (jobs)		2,890	2,904	3,735	4,458	5,395	5,059
On-the-Job Training - All sectors - None (jobs)		2,558	2,462	3,057	3,681	4,428	4,320
On-the-Job Training - All sectors - Up to 1 year (jobs)		30,452	30,274	38,556	46,472	56,436	53,244
On-the-Job Training - All sectors - 1 to 4 years (jobs)		9,729	9,493	12,072	15,184	18,779	16,856
On-the-Job Training - All sectors - 4 to 10 years (jobs)		3,034	2,800	3,449	4,699	5,965	4,992
On-the-Job Training - All sectors - Over 10 years (jobs)		481	478	612	690	809	845
On-Site or In-Plant Training - All sectors - None (jobs)		7,546	7,420	9,391	11,285	13,626	13,168
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		27,647	27,421	34,904	42,280	51,469	48,215
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		7,569	7,406	9,428	11,789	14,556	13,154
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		3,105	2,880	3,535	4,739	5,972	5,025
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		387	380	489	633	795	695
Wage income - All (million \$2019)		2,915	2,862	3,625	4,615	5,757	5,148

Table 29: E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	683	640	573	490	414	364	340
Final energy use - Residential (PJ)	376	351	316	265	217	183	164
Final energy use - Commercial (PJ)	306	301	289	269	251	242	241
Final energy use - Industry (PJ)	130	131	133	133	134	135	137

Table 30: E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		3.49	3.59	11.3	12.3	10	10.7

Table 31: E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Transportation

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	94.3	585	1,075	2,791	4,507	5,878	7,249
Vehicle stocks - LDV – All others (1000 units)	6,045	5,756	5,467	3,984	2,501	1,415	329
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		1,151	2,985	4,782	7,266	7,885	7,530
Public EV charging plugs - DC Fast (1000 units)	0.341		1.73		7.27		11.7
Public EV charging plugs - L2 (1000 units)	0.794		41.6		175		281

Table 32: E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	4.07	17.8	67.1	90.9	93.9	94.1	94
Sales of space heating units - Electric Resistance (%)	6.87	9.53	5.27	2.94	2.62	2.66	2.75
Sales of space heating units - Gas (%)	79.3	57.7	22.7	3.87	1.37	1.23	1.23
Sales of space heating units - Fossil (%)	9.77	15	4.87	2.25	2.08	2.05	1.99
Sales of water heating units - Electric Heat Pump (%)	0	7.03	39.6	53.9	55.6	55.7	55.7
Sales of water heating units - Electric Resistance (%)	17.8	33.3	37.6	43.3	44.2	44.3	44.3
Sales of water heating units - Gas Furnace (%)	79.1	57.8	22.4	2.77	0.146	0	0
Sales of water heating units - Other (%)	3.14	1.9	0.397	0.064	0.049	0.049	0.05
Sales of cooking units - Electric Resistance (%)	33.6	47.7	91.1	99.5	100	100	100
Sales of cooking units - Gas (%)	66.4	52.3	8.94	0.45	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		7.13	8.05				

Table 33: E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	0.831	16.8	53.8	78.3	81.8	82	81.9
Sales of space heating units - Electric Resistance (%)	2.64	4.45	11.2	16.1	17	17	17.2
Sales of space heating units - Gas Furnace (%)	88.4	67.1	32.7	5.5	1.14	0.906	0.899
Sales of space heating units - Fossil (%)	8.14	11.7	2.29	0.1	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.247	7.96	43.7	60.3	62.3	62.4	62.4
Sales of water heating units - Electric Resistance (%)	1.46	5.37	23	35.5	37.3	37.4	37.4

Table 33: *E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Commercial (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	97.6	85.5	33	4.08	0.216	0	0
Sales of water heating units - Other (%)	0.649	1.16	0.372	0.184	0.175	0.176	0.176
Sales of cooking units - Electric Resistance (%)	18.5	33.7	75.3	83.5	83.9	84	84
Sales of cooking units - Gas (%)	81.5	66.3	24.7	16.5	16.1	16	16
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		41,628	45,491				

Table 34: *E+RE+ scenario - PILLAR 2: Clean Electricity - Generating capacity*

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	527	527	0	0	0	0	0
Installed thermal - Natural gas (MW)	9,622	11,427	14,350	17,069	16,891	15,661	17,190
Installed thermal - Nuclear (MW)	3,631	3,631	3,631	3,631	2,461	0	0
Installed renewables - Rooftop PV (MW)	1,929	2,892	3,843	5,079	6,573	8,274	10,225
Installed renewables - Solar - Base land use assumptions (MW)	772	4,096	4,538	4,538	4,538	4,538	10,263
Installed renewables - Wind - Base land use assumptions (MW)	9	9	9	9	9	269	434
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	83.2	159	345	13,537	36,114	39,330
Installed renewables - Solar - Constrained land use assumptions (MW)	772	2,810	3,916	3,916	3,916	3,916	13,425
Installed renewables - Wind - Constrained land use assumptions (MW)	10.3	10.3	10.3	212	296	296	296
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	83.2	179	366	13,410	23,571	39,144
Capital invested - Solar PV - Base (billion \$2018)		4.45	0.529	0	0	0	5.3
Capital invested - Wind - Base (billion \$2018)		0	0	0	0	0.524	0.315
Capital invested - Offshore Wind - Base (billion \$2018)		0.236	0.183	0.38	22.9	33.3	4.26

Table 35: *E+RE+ scenario - PILLAR 2: Clean Electricity - Generation*

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	1,439	7,460	8,237	8,237	8,237	8,237	18,554
Wind - Base land use assumptions (GWh)	30.5	30.5	30.5	30.5	30.5	899	1,382
OffshoreWind - Base land use assumptions (GWh)	0	355	677	1,479	59,134	160,800	175,860
Solar - Constrained land use assumptions (GWh)	2,878	10,226	14,138	14,138	14,138	14,138	48,346
Wind - Constrained land use assumptions (GWh)	61	61	61	1,411	1,878	1,878	1,878
OffshoreWind - Constrained land use assumptions (GWh)	0	710	1,529	3,123	117,853	207,591	350,018

Table 36: *E+RE+ scenario - PILLAR 6: Land sinks - Forests*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-34.3
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-218
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-372
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-3.43

Table 36: E+RE+ scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-57.4
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-94.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-23.3
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-161
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-963
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-51.4
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-761
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-671
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-5.02
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-115
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-181
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-165
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-319
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-2,269
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-68.4
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,305
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-969
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-6.74
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-172
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-269
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-308
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-3,576
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-478
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							5.6
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							166
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							189

Table 36: *E+RE+ scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.24
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							13.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.51
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							95.8
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							473
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							8.4
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							171
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							342
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1.87
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							19.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							11
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							193
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							747
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							11.2
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							177
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							494
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2.48
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0

Table 36: *E+RE+ scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							25.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							8.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							158
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							877

Table 37: *E+RE+ scenario - PILLAR 6: Land sinks - Agriculture*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-178
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-4.19
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-182
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-341
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-8.38
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-349
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							89.9
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							7.62
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							97.6
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							172
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							15.2

Table 37: *E+RE+ scenario - PILLAR 6: Land sinks - Agriculture (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							188

Table 38: *E+RE- scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		110	0.076	0.076	0.071	0.046	0.003
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		76.6	60.7	68.3	54.4	24.2	6.67
Premature deaths from air pollution - Mobile - On-Road (deaths)		442	421	327	193	88.7	33.7
Premature deaths from air pollution - Gas Stations (deaths)		32.3	30.2	23.1	13.7	6.38	2.62
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		115	98.9	69.7	40.2	19.5	7.45
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		45.8	37.9	26.3	15.5	6.86	2.01
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		8.17	7.55	6.06	4.25	2.55	1.44
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.42	2.37	2.31	2.24	2.16	2.06
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		98.8	91.7	73.3	51	32.7	18.1
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		17.4	14.7	11	7.32	5.27	4.06
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		3.97	3.41	2.84	2.26	1.69	1.12
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.17	0.713	0.725	0.731	0.758	0.724
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		72.5	70.7	70.3	62.9	54	41.6
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		976	0.678	0.674	0.627	0.411	0.029
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		679	537	605	482	214	59.1
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		3,928	3,747	2,908	1,717	789	300
Monetary damages from air pollution - Gas Stations (million \$2019)		286	268	204	121	56.5	23.2
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		1,016	877	618	356	173	66
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		406	336	233	137	60.8	17.8
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		72.4	66.9	53.7	37.7	22.6	12.7

Table 38: *E+RE- scenario - IMPACTS - Health (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		21.5	21	20.5	19.8	19.1	18.3
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		875	812	649	452	290	160
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		154	130	97.1	64.8	46.6	35.9
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		35.1	30.2	25.1	20	14.9	9.96
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		10.3	6.29	6.4	6.45	6.69	6.39
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		644	628	624	559	480	369

Table 39: *E+RE- scenario - IMPACTS - Jobs*

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		93.4	326	126	87.2	64.9	50.1
By economic sector - Construction (jobs)		10,233	10,104	12,701	13,390	13,127	16,622
By economic sector - Manufacturing (jobs)		5,506	5,669	5,431	4,671	4,784	3,375
By economic sector - Mining (jobs)		3,142	2,260	1,561	1,028	661	435
By economic sector - Other (jobs)		1,219	1,297	1,735	2,049	2,206	3,806
By economic sector - Pipeline (jobs)		769	726	647	508	403	325
By economic sector - Professional (jobs)		4,108	4,185	5,365	5,581	5,572	8,095
By economic sector - Trade (jobs)		3,539	3,257	3,732	3,850	3,844	5,641
By economic sector - Utilities (jobs)		8,712	8,922	14,246	14,160	14,062	17,762
By resource sector - Biomass (jobs)		327	835	430	326	254	208
By resource sector - CO2 (jobs)		0	453	404	0	0	0
By resource sector - Coal (jobs)		209	70	0	0	0	0
By resource sector - Grid (jobs)		8,875	9,836	17,608	19,897	20,490	19,968
By resource sector - Natural Gas (jobs)		7,436	6,330	5,933	6,720	5,807	5,665
By resource sector - Nuclear (jobs)		1,833	1,803	4,230	2,243	2,208	7,229
By resource sector - Oil (jobs)		7,096	5,643	4,064	2,777	1,936	1,391
By resource sector - Solar (jobs)		11,316	11,493	12,820	13,249	13,722	21,501
By resource sector - Wind (jobs)		229	283	53.8	112	308	150
By education level - All sectors - High school diploma or less (jobs)		15,818	15,694	19,238	19,242	18,985	23,309
By education level - All sectors - Associates degree or some college (jobs)		11,660	11,526	14,472	14,638	14,497	17,978
By education level - All sectors - Bachelors degree (jobs)		7,748	7,491	9,256	8,941	8,777	11,456
By education level - All sectors - Masters or professional degree (jobs)		1,838	1,787	2,264	2,203	2,170	2,933
By education level - All sectors - Doctoral degree (jobs)		256	249	312	301	296	435
Related work experience - All sectors - None (jobs)		5,382	5,330	6,608	6,646	6,565	8,170
Related work experience - All sectors - Up to 1 year (jobs)		7,425	7,374	9,046	8,996	8,902	11,199
Related work experience - All sectors - 1 to 4 years (jobs)		13,470	13,227	16,402	16,295	16,066	20,207
Related work experience - All sectors - 4 to 10 years (jobs)		8,715	8,539	10,657	10,615	10,458	13,116

Table 39: E+RE- scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - All sectors - Over 10 years (jobs)		2,327	2,275	2,831	2,772	2,734	3,418
On-the-Job Training - All sectors - None (jobs)		2,063	2,010	2,481	2,432	2,399	3,166
On-the-Job Training - All sectors - Up to 1 year (jobs)		24,527	24,162	29,704	29,354	28,970	36,348
On-the-Job Training - All sectors - 1 to 4 years (jobs)		7,869	7,751	9,761	9,839	9,711	12,043
On-the-Job Training - All sectors - 4 to 10 years (jobs)		2,486	2,457	3,156	3,271	3,222	4,019
On-the-Job Training - All sectors - Over 10 years (jobs)		376	367	442	430	422	535
On-Site or In-Plant Training - All sectors - None (jobs)		6,048	5,954	7,339	7,253	7,160	9,179
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		22,293	21,947	27,057	26,779	26,429	33,125
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		6,112	6,022	7,550	7,598	7,500	9,289
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		2,555	2,512	3,203	3,287	3,230	4,033
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		312	311	395	409	404	486
Wage income - All (million \$2019)		2,390	2,371	3,015	3,032	3,024	3,884

Table 40: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	683	640	573	490	414	364	340
Final energy use - Residential (PJ)	376	351	316	265	217	183	164
Final energy use - Commercial (PJ)	306	301	289	269	251	242	241
Final energy use - Industry (PJ)	130	131	133	133	134	135	137

Table 41: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		3.49	3.59	11.3	12.3	10	10.7

Table 42: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Transportation

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV - EV (1000 units)	94.3	585	1,075	2,791	4,507	5,878	7,249
Vehicle stocks - LDV - All others (1000 units)	6,045	5,756	5,467	3,984	2,501	1,415	329
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		1,151	2,985	4,782	7,266	7,885	7,530
Public EV charging plugs - DC Fast (1000 units)	0.341		1.73		7.27		11.7
Public EV charging plugs - L2 (1000 units)	0.794		41.6		175		281

Table 43: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	4.07	17.8	67.1	90.9	93.9	94.1	94
Sales of space heating units - Electric Resistance (%)	6.87	9.53	5.27	2.94	2.62	2.66	2.75
Sales of space heating units - Gas (%)	79.3	57.7	22.7	3.87	1.37	1.23	1.23
Sales of space heating units - Fossil (%)	9.77	15	4.87	2.25	2.08	2.05	1.99

Table 43: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Residential (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Electric Heat Pump (%)	0	7.03	39.6	53.9	55.6	55.7	55.7
Sales of water heating units - Electric Resistance (%)	17.8	33.3	37.6	43.3	44.2	44.3	44.3
Sales of water heating units - Gas Furnace (%)	79.1	57.8	22.4	2.77	0.146	0	0
Sales of water heating units - Other (%)	3.14	1.9	0.397	0.064	0.049	0.049	0.05
Sales of cooking units - Electric Resistance (%)	33.6	47.7	91.1	99.5	100	100	100
Sales of cooking units - Gas (%)	66.4	52.3	8.94	0.45	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		7.13	8.05				

Table 44: E+RE- scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	0.831	16.8	53.8	78.3	81.8	82	81.9
Sales of space heating units - Electric Resistance (%)	2.64	4.45	11.2	16.1	17	17	17.2
Sales of space heating units - Gas Furnace (%)	88.4	67.1	32.7	5.5	1.14	0.906	0.899
Sales of space heating units - Fossil (%)	8.14	11.7	2.29	0.1	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.247	7.96	43.7	60.3	62.3	62.4	62.4
Sales of water heating units - Electric Resistance (%)	1.46	5.37	23	35.5	37.3	37.4	37.4
Sales of water heating units - Gas Furnace (%)	97.6	85.5	33	4.08	0.216	0	0
Sales of water heating units - Other (%)	0.649	1.16	0.372	0.184	0.175	0.176	0.176
Sales of cooking units - Electric Resistance (%)	18.5	33.7	75.3	83.5	83.9	84	84
Sales of cooking units - Gas (%)	81.5	66.3	24.7	16.5	16.1	16	16
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		41,628	45,491				

Table 45: E+RE- scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	527	527	0	0	0	0	0
Installed thermal - Natural gas (MW)	9,622	10,065	11,342	12,259	15,714	17,497	15,768
Installed thermal - Nuclear (MW)	3,631	3,631	3,631	4,662	4,662	4,662	6,887
Installed renewables - Rooftop PV (MW)	1,929	2,892	3,843	5,079	6,573	8,274	10,225
Installed renewables - Solar - Base land use assumptions (MW)	772	1,195	1,752	2,347	2,991	2,991	2,991
Installed renewables - Wind - Base land use assumptions (MW)	9	9	9	9	9	9	9
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	159	345	521	879	3,638	4,819
Installed renewables - Solar - Constrained land use assumptions (MW)	772	1,003	1,892	2,085	2,383	2,383	2,383
Installed renewables - Wind - Constrained land use assumptions (MW)	9	9	9	9	9	9	9
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	179	290	548	855	3,156	3,936
Capital invested - Solar PV - Base (billion \$2018)		0.566	0.667	0.657	0.669	0	0
Capital invested - Wind - Base (billion \$2018)		0	0	0	0	0	0

Table 45: E+RE- scenario - PILLAR 2: Clean Electricity - Generating capacity (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Offshore Wind - Base (billion \$2018)		0.451	0.447	0.359	0.621	4.07	1.56
Capital invested - Solar PV - Constrained (billion \$2018)		0.309	1.06	0.212	0.31	0	0
Capital invested - Wind - Constrained (billion \$2018)		0	0	0	0	0	0
Capital invested - Offshore Wind - Constrained (billion \$2018)		0.507	0.267	0.527	0.533	3.39	1.03

Table 46: E+RE- scenario - PILLAR 2: Clean Electricity - Generation

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	1,439	2,213	3,227	4,281	5,425	5,425	5,425
Wind - Base land use assumptions (GWh)	30.5	30.5	30.5	30.5	30.5	30.5	30.5
OffshoreWind - Base land use assumptions (GWh)	0	677	1,479	2,233	3,750	15,641	20,804
Solar - Constrained land use assumptions (GWh)	1,439	1,862	3,445	3,784	4,310	4,310	4,310
Wind - Constrained land use assumptions (GWh)	30.5	30.5	30.5	30.5	30.5	30.5	30.5
OffshoreWind - Constrained land use assumptions (GWh)	0	765	1,239	2,347	3,655	13,568	16,966

Table 47: E+RE- scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-34.3
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-218
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-372
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-3.43
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-57.4
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-94.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-23.3
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-161
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-963
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-51.4
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-761
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-671
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-5.02
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-115
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-181
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0

Table 47: E+RE- scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-165
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-319
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-2,269
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-68.4
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,305
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-969
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-6.74
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-172
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-269
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-308
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-3,576
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-478
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							5.6
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							166
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							189
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.24
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							13.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.51
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							95.8
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							473
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							8.4
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							171

Table 47: *E+RE- scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							342
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1.87
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							19.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							11
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							193
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							747
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							11.2
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							177
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							494
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2.48
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							25.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							8.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							158
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							877

Table 48: *E+RE- scenario - PILLAR 6: Land sinks - Agriculture*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO ₂ e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO ₂ e/y)							-178

Table 48: E+RE- scenario - PILLAR 6: Land sinks - Agriculture (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-4.19
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-182
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-341
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-8.38
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-349
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							89.9
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							7.62
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							97.6
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							172
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							15.2
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							188

Table 49: E-B+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		110	0.076	0.076	0.071	0.046	0.003
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		75.2	41.6	24.9	20.8	12.3	3.35
Premature deaths from air pollution - Mobile - On-Road (deaths)		450	467	465	427	347	243
Premature deaths from air pollution - Gas Stations (deaths)		33	34.2	33.8	30.9	24.9	17.3
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		116	111	102	86.9	66.2	44.3
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		46.7	45.8	44.8	39.9	30.3	19.5
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		8.28	8.48	8.58	8.06	6.68	5.01

Table 49: E-B+ scenario - IMPACTS - Health (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.42	2.37	2.31	2.24	2.16	2.06
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		99.3	102	102	95.6	83.4	67.2
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		17.5	16.6	15.9	14.1	12.2	10.1
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		3.97	3.66	3.33	2.99	2.64	2.29
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.26	0.715	0.731	0.742	0.768	0.773
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		71	62.8	51.6	42.9	36.8	27.1
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		976	0.678	0.674	0.627	0.411	0.029
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		666	369	221	185	109	29.7
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		4,005	4,154	4,132	3,799	3,086	2,158
Monetary damages from air pollution - Gas Stations (million \$2019)		292	303	299	273	220	153
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		1,025	982	906	770	587	392
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		414	406	397	353	268	173
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		73.4	75.2	76	71.4	59.2	44.4
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		21.5	21	20.5	19.8	19.1	18.3
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		879	899	899	847	738	595
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		155	147	141	125	108	89.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		35.1	32.4	29.5	26.4	23.4	20.3
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		11.1	6.31	6.45	6.54	6.77	6.82
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		631	558	458	381	327	241

Table 50: E-B+ scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		91.1	195	83.3	62.5	52.6	502
By economic sector - Construction (jobs)		10,942	10,459	10,726	10,699	20,803	22,200

Table 50: E-B+ scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Manufacturing (jobs)		6,809	11,958	8,431	6,350	11,559	12,746
By economic sector - Mining (jobs)		3,122	2,275	1,668	1,235	819	461
By economic sector - Other (jobs)		1,370	1,432	1,640	1,844	2,720	4,196
By economic sector - Pipeline (jobs)		745	670	559	441	346	246
By economic sector - Professional (jobs)		4,406	4,246	4,363	4,587	8,438	10,294
By economic sector - Trade (jobs)		3,737	3,432	3,444	3,519	5,606	6,869
By economic sector - Utilities (jobs)		8,876	8,525	8,948	9,185	25,563	22,147
By resource sector - Biomass (jobs)		362	525	282	262	244	2,366
By resource sector - CO2 (jobs)		0	412	367	0	0	0
By resource sector - Coal (jobs)		209	70	0	0	0	0
By resource sector - Grid (jobs)		9,149	9,755	11,554	12,053	47,663	40,648
By resource sector - Natural Gas (jobs)		7,373	5,432	4,422	4,583	3,642	3,098
By resource sector - Nuclear (jobs)		1,833	1,803	1,775	1,747	1,720	1,693
By resource sector - Oil (jobs)		7,170	6,013	5,040	4,237	3,167	1,945
By resource sector - Solar (jobs)		13,931	18,438	15,992	14,247	15,719	26,930
By resource sector - Wind (jobs)		72	744	430	795	3,752	2,978
By education level - All sectors - High school diploma or less (jobs)		17,043	18,577	17,091	16,173	32,587	34,204
By education level - All sectors - Associates degree or some college (jobs)		12,545	13,566	12,611	12,064	24,668	25,684
By education level - All sectors - Bachelors degree (jobs)		8,286	8,783	8,023	7,605	14,657	15,465
By education level - All sectors - Masters or professional degree (jobs)		1,953	2,000	1,880	1,825	3,551	3,791
By education level - All sectors - Doctoral degree (jobs)		272	266	256	255	443	514
Related work experience - All sectors - None (jobs)		5,774	6,192	5,758	5,509	11,128	11,675
Related work experience - All sectors - Up to 1 year (jobs)		8,039	8,854	8,108	7,667	15,149	16,264
Related work experience - All sectors - 1 to 4 years (jobs)		14,438	15,440	14,277	13,606	27,238	28,469
Related work experience - All sectors - 4 to 10 years (jobs)		9,340	9,947	9,220	8,796	17,687	18,377
Related work experience - All sectors - Over 10 years (jobs)		2,508	2,760	2,500	2,345	4,704	4,875
On-the-Job Training - All sectors - None (jobs)		2,218	2,353	2,178	2,079	3,940	4,269
On-the-Job Training - All sectors - Up to 1 year (jobs)		26,411	28,814	26,322	24,887	49,465	52,212
On-the-Job Training - All sectors - 1 to 4 years (jobs)		8,428	8,952	8,377	8,029	16,478	16,973
On-the-Job Training - All sectors - 4 to 10 years (jobs)		2,632	2,611	2,575	2,548	5,321	5,450
On-the-Job Training - All sectors - Over 10 years (jobs)		410	461	411	380	702	756
On-Site or In-Plant Training - All sectors - None (jobs)		6,520	7,068	6,480	6,151	11,965	12,799
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		23,986	26,078	23,891	22,620	45,143	47,503
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		6,554	6,995	6,524	6,239	12,765	13,184
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		2,705	2,695	2,630	2,586	5,338	5,463
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		334	355	337	326	694	710
Wage income - All (million \$2019)		2,549	2,704	2,559	2,486	5,110	5,348

Table 51: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	684	645	598	556	522	481	433
Final energy use - Residential (PJ)	376	353	337	317	287	250	214
Final energy use - Commercial (PJ)	306	301	299	297	292	284	276
Final energy use - Industry (PJ)	130	131	133	135	136	137	139

Table 52: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		2.76	2.76	4.34	4.53	9.51	10.3

Table 53: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Transportation

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	73	217	361	1,027	1,693	3,168	4,643
Vehicle stocks - LDV – All others (1000 units)	6,069	6,069	6,069	5,757	5,445	4,196	2,947
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	192	391	1,332	4,152	6,062
Public EV charging plugs - DC Fast (1000 units)	0.341		0.582		2.73		7.49
Public EV charging plugs - L2 (1000 units)	0.794		14		65.6		180

Table 54: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	4.07	9.27	14.9	31.5	59.1	80.8	90.2
Sales of space heating units - Electric Resistance (%)	6.87	10.2	9.71	8.26	5.82	3.82	3.01
Sales of space heating units - Gas (%)	79.3	63.6	59.6	47.8	27.8	11.6	4.3
Sales of space heating units - Fossil (%)	9.77	16.9	15.8	12.4	7.29	3.83	2.52
Sales of water heating units - Electric Heat Pump (%)	0	1.31	5.02	15.9	33.8	47.5	53.3
Sales of water heating units - Electric Resistance (%)	17.8	32.8	33.2	34.8	38	41.5	43.4
Sales of water heating units - Gas Furnace (%)	79.1	63.7	59.7	47.8	27.4	10.7	3.19
Sales of water heating units - Other (%)	3.14	2.18	2.01	1.52	0.769	0.279	0.109
Sales of cooking units - Electric Resistance (%)	33.3	35.1	41.2	57.3	79.6	93.4	98.2
Sales of cooking units - Gas (%)	66.7	64.9	58.8	42.7	20.4	6.57	1.77
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		7.14	8.46				

Table 55: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	0.831	10.8	15	27.7	49.8	69	77.8
Sales of space heating units - Electric Resistance (%)	2.64	3.4	4.18	6.57	10.9	14.6	16.6
Sales of space heating units - Gas Furnace (%)	88.4	72.3	67.9	55.8	34.4	14.9	5.15
Sales of space heating units - Fossil (%)	8.14	13.5	12.9	9.99	5	1.6	0.431
Sales of water heating units - Electric Heat Pump (%)	0.247	1.77	5.84	17.8	37.6	53.1	59.7
Sales of water heating units - Electric Resistance (%)	1.46	2.65	4.65	10.7	21.4	30.9	35.4

Table 55: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Commercial (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	97.6	94.3	88.2	70.5	40.4	15.7	4.7
Sales of water heating units - Other (%)	0.649	1.31	1.29	1.01	0.586	0.311	0.212
Sales of cooking units - Electric Resistance (%)	18.5	21.6	27.5	43	64.5	77.7	82.3
Sales of cooking units - Gas (%)	81.5	78.4	72.5	57	35.5	22.3	17.7
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		41,604	45,411				

Table 56: E-B+ scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	527	527	0	0	0	0	0
Installed thermal - Natural gas (MW)	9,526	11,427	11,246	11,125	11,402	10,950	8,438
Installed thermal - Nuclear (MW)	3,631	3,631	3,631	3,631	3,631	3,631	3,631
Capital invested - Biomass power plant (billion \$2018)	0	0.008	0.352	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	0	0	0

Table 57: E-B+ scenario - PILLAR 2: Clean Electricity - Generation

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	16.3	707	707	707	707	707
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0

Table 58: E-B+ scenario - PILLAR 3: Clean fuels - Bioenergy

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	1	1	1	1	1	1
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel (quantity)	0	0	0	1	1	1	1
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	1	1	1	7
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	1	1	1	1	1	1
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment - Cumulative 5-yr (million \$2018)		9.36	392	34.4	5.46	9	4,899
Biomass purchases (million \$2018/y)		14.3	180	183	183	184	593

Table 59: E-B+ scenario - PILLAR 4: CCUS - CO2 capture

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	0	0	0
Annual - BECCS (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	0	0	0
Cumulative - BECCS (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0	0	0	0

Table 59: E-B+ scenario - PILLAR 4: CCUS - CO2 capture (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0

Table 60: E-B+ scenario - PILLAR 4: CCUS - CO2 pipelines

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	107	142	142	142	142
Spur (km)		0	0	0	0	0	0
All (km)		0	107	142	142	142	142
Cumulative investment - Trunk (million \$2018)		0	230	438	438	460	460
Cumulative investment - Spur (million \$2018)		0	0	0	0	0	0
Cumulative investment - All (million \$2018)		0	230	438	438	460	460

Table 61: E-B+ scenario - PILLAR 4: CCUS - CO2 storage

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	0	0	0	0	0
Injection wells (wells)		0	0	0	0	0	0
Resource characterization, appraisal, permitting costs (million \$2020)		0	0	0	0	0	0
Wells and facilities construction costs (million \$2020)		0	0	0	0	0	0

Table 62: E-B+ scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-34.3
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-218
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-372
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-3.43
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-57.4
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-94.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-23.3
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-161
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-963
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-51.4
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-761
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-671
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-5.02
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-115
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-181

Table 62: E-B+ scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO ₂ e/y)							-165
Carbon sink potential - Mid - Restore productivity (1000 tCO ₂ e/y)							-319
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO ₂ e/y)							-2,269
Carbon sink potential - High - Accelerate regeneration (1000 tCO ₂ e/y)							-68.4
Carbon sink potential - High - Avoid deforestation (1000 tCO ₂ e/y)							-1,305
Carbon sink potential - High - Extend rotation length (1000 tCO ₂ e/y)							-969
Carbon sink potential - High - Improve plantations (1000 tCO ₂ e/y)							-6.74
Carbon sink potential - High - Increase retention of HWP (1000 tCO ₂ e/y)							-172
Carbon sink potential - High - Increase trees outside forests (1000 tCO ₂ e/y)							-269
Carbon sink potential - High - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO ₂ e/y)							-308
Carbon sink potential - High - All (not counting overlap) (1000 tCO ₂ e/y)							-3,576
Carbon sink potential - High - Restore productivity (1000 tCO ₂ e/y)							-478
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							5.6
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							166
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							189
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.24
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							13.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.51
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							95.8
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							473
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							8.4

Table 62: E-B+ scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							171
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							342
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1.87
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							19.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							11
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							193
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							747
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							11.2
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							177
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							494
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2.48
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							25.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							8.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							158
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							877

Table 63: E-B+ scenario - PILLAR 6: Land sinks - Agriculture

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-18.8

Table 63: E-B+ scenario - PILLAR 6: Land sinks - Agriculture (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-169
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-3.91
Carbon sink potential - Moderate deployment - Cropland to woody energy crops (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Pasture to energy crops (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-191
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-18.8
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-324
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-7.83
Carbon sink potential - Aggressive deployment - Cropland to woody energy crops (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Pasture to energy crops (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-351
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							9.08
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							85.2
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							7.12
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							4.53
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							2.71
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							109
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							9.08
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							403
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							14.2
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							4.53

Table 63: E-B+ scenario - PILLAR 6: Land sinks - Agriculture (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							2.71
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							434

Table 64: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		286	183	172	167	164	151
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		55.3	56.9	87.5	90.1	92.3	89.1
Premature deaths from air pollution - Mobile - On-Road (deaths)		449	472	494	519	544	570
Premature deaths from air pollution - Gas Stations (deaths)		32.9	34.5	35.9	37.7	39.4	41
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		113	110	107	107	109	110
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		45.1	39.1	29.3	20.2	13.3	9.33
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		8.03	8.18	8.39	8.68	8.95	9.18
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.53	2.6	2.65	2.7	2.75	2.78
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		100	105	106	107	114	125
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		17.6	16.5	14.9	12.1	10.4	9.36
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		4.15	4.34	4.53	4.71	4.88	5.05
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		2.31	1.74	1.52	1.49	1.49	1.45
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		71.6	79	83.8	81.8	84.1	82.9
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		2,533	1,622	1,521	1,482	1,457	1,337
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		490	504	775	798	818	790
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		3,992	4,196	4,392	4,611	4,833	5,068
Monetary damages from air pollution - Gas Stations (million \$2019)		291	305	318	334	349	363
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		1,004	971	949	949	962	971
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		400	347	260	179	118	82.7

Table 64: REF scenario - IMPACTS - Health (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		71.2	72.5	74.3	76.9	79.3	81.4
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		22.4	23	23.5	23.9	24.3	24.6
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		888	930	939	949	1,005	1,106
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		156	146	132	107	92	82.9
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		36.7	38.4	40.1	41.7	43.2	44.7
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		20.4	15.4	13.4	13.1	13.1	12.8
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		636	701	744	727	747	736

Table 65: REF scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		86.4	77.4	76.5	62.3	62.2	67.4
By economic sector - Construction (jobs)		5,475	9,568	12,233	13,271	13,493	22,828
By economic sector - Manufacturing (jobs)		2,494	2,853	3,378	3,790	3,620	7,120
By economic sector - Mining (jobs)		3,183	2,595	2,127	1,735	1,477	1,240
By economic sector - Other (jobs)		214	1,164	1,573	1,877	2,087	4,052
By economic sector - Pipeline (jobs)		768	797	806	763	773	770
By economic sector - Professional (jobs)		2,581	3,826	4,907	5,437	5,548	9,509
By economic sector - Trade (jobs)		2,525	3,240	3,769	4,089	4,228	7,019
By economic sector - Utilities (jobs)		8,499	8,541	12,164	13,494	13,320	21,983
By resource sector - Biomass (jobs)		333	312	290	259	265	269
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		209	197	187	178	170	65.1
By resource sector - Grid (jobs)		8,502	8,810	15,588	17,554	17,536	36,464
By resource sector - Natural Gas (jobs)		7,589	7,258	8,036	8,607	8,612	8,410
By resource sector - Nuclear (jobs)		1,833	1,803	1,775	1,747	1,492	1,148
By resource sector - Oil (jobs)		7,259	6,222	5,494	5,103	4,877	4,721
By resource sector - Solar (jobs)			7,801	9,420	10,843	11,616	21,515
By resource sector - Wind (jobs)		100	257	244	227	40	1,996
By education level - All sectors - High school diploma or less (jobs)		10,645	13,801	17,395	18,869	18,940	31,876
By education level - All sectors - Associates degree or some college (jobs)		7,973	10,243	13,092	14,300	14,371	24,236
By education level - All sectors - Bachelors degree (jobs)		5,671	6,750	8,249	8,870	8,823	14,421
By education level - All sectors - Masters or professional degree (jobs)		1,359	1,636	2,019	2,178	2,173	3,569
By education level - All sectors - Doctoral degree (jobs)		178	232	279	300	300	486
Related work experience - All sectors - None (jobs)		3,736	4,747	6,009	6,539	6,574	11,015
Related work experience - All sectors - Up to 1 year (jobs)		4,848	6,415	8,051	8,740	8,771	14,865
Related work experience - All sectors - 1 to 4 years (jobs)		9,483	11,828	14,827	16,071	16,097	26,812

Table 65: REF scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - All sectors - 4 to 10 years (jobs)		6,127	7,667	9,642	10,458	10,466	17,399
Related work experience - All sectors - Over 10 years (jobs)		1,632	2,004	2,504	2,709	2,700	4,499
On-the-Job Training - All sectors - None (jobs)		1,399	1,803	2,215	2,392	2,397	3,984
On-the-Job Training - All sectors - Up to 1 year (jobs)		17,017	21,276	26,581	28,802	28,828	48,233
On-the-Job Training - All sectors - 1 to 4 years (jobs)		5,458	6,970	8,879	9,663	9,693	16,221
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,717	2,295	2,970	3,242	3,272	5,458
On-the-Job Training - All sectors - Over 10 years (jobs)		234	317	388	418	417	692
On-Site or In-Plant Training - All sectors - None (jobs)		4,091	5,251	6,542	7,093	7,103	11,864
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		15,496	19,387	24,258	26,289	26,319	44,041
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		4,229	5,398	6,861	7,463	7,487	12,546
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,793	2,346	3,006	3,272	3,294	5,456
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		216	280	365	401	404	683
Wage income - All (million \$2019)		1,719	2,150	2,736	2,999	3,040	5,100

Table 66: REF scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	684	651	614	593	597	615	636
Final energy use - Residential (PJ)	376	350	336	325	318	315	313
Final energy use - Commercial (PJ)	306	305	307	309	314	329	352
Final energy use - Industry (PJ)	130	134	140	145	151	158	164

Table 67: REF scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		2.77	2.78	8.27	8.93	8.04	8.51

Table 68: REF scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	2.27	23.8	24.8	26.1	26.8	27.3	28.1
Sales of space heating units - Electric Resistance (%)	7.12	8.97	8.81	8.6	8.48	7.9	7.12
Sales of space heating units - Gas (%)	80.7	53.6	59.1	61.5	61.2	61.2	61.3
Sales of space heating units - Fossil (%)	9.93	13.6	7.36	3.84	3.54	3.54	3.56
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	17.8	32.6	32.5	32.5	32.5	32.5	32.4
Sales of water heating units - Gas Furnace (%)	79.1	65.2	65.2	65.3	65.3	65.3	65.3
Sales of water heating units - Other (%)	3.14	2.24	2.24	2.24	2.24	2.24	2.24
Sales of cooking units - Electric Resistance (%)	32.8	32.8	32.8	32.8	32.8	32.8	32.8
Sales of cooking units - Gas (%)	67.2	67.2	67.2	67.2	67.2	67.2	67.2

Table 68: REF scenario - PILLAR 1: Efficiency/Electrification - Residential (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		6.64	7				

Table 69: REF scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	0.831	15.4	41.5	62.9	66.3	66.6	66.5
Sales of space heating units - Electric Resistance (%)	2.64	4.05	8.88	20.9	30.7	32.3	32.6
Sales of space heating units - Gas Furnace (%)	88.4	67.4	39.3	11.6	2.31	0.996	0.899
Sales of space heating units - Fossil (%)	8.14	13.2	10.3	4.62	0.695	0.058	0
Sales of water heating units - Electric Heat Pump (%)	0.247	0.326	0.328	0.328	0.329	0.331	0.332
Sales of water heating units - Electric Resistance (%)	1.46	1.94	1.92	1.93	1.93	1.93	1.93
Sales of water heating units - Gas Furnace (%)	97.6	96.4	96.3	96.3	96.3	96.3	96.3
Sales of water heating units - Other (%)	0.649	1.34	1.42	1.41	1.43	1.46	1.47
Sales of cooking units - Electric Resistance (%)	18.5	19.4	19.4	19.6	19.7	19.8	19.9
Sales of cooking units - Gas (%)	81.5	80.6	80.6	80.4	80.3	80.2	80.1
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		41,117	42,334				

Table 70: REF scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	527	527	527	527	527	527	0
Installed thermal - Natural gas (MW)	9,526	11,427	11,246	15,095	18,802	21,751	20,939
Installed thermal - Nuclear (MW)	3,631	3,631	3,631	3,631	3,631	2,461	2,461
Installed renewables - Rooftop PV (MW)	1,929	2,892	3,843	5,079	6,573	8,274	10,225
Installed renewables - Solar - Base land use assumptions (MW)	770	770	770	770	770	770	770
Installed renewables - Wind - Base land use assumptions (MW)	9	9	9	9	9	9	9
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	83.2	159	261	345	425	14,757
Installed renewables - Solar - Constrained land use assumptions (MW)	1.37	1.37	1.37	1.37	1.37	1.37	1.37

Table 71: REF scenario - PILLAR 2: Clean Electricity - Generation

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	1,439	1,439	1,439	1,439	1,439	1,439	1,439
Wind - Base land use assumptions (GWh)	30.5	30.5	30.5	30.5	30.5	30.5	30.5
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0

Table 72: REF scenario - PILLAR 6: Land sinks - Forests - REF only

Item	2020	2025	2030	2035	2040	2045	2050
Business-as-usual carbon sink - Natural uptake (Mt CO2e/y)	0.55		-1.73				-1.55
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.047		-0.084				-0.088
Business-as-usual carbon sink - Total (Mt CO2e/y)	0.503		-1.82				-1.64

Table 73: REF scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO ₂ e/y)							-34.3
Carbon sink potential - Low - Avoid deforestation (1000 tCO ₂ e/y)							-218
Carbon sink potential - Low - Extend rotation length (1000 tCO ₂ e/y)							-372
Carbon sink potential - Low - Improve plantations (1000 tCO ₂ e/y)							-3.43
Carbon sink potential - Low - Increase retention of HWP (1000 tCO ₂ e/y)							-57.4
Carbon sink potential - Low - Increase trees outside forests (1000 tCO ₂ e/y)							-94.1
Carbon sink potential - Low - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO ₂ e/y)							-23.3
Carbon sink potential - Low - Restore productivity (1000 tCO ₂ e/y)							-161
Carbon sink potential - Low - All (not counting overlap) (1000 tCO ₂ e/y)							-963
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO ₂ e/y)							-51.4
Carbon sink potential - Mid - Avoid deforestation (1000 tCO ₂ e/y)							-761
Carbon sink potential - Mid - Extend rotation length (1000 tCO ₂ e/y)							-671
Carbon sink potential - Mid - Improve plantations (1000 tCO ₂ e/y)							-5.02
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO ₂ e/y)							-115
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO ₂ e/y)							-181
Carbon sink potential - Mid - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO ₂ e/y)							-165
Carbon sink potential - Mid - Restore productivity (1000 tCO ₂ e/y)							-319
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO ₂ e/y)							-2,269
Carbon sink potential - High - Accelerate regeneration (1000 tCO ₂ e/y)							-68.4
Carbon sink potential - High - Avoid deforestation (1000 tCO ₂ e/y)							-1,305
Carbon sink potential - High - Extend rotation length (1000 tCO ₂ e/y)							-969
Carbon sink potential - High - Improve plantations (1000 tCO ₂ e/y)							-6.74
Carbon sink potential - High - Increase retention of HWP (1000 tCO ₂ e/y)							-172
Carbon sink potential - High - Increase trees outside forests (1000 tCO ₂ e/y)							-269
Carbon sink potential - High - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO ₂ e/y)							-308
Carbon sink potential - High - All (not counting overlap) (1000 tCO ₂ e/y)							-3,576

Table 73: REF scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-478
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							5.6
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							166
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							189
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.24
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							13.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.51
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							95.8
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							473
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							8.4
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							171
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							342
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1.87
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							19.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							11
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							193
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							747
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							11.2

Table 73: REF scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							177
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							494
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2.48
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							25.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							8.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							158
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							877