



## **Net-Zero America - Mississippi data**

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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)		24.9	0.026	0.024	0.016	0.01	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		9.43	6.67	3.71	3.05	1.39	0.533
Premature deaths from air pollution - Mobile - On-Road (deaths)		48.3	44.8	33.9	19.4	8.78	3.42
Premature deaths from air pollution - Gas Stations (deaths)		6.53	5.98	4.49	2.65	1.3	0.621
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		4.69	3.79	2.53	1.42	0.718	0.359
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.212	0.172	0.118	0.069	0.032	0.012
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.09	0.957	0.716	0.457	0.234	0.103
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.942	0.898	0.85	0.798	0.747	0.692
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.35	2.92	2.12	1.33	0.813	0.526
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.589	0.488	0.384	0.283	0.195	0.125
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.293	0.245	0.199	0.154	0.113	0.074
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.54	0.215	0.209	0.202	0.201	0.196
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		29.8	27.8	25.1	19.4	14.3	8.78
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		221	0.234	0.211	0.138	0.085	0.005
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		83.6	59.1	32.9	27	12.3	4.72
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		429	398	301	173	78.1	30.4
Monetary damages from air pollution - Gas Stations (million \$2019)		57.9	52.9	39.8	23.5	11.5	5.5
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		41.6	33.6	22.4	12.6	6.36	3.18
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		1.88	1.52	1.05	0.615	0.283	0.109
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		9.62	8.48	6.35	4.05	2.07	0.912
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		8.34	7.95	7.52	7.07	6.61	6.13
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		29.7	25.8	18.8	11.8	7.2	4.66

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)		5.21	4.32	3.4	2.5	1.73	1.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		2.6	2.17	1.76	1.37	0.997	0.653
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		4.76	1.89	1.85	1.78	1.77	1.73
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		264	247	223	172	127	77.9

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		189	485	978	1,218	1,526	1,173
By economic sector - Construction (jobs)		5,089	6,103	10,097	12,506	13,891	16,716
By economic sector - Manufacturing (jobs)		4,317	4,716	5,643	5,421	5,176	5,396
By economic sector - Mining (jobs)		4,845	4,039	3,230	2,135	1,564	986
By economic sector - Other (jobs)		373	424	1,165	2,143	2,559	3,447
By economic sector - Pipeline (jobs)		557	829	869	478	423	430
By economic sector - Professional (jobs)		2,889	3,019	4,871	6,557	7,933	8,893
By economic sector - Trade (jobs)		2,565	2,391	3,199	4,106	4,699	5,563
By economic sector - Utilities (jobs)		5,919	6,795	9,694	10,175	11,827	13,892
By resource sector - Biomass (jobs)		633	1,293	2,731	3,634	5,568	5,022
By resource sector - CO2 (jobs)		12.8	3,162	4,290	1,772	2,278	2,838
By resource sector - Coal (jobs)		218	0	0	0	0	0
By resource sector - Grid (jobs)		6,087	6,222	11,291	14,484	17,970	23,263
By resource sector - Natural Gas (jobs)		6,086	4,934	4,471	4,263	3,622	2,101
By resource sector - Nuclear (jobs)		727	715	704	693	682	672
By resource sector - Oil (jobs)		10,204	8,953	7,700	5,576	4,129	2,634
By resource sector - Solar (jobs)		2,064	2,510	7,235	13,070	14,420	18,692
By resource sector - Wind (jobs)		710	1,013	1,326	1,246	929	1,274
By education level - All sectors - High school diploma or less (jobs)		10,901	12,015	16,944	19,188	21,276	24,217
By education level - All sectors - Associates degree or some college (jobs)		8,042	8,777	12,318	13,926	15,456	17,895
By education level - All sectors - Bachelors degree (jobs)		6,132	6,305	8,212	9,037	9,958	11,131
By education level - All sectors - Masters or professional degree (jobs)		1,467	1,502	1,995	2,253	2,525	2,829
By education level - All sectors - Doctoral degree (jobs)		200	202	278	334	383	424
Related work experience - All sectors - None (jobs)		3,781	4,133	5,787	6,548	7,299	8,337
Related work experience - All sectors - Up to 1 year (jobs)		5,048	5,521	7,874	9,093	10,163	11,595
Related work experience - All sectors - 1 to 4 years (jobs)		9,868	10,554	14,410	16,123	17,826	20,239
Related work experience - All sectors - 4 to 10 years (jobs)		6,313	6,761	9,231	10,288	11,367	12,978
Related work experience - All sectors - Over 10 years (jobs)		1,733	1,832	2,446	2,687	2,943	3,347
On-the-Job Training - All sectors - None (jobs)		1,466	1,541	2,117	2,430	2,706	3,094
On-the-Job Training - All sectors - Up to 1 year (jobs)		17,877	19,151	26,246	29,511	32,732	37,026

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)		5,516	6,008	8,352	9,340	10,312	11,889
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,628	1,826	2,654	3,035	3,393	3,967
On-the-Job Training - All sectors - Over 10 years (jobs)		256	276	378	421	454	520
On-Site or In-Plant Training - All sectors - None (jobs)		4,283	4,600	6,380	7,256	8,054	9,150
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		16,206	17,363	23,800	26,743	29,654	33,627
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		4,303	4,679	6,496	7,271	8,026	9,237
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,739	1,923	2,732	3,085	3,434	3,981
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		212	237	339	384	430	500
Wage income - All (million \$2019)		1,368	1,474	2,008	2,246	2,514	2,872

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		75.7	66.7	53.5	41	31.1	23.1
Oil consumption - Cumulative (million bbls)							1,650
Oil production - Annual (million bbls)		30.3	30.5	30.4	24.1	19.6	13
Natural gas consumption - Annual (tcf)		446	376	302	227	143	99.1
Natural gas consumption - Cumulative (tcf)							9,085
Natural gas production - Annual (tcf)		43.4	41	35.7	30.2	24	18.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	350	323	285	238	196	170	160
Final energy use - Residential (PJ)	99.2	92.9	85.6	76.5	69.1	64.8	63
Final energy use - Commercial (PJ)	70.6	70.6	68.1	64.4	61.3	60.1	60.4
Final energy use - Industry (PJ)	201	206	208	206	206	204	203

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)		2.03	2.09	3.69	3.94	2.98	3.07

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	3.71	173	342	935	1,528	2,001	2,475
Vehicle stocks - LDV – All others (1000 units)	2,064	1,965	1,866	1,360	854	483	112
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		398	1,016	1,653	2,501	2,725	2,596
Public EV charging plugs - DC Fast (1000 units)	0.053		0.878		3.92		6.35
Public EV charging plugs - L2 (1000 units)	0.175		21.1		94.3		153

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 (%)	29.5	45.1	80.4	88.3	88.7	88.6	88.6
Sales of space heating units - Electric Resistance (%)	28.6	27.1	11.4	7.85	7.68	7.79	7.8
Sales of space heating units - Gas (%)	30.2	16.4	4.98	2.47	2.38	2.36	2.35
Sales of space heating units - Fossil (%)	11.7	11.3	3.21	1.36	1.27	1.25	1.25
Sales of water heating units - Electric Heat Pump (%)	0	12.1	64	75.6	76.1	76.1	76.1
Sales of water heating units - Electric Resistance (%)	67.2	69.3	30.5	21.8	21.4	21.4	21.4
Sales of water heating units - Gas Furnace (%)	29.2	16.1	3.02	0.128	0	0	0
Sales of water heating units - Other (%)	3.59	2.49	2.46	2.47	2.48	2.48	2.49
Sales of cooking units - Electric Resistance (%)	75.8	81	96.7	99.8	100	100	100
Sales of cooking units - Gas (%)	24.2	19	3.26	0.164	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		2.27	2.78				

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 (%)	9.46	29.3	77	90.8	91.9	92	92
Sales of space heating units - Electric Resistance (%)	4.72	4.61	4.92	6.26	6.57	6.57	6.55
Sales of space heating units - Gas Furnace (%)	85.8	63.2	17.5	2.95	1.48	1.43	1.43
Sales of space heating units - Fossil (%)	0	2.89	0.56	0.024	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.153	10.6	55.7	65.7	66.1	66.2	66.2
Sales of water heating units - Electric Resistance (%)	5.64	9.97	28	32.1	32.3	32.3	32.3
Sales of water heating units - Gas Furnace (%)	92.7	77.8	14.7	0.62	0	0	0
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric Resistance (%)	43.5	55.3	83.4	88.9	89.2	89.2	89.1
Sales of cooking units - Gas (%)	56.5	44.7	16.6	11.1	10.8	10.8	10.9
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		8,123	9,222				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,610	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	11,309	10,201	9,310	11,906	9,082	9,043	10,101
Installed thermal - Nuclear (MW)	1,440	1,440	1,440	1,440	1,440	1,440	1,440
Installed renewables - Rooftop PV (MW)	16.9	27.3	38.6	55	78.1	108	146
Installed renewables - Solar - Base land use assumptions (MW)	49.1	1,116	2,278	7,216	16,315	25,778	37,471
Installed renewables - Wind - Base land use assumptions (MW)	0	0	0	0	0	472	1,550
Installed renewables - Solar - Constrained land use assumptions (MW)	44.8	890	2,802	11,209	18,136	28,224	39,263
Installed renewables - Wind - Constrained land use assumptions (MW)	0	0	0	0	13,281	13,281	13,281
Capital invested - Solar PV - Base (billion \$2018)		1.43	1.39	5.45	9.46	9.29	10.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Wind - Base (billion \$2018)		0	0	0	0	0.529	1.14
Capital invested - Solar PV - Constrained (billion \$2018)		0.876	2.23	4.75	5.05	7.97	9.84
Capital invested - Wind - Constrained (billion \$2018)		0	0	0	15.8	0	0
Capital invested - Biomass power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0.002	0	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	2.86	0	0	2.52	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	112	2,150	4,376	13,814	31,219	49,326	71,640
Wind - Base land use assumptions (GWh)	0	0	0	0	0	1,363	4,502
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	103	1,718	5,358	21,445	34,720	53,997	75,091
Wind - Constrained land use assumptions (GWh)	0	0	0	0	33,276	33,276	33,276
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	3,205	3,205	3,205	6,036	6,036
Biomass w/ccu allam power plant (GWh)	0	0	0	0	2.37	2.37	2.37

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	2	2	2	4	4
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	1	1	1
Number of facilities - Beccs hydrogen (quantity)	0	0	0	4	7	14	14
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	1	1	1
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	1	1	1
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	1	1	1	1	1
Conversion capital investment - Cumulative 5-yr (million \$2018)		0	2,620	4,363	3,928	8,452	0
Biomass purchases (million \$2018/y)		0	125	365	581	1,029	1,029

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	3.17	13.7	18.5	30.9	31.4
Annual - BECCS (MMT)		0	3.17	8.78	13.7	24.3	24.3
Annual - NGCC (MMT)		0	0	4.93	4.83	6.52	7.04
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	3.17	16.9	35.4	66.3	97.6
Cumulative - BECCS (MMT)		0	3.17	11.9	25.7	50	74.3



Table 12: E+ scenario - PILLAR 4: CCUS - CO2 capture (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Cumulative - NGCC (MMT)		0	0	4.93	9.76	16.3	23.3
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	487	973	973	973	973
Spur (km)		0	103	1,060	1,633	2,269	2,604
All (km)		0	589	2,034	2,607	3,243	3,577
Cumulative investment - Trunk (million \$2018)		0	2,854	5,707	5,707	5,707	5,707
Cumulative investment - Spur (million \$2018)		0	84.9	787	1,278	1,895	2,084
Cumulative investment - All (million \$2018)		0	2,939	6,495	6,986	7,602	7,791

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	6.58	21.1	37.9	60.2	80.1
Injection wells (wells)		0	6	24	42	70	86
Resource characterization, appraisal, permitting costs (million \$2020)		32.8	590	935	935	935	935
Wells and facilities construction costs (million \$2020)		0	181	705	1,257	2,102	2,610

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)							-374
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-213
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,218
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,599
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,234
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-283
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,261
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-497
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,692
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-17,371
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-560
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-746
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,798
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-3,809
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-10,469

Table 15: 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)							-546
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4,891
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,528
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,356
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-33,702
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-746
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,278
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-8,378
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-5,109
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-15,703
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-809
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-6,522
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-6,558
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-50,122
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-5,019
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							61.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							162
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,637
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							941
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)							40.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							216
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							32.3
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,007
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							4,096
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							91.6

Table 15: *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)							168
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,954
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,416
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)							58.6
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							323
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							234
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,027
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							7,273
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							122
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							173
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,272
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,882
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)							76.8
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							431
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							186
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,664
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,807

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)							-172

Table 16: 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)							-3,250
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-34.3
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-3,456
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-172
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-6,293
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-68.6
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-6,534
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							69.5
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							939
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							62.4
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,070
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							69.5
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,815
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							125
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							2,009

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)		24.9	0.026	0.024	0.016	0.01	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		8.9	5.33	2.31	0.888	0.335	0.23
Premature deaths from air pollution - Mobile - On-Road (deaths)		49	49.2	47.7	42.8	33.9	23.1
Premature deaths from air pollution - Gas Stations (deaths)		6.67	6.69	6.42	5.73	4.53	3.13
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		4.73	4.24	3.71	3.04	2.27	1.53
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.217	0.205	0.193	0.17	0.132	0.093

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.1	1.08	1.05	0.945	0.741	0.521
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.942	0.898	0.85	0.798	0.747	0.692
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.38	3.32	3.15	2.77	2.21	1.64
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.59	0.535	0.482	0.417	0.346	0.278
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.293	0.263	0.233	0.204	0.176	0.15
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.519	0.215	0.212	0.207	0.201	0.186
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		29.7	26.7	23	19.9	17.5	12.2
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		221	0.234	0.211	0.138	0.085	0.005
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		78.8	47.2	20.4	7.86	2.97	2.04
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		436	438	424	380	301	205
Monetary damages from air pollution - Gas Stations (million \$2019)		59.1	59.2	56.9	50.7	40.2	27.7
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		41.9	37.6	32.9	26.9	20.1	13.6
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		1.92	1.82	1.71	1.51	1.17	0.828
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		9.75	9.61	9.33	8.38	6.57	4.62
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		8.34	7.95	7.52	7.07	6.61	6.13
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		29.9	29.4	27.9	24.5	19.6	14.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		5.23	4.73	4.27	3.69	3.06	2.46
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		2.6	2.33	2.06	1.81	1.56	1.33
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		4.58	1.9	1.87	1.82	1.77	1.64
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		264	237	204	177	155	108

Table 18: E- scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		211	1,055	1,662	2,103	2,116	1,172
By economic sector - Construction (jobs)		5,095	7,025	10,501	12,868	16,198	17,771
By economic sector - Manufacturing (jobs)		4,381	5,041	5,748	6,514	7,091	6,628
By economic sector - Mining (jobs)		4,885	4,172	3,476	2,726	2,332	1,509
By economic sector - Other (jobs)		381	447	1,015	1,947	2,802	3,490
By economic sector - Pipeline (jobs)		558	1,061	1,197	638	655	702
By economic sector - Professional (jobs)		2,905	3,679	5,634	8,599	10,215	9,126
By economic sector - Trade (jobs)		2,604	2,550	3,409	4,852	5,837	5,833
By economic sector - Utilities (jobs)		5,823	7,767	10,426	10,981	13,807	14,759
By resource sector - Biomass (jobs)		665	2,798	5,421	8,754	9,011	4,853
By resource sector - CO2 (jobs)		15.2	5,385	7,345	3,063	3,906	4,835
By resource sector - Coal (jobs)		352	68.2	0	0	0	0
By resource sector - Grid (jobs)		5,910	6,515	9,877	15,188	20,451	23,456
By resource sector - Natural Gas (jobs)		5,993	4,484	4,411	3,965	3,942	2,212
By resource sector - Nuclear (jobs)		727	715	704	693	682	672
By resource sector - Oil (jobs)		10,239	9,126	8,155	7,121	6,084	3,958
By resource sector - Solar (jobs)		2,191	2,646	5,979	11,230	15,606	18,991
By resource sector - Wind (jobs)		750	1,061	1,176	1,213	1,370	2,015
By education level - All sectors - High school diploma or less (jobs)		10,960	13,861	18,473	21,940	26,134	26,150
By education level - All sectors - Associates degree or some college (jobs)		8,060	9,940	13,177	15,505	18,784	19,315
By education level - All sectors - Bachelors degree (jobs)		6,151	7,067	8,924	10,671	12,482	12,051
By education level - All sectors - Masters or professional degree (jobs)		1,471	1,698	2,182	2,692	3,164	3,028
By education level - All sectors - Doctoral degree (jobs)		201	233	313	419	489	447
Related work experience - All sectors - None (jobs)		3,794	4,748	6,314	7,494	8,965	8,988
Related work experience - All sectors - Up to 1 year (jobs)		5,080	6,384	8,609	10,548	12,562	12,452
Related work experience - All sectors - 1 to 4 years (jobs)		9,904	11,982	15,588	18,447	21,937	21,872
Related work experience - All sectors - 4 to 10 years (jobs)		6,328	7,636	9,942	11,678	13,956	14,039
Related work experience - All sectors - Over 10 years (jobs)		1,737	2,048	2,615	3,060	3,634	3,639
On-the-Job Training - All sectors - None (jobs)		1,473	1,744	2,296	2,818	3,351	3,323
On-the-Job Training - All sectors - Up to 1 year (jobs)		17,962	21,859	28,592	34,287	40,580	39,988
On-the-Job Training - All sectors - 1 to 4 years (jobs)		5,525	6,797	8,931	10,353	12,505	12,856
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,627	2,089	2,847	3,301	4,060	4,257
On-the-Job Training - All sectors - Over 10 years (jobs)		257	309	401	468	557	568
On-Site or In-Plant Training - All sectors - None (jobs)		4,302	5,262	6,941	8,355	9,933	9,857
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		16,280	19,780	25,868	30,950	36,702	36,320
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		4,312	5,296	6,953	8,097	9,756	9,990
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,738	2,191	2,940	3,397	4,140	4,286
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		211	270	365	427	522	539
Wage income - All (million \$2019)		1,371	1,672	2,181	2,592	3,107	3,109

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	351	326	298	275	258	238	214
Final energy use - Residential (PJ)	99.2	93.3	89.2	84.7	79.1	73.1	68.2
Final energy use - Commercial (PJ)	70.6	70.8	69.9	68.7	66.7	64.8	63.6
Final energy use - Industry (PJ)	201	207	209	208	209	207	206

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)		1.69	1.71	2.12	2.18	3.13	3.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	2.87	52.7	102	333	564	1,075	1,585
Vehicle stocks - LDV – All others (1000 units)	2,072	2,072	2,072	1,966	1,859	1,433	1,006
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	63.7	135	456	1,438	2,094
Public EV charging plugs - DC Fast (1000 units)	0.053		0.263		1.45		4.06
Public EV charging plugs - L2 (1000 units)	0.175		6.32		34.8		97.8

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 (%)	29.5	38.3	42.3	54.1	71.8	83.3	87.2
Sales of space heating units - Electric Resistance (%)	28.6	30.1	28.3	23	15.1	10.1	8.37
Sales of space heating units - Gas (%)	30.2	18.6	17.3	13.8	8.07	4.19	2.84
Sales of space heating units - Fossil (%)	11.7	12.9	12.1	9.17	5.03	2.44	1.57
Sales of water heating units - Electric Heat Pump (%)	0	2.08	7.99	25	51.1	68.1	74
Sales of water heating units - Electric Resistance (%)	67.2	76.8	72.5	59.6	40.1	27.4	23
Sales of water heating units - Gas Furnace (%)	29.2	18.6	17	12.9	6.35	2.02	0.528
Sales of water heating units - Other (%)	3.59	2.49	2.47	2.49	2.51	2.49	2.49
Sales of cooking units - Electric Resistance (%)	75.7	76.4	78.6	84.4	92.6	97.6	99.4
Sales of cooking units - Gas (%)	24.3	23.6	21.4	15.6	7.42	2.39	0.644
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		2.25	2.65				

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 (%)	9.46	20.2	25.6	41.4	66.1	83.2	89.6
Sales of space heating units - Electric Resistance (%)	4.72	4.61	4.65	4.77	5.23	5.91	6.33
Sales of space heating units - Gas Furnace (%)	85.8	71.8	66.6	51.4	27.5	10.5	3.93
Sales of space heating units - Fossil (%)	0	3.34	3.16	2.39	1.19	0.387	0.102
Sales of water heating units - Electric Heat Pump (%)	0.153	1.96	7.08	21.8	44.4	59.2	64.3
Sales of water heating units - Electric Resistance (%)	5.64	6.47	8.38	14.4	23.5	29.5	31.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	92.7	90	83	62.2	30.5	9.74	2.53
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric Resistance (%)	43.5	47.1	51.3	61.6	76.1	85	88
Sales of cooking units - Gas (%)	56.5	52.9	48.7	38.4	23.9	15	12
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		8,119	9,209				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,610	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	11,309	9,884	9,801	9,472	9,379	9,241	8,716
Installed thermal - Nuclear (MW)	1,440	1,440	1,440	1,440	1,440	1,440	1,440

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)							-374
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-213
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,218
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,599
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,234
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-283
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,261
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-497
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,692
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-17,371
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-560
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-746
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,798
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-3,809
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-10,469
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-546
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4,891
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,528
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,356
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-33,702



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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-746
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,278
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-8,378
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-5,109
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-15,703
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-809
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-6,522
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-6,558
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-50,122
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-5,019
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							61.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							162
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,637
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							941
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)							40.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							216
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							32.3
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,007
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							4,096
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							91.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							168
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,954
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,416

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 - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							58.6
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							323
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							234
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,027
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							7,273
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							122
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							173
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,272
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,882
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)							76.8
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							431
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							186
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,664
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,807

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)							-172
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-3,250
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-34.3
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-3,456

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-172
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-6,293
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-68.6
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-6,534
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							69.5
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							939
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							62.4
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,070
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							69.5
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,815
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							125
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							2,009

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)		24.9	0.026	0.024	0.016	0.01	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		10.1	7.01	3.73	2.37	0.648	0.267
Premature deaths from air pollution - Mobile - On-Road (deaths)		48.3	44.8	33.9	19.4	8.78	3.42
Premature deaths from air pollution - Gas Stations (deaths)		6.53	5.98	4.49	2.65	1.3	0.621
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		4.69	3.79	2.53	1.42	0.718	0.359
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.212	0.172	0.118	0.069	0.032	0.012
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.09	0.957	0.716	0.457	0.234	0.103
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.942	0.898	0.85	0.798	0.747	0.692
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.35	2.92	2.12	1.33	0.813	0.526

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.589	0.488	0.384	0.283	0.195	0.125
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.293	0.245	0.199	0.154	0.113	0.074
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.593	0.215	0.209	0.201	0.2	0.174
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		29.3	27.4	23.4	16.7	10.1	1.47
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		221	0.234	0.211	0.138	0.085	0.005
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		89.4	62.1	33.1	21	5.74	2.37
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		429	398	301	173	78.1	30.4
Monetary damages from air pollution - Gas Stations (million \$2019)		57.9	52.9	39.8	23.5	11.5	5.5
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		41.6	33.6	22.4	12.6	6.36	3.18
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		1.88	1.52	1.05	0.615	0.283	0.109
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		9.62	8.48	6.35	4.05	2.07	0.912
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		8.34	7.95	7.52	7.07	6.61	6.13
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		29.7	25.8	18.8	11.8	7.2	4.66
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		5.21	4.32	3.4	2.5	1.73	1.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		2.6	2.17	1.76	1.37	0.997	0.653
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		5.23	1.89	1.84	1.78	1.77	1.54
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		260	243	208	149	90.1	13.1

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		190	295	909	1,120	1,303	1,173
By economic sector - Construction (jobs)		6,147	7,558	10,605	19,997	27,931	38,149
By economic sector - Manufacturing (jobs)		4,553	5,177	6,555	7,029	8,263	9,975
By economic sector - Mining (jobs)		4,809	3,803	2,843	1,734	973	167
By economic sector - Other (jobs)		561	940	1,641	4,170	6,517	8,511
By economic sector - Pipeline (jobs)		542	464	344	233	143	51.9
By economic sector - Professional (jobs)		3,276	3,734	5,508	9,903	14,042	18,493

Table 28: E+RE+ scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Trade (jobs)		2,797	2,950	3,641	6,429	9,221	12,234
By economic sector - Utilities (jobs)		6,540	6,630	8,819	13,013	18,089	31,071
By resource sector - Biomass (jobs)		597	783	2,404	3,611	4,844	5,179
By resource sector - CO2 (jobs)		0	0.001	0.001	0.001	0.001	0.001
By resource sector - Coal (jobs)		218	0	0	0	0	0
By resource sector - Grid (jobs)		7,169	8,709	13,514	21,865	33,151	61,983
By resource sector - Natural Gas (jobs)		6,196	4,797	4,048	3,787	3,212	2,360
By resource sector - Nuclear (jobs)		727	715	704	693	402	0
By resource sector - Oil (jobs)		10,205	8,924	7,495	5,102	3,220	503
By resource sector - Solar (jobs)		3,492	6,441	10,842	26,608	39,430	45,812
By resource sector - Wind (jobs)		811	1,182	1,858	1,962	2,223	3,987
By education level - All sectors - High school diploma or less (jobs)		12,065	13,203	17,442	27,334	37,142	51,413
By education level - All sectors - Associates degree or some college (jobs)		8,920	9,652	12,610	20,076	27,576	38,763
By education level - All sectors - Bachelors degree (jobs)		6,621	6,826	8,450	12,572	16,825	22,940
By education level - All sectors - Masters or professional degree (jobs)		1,589	1,641	2,066	3,162	4,281	5,854
By education level - All sectors - Doctoral degree (jobs)		219	230	298	483	659	855
Related work experience - All sectors - None (jobs)		4,174	4,506	5,909	9,309	12,726	17,723
Related work experience - All sectors - Up to 1 year (jobs)		5,603	6,176	8,248	13,130	17,935	24,594
Related work experience - All sectors - 1 to 4 years (jobs)		10,814	11,509	14,782	22,799	30,905	42,827
Related work experience - All sectors - 4 to 10 years (jobs)		6,934	7,365	9,413	14,606	19,827	27,609
Related work experience - All sectors - Over 10 years (jobs)		1,890	1,994	2,513	3,783	5,088	7,072
On-the-Job Training - All sectors - None (jobs)		1,612	1,724	2,216	3,526	4,814	6,538
On-the-Job Training - All sectors - Up to 1 year (jobs)		19,581	20,959	27,134	41,687	56,455	77,796
On-the-Job Training - All sectors - 1 to 4 years (jobs)		6,105	6,556	8,475	13,371	18,253	25,677
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,834	2,003	2,648	4,429	6,138	8,715
On-the-Job Training - All sectors - Over 10 years (jobs)		283	308	393	614	823	1,099
On-Site or In-Plant Training - All sectors - None (jobs)		4,719	5,074	6,614	10,397	14,142	19,327
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		17,762	19,009	24,573	37,829	51,277	70,866
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		4,757	5,116	6,616	10,401	14,183	19,904
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,941	2,093	2,721	4,449	6,118	8,640
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		236	258	341	551	761	1,088
Wage income - All (million \$2019)		1,491	1,588	2,039	3,127	4,265	6,004

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	350	323	285	238	196	170	160
Final energy use - Residential (PJ)	99.2	92.9	85.6	76.5	69.1	64.8	63
Final energy use - Commercial (PJ)	70.6	70.6	68.1	64.4	61.3	60.1	60.4
Final energy use - Industry (PJ)	201	206	208	206	206	204	203

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)		2.03	2.09	3.69	3.94	2.98	3.07

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	3.71	173	342	935	1,528	2,001	2,475
Vehicle stocks - LDV – All others (1000 units)	2,064	1,965	1,866	1,360	854	483	112
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		398	1,016	1,653	2,501	2,725	2,596
Public EV charging plugs - DC Fast (1000 units)	0.053		0.878		3.92		6.35
Public EV charging plugs - L2 (1000 units)	0.175		21.1		94.3		153

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 (%)	29.5	45.1	80.4	88.3	88.7	88.6	88.6
Sales of space heating units - Electric Resistance (%)	28.6	27.1	11.4	7.85	7.68	7.79	7.8
Sales of space heating units - Gas (%)	30.2	16.4	4.98	2.47	2.38	2.36	2.35
Sales of space heating units - Fossil (%)	11.7	11.3	3.21	1.36	1.27	1.25	1.25
Sales of water heating units - Electric Heat Pump (%)	0	12.1	64	75.6	76.1	76.1	76.1
Sales of water heating units - Electric Resistance (%)	67.2	69.3	30.5	21.8	21.4	21.4	21.4
Sales of water heating units - Gas Furnace (%)	29.2	16.1	3.02	0.128	0	0	0
Sales of water heating units - Other (%)	3.59	2.49	2.46	2.47	2.48	2.48	2.49
Sales of cooking units - Electric Resistance (%)	75.8	81	96.7	99.8	100	100	100
Sales of cooking units - Gas (%)	24.2	19	3.26	0.164	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		2.27	2.78				

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 (%)	9.46	29.3	77	90.8	91.9	92	92
Sales of space heating units - Electric Resistance (%)	4.72	4.61	4.92	6.26	6.57	6.57	6.55
Sales of space heating units - Gas Furnace (%)	85.8	63.2	17.5	2.95	1.48	1.43	1.43
Sales of space heating units - Fossil (%)	0	2.89	0.56	0.024	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.153	10.6	55.7	65.7	66.1	66.2	66.2
Sales of water heating units - Electric Resistance (%)	5.64	9.97	28	32.1	32.3	32.3	32.3
Sales of water heating units - Gas Furnace (%)	92.7	77.8	14.7	0.62	0	0	0
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric Resistance (%)	43.5	55.3	83.4	88.9	89.2	89.2	89.1
Sales of cooking units - Gas (%)	56.5	44.7	16.6	11.1	10.8	10.8	10.9
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		8,123	9,222				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,610	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	11,309	11,833	11,809	11,975	9,573	9,533	13,831
Installed thermal - Nuclear (MW)	1,440	1,440	1,440	1,440	1,440	0	0
Installed renewables - Rooftop PV (MW)	16.9	27.3	38.6	55	78.1	108	146
Installed renewables - Solar - Base land use assumptions (MW)	49.1	2,076	5,698	12,500	31,216	56,368	90,754
Installed renewables - Wind - Base land use assumptions (MW)	0	0	0	0	205	1,597	33,504
Installed renewables - Solar - Constrained land use assumptions (MW)	49.1	2,280	5,511	14,111	35,911	67,096	101,794
Installed renewables - Wind - Constrained land use assumptions (MW)	0	0	0	3,031	13,398	13,398	14,643
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion \$2018)		2.71	4.34	7.5	19.5	24.7	31.9
Capital invested - Wind - Base (billion \$2018)		0	0	0	0.242	1.56	33.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	112	3,996	10,932	23,931	59,775	107,942	173,782
Wind - Base land use assumptions (GWh)	0	0	0	0	582	4,639	85,097
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	225	8,761	21,079	53,942	137,442	256,617	389,257
Wind - Constrained land use assumptions (GWh)	0	0	0	15,051	67,125	67,125	74,355
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0

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)							-374
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-213
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,218
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,599
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,234
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-283
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,261
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-497
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,692
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-17,371

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-560
Carbon sink potential - Mid - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-746
Carbon sink potential - Mid - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-5,798
Carbon sink potential - Mid - Improve plantations (1000 tCO <sub>2</sub> e/y)							-3,809
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-10,469
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-546
Carbon sink potential - Mid - Reforest cropland (1000 tCO <sub>2</sub> e/y)							-4,891
Carbon sink potential - Mid - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-3,528
Carbon sink potential - Mid - Restore productivity (1000 tCO <sub>2</sub> e/y)							-3,356
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-33,702
Carbon sink potential - High - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-746
Carbon sink potential - High - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-1,278
Carbon sink potential - High - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-8,378
Carbon sink potential - High - Improve plantations (1000 tCO <sub>2</sub> e/y)							-5,109
Carbon sink potential - High - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-15,703
Carbon sink potential - High - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-809
Carbon sink potential - High - Reforest cropland (1000 tCO <sub>2</sub> e/y)							-6,522
Carbon sink potential - High - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-6,558
Carbon sink potential - High - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-50,122
Carbon sink potential - High - Restore productivity (1000 tCO <sub>2</sub> e/y)							-5,019
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							61.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							162
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,637
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							941
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)							40.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							216



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 - Reforest pasture (1000 hectares)							32.3
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,007
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							4,096
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							91.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							168
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,954
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,416
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)							58.6
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							323
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							234
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,027
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							7,273
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							122
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							173
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,272
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,882
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)							76.8
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							431
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							186
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,664

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 - Total impacted (over 30 years) (1000 hectares)							8,807

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)							-172
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-3,250
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-34.3
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-3,456
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-172
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-6,293
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-68.6
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-6,534
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							69.5
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							939
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							62.4
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,070
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							69.5
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,815
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							125
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							2,009

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)		24.9	0.026	0.024	0.016	0.01	0.001

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		9.59	6.13	5.65	4.53	1.69	0.525
Premature deaths from air pollution - Mobile - On-Road (deaths)		48.3	44.8	33.9	19.4	8.78	3.42
Premature deaths from air pollution - Gas Stations (deaths)		6.53	5.98	4.49	2.65	1.3	0.621
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		4.69	3.79	2.53	1.42	0.718	0.359
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.212	0.172	0.118	0.069	0.032	0.012
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.09	0.957	0.716	0.457	0.234	0.103
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.942	0.898	0.85	0.798	0.747	0.692
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.35	2.92	2.12	1.33	0.813	0.526
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.589	0.488	0.384	0.283	0.195	0.125
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.293	0.245	0.199	0.154	0.113	0.074
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.487	0.214	0.209	0.202	0.201	0.174
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		30.1	29	28.2	23.8	19.7	14.5
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		221	0.234	0.211	0.138	0.085	0.005
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		84.9	54.3	50.1	40.1	15	4.65
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		429	398	301	173	78.1	30.4
Monetary damages from air pollution - Gas Stations (million \$2019)		57.9	52.9	39.8	23.5	11.5	5.5
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		41.6	33.6	22.4	12.6	6.36	3.18
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		1.88	1.52	1.05	0.615	0.283	0.109
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		9.62	8.48	6.35	4.05	2.07	0.912
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		8.34	7.95	7.52	7.07	6.61	6.13
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		29.7	25.8	18.8	11.8	7.2	4.66
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		5.21	4.32	3.4	2.5	1.73	1.1

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 - Other (million \$2019)		2.6	2.17	1.76	1.37	0.997	0.653
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		4.3	1.89	1.85	1.78	1.77	1.54
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		268	257	250	211	175	129

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		203	1,126	1,680	1,709	1,711	1,172
By economic sector - Construction (jobs)		4,623	6,691	9,255	8,798	9,851	8,631
By economic sector - Manufacturing (jobs)		4,061	4,150	4,531	4,499	4,242	3,459
By economic sector - Mining (jobs)		4,876	4,260	3,575	2,448	1,979	1,393
By economic sector - Other (jobs)		276	302	521	857	1,169	701
By economic sector - Pipeline (jobs)		571	1,181	1,384	746	745	818
By economic sector - Professional (jobs)		2,692	3,478	4,977	5,786	6,352	4,798
By economic sector - Trade (jobs)		2,440	2,374	2,860	3,109	3,342	2,450
By economic sector - Utilities (jobs)		5,789	8,152	10,944	10,102	10,841	11,560
By resource sector - Biomass (jobs)		605	2,859	5,653	6,323	6,703	4,884
By resource sector - CO2 (jobs)		16.2	6,099	8,313	3,446	4,394	5,455
By resource sector - Coal (jobs)		218	0	0	0	0	0
By resource sector - Grid (jobs)		5,800	5,549	9,976	12,223	13,044	13,117
By resource sector - Natural Gas (jobs)		6,181	5,814	5,005	5,420	5,273	4,225
By resource sector - Nuclear (jobs)		727	715	704	693	682	1,580
By resource sector - Oil (jobs)		10,204	8,953	7,700	5,576	4,230	2,977
By resource sector - Solar (jobs)		1,235	1,308	2,076	3,890	5,511	2,465
By resource sector - Wind (jobs)		547	416	299	483	393	279
By education level - All sectors - High school diploma or less (jobs)		10,374	13,360	17,002	16,264	17,195	14,921
By education level - All sectors - Associates degree or some college (jobs)		7,652	9,633	12,151	11,568	12,355	10,916
By education level - All sectors - Bachelors degree (jobs)		5,902	6,844	8,264	7,937	8,274	7,114
By education level - All sectors - Masters or professional degree (jobs)		1,412	1,652	2,026	1,990	2,092	1,781
By education level - All sectors - Doctoral degree (jobs)		191	225	283	294	314	251
Related work experience - All sectors - None (jobs)		3,608	4,613	5,850	5,594	5,937	5,167
Related work experience - All sectors - Up to 1 year (jobs)		4,784	6,091	7,819	7,653	8,127	6,948
Related work experience - All sectors - 1 to 4 years (jobs)		9,444	11,617	14,424	13,769	14,508	12,614
Related work experience - All sectors - 4 to 10 years (jobs)		6,037	7,419	9,219	8,747	9,253	8,131
Related work experience - All sectors - Over 10 years (jobs)		1,659	1,973	2,414	2,292	2,405	2,122
On-the-Job Training - All sectors - None (jobs)		1,396	1,670	2,082	2,029	2,152	1,836
On-the-Job Training - All sectors - Up to 1 year (jobs)		17,086	21,056	26,316	25,391	26,714	23,020
On-the-Job Training - All sectors - 1 to 4 years (jobs)		5,262	6,625	8,298	7,800	8,301	7,387
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,546	2,069	2,673	2,497	2,706	2,429

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

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - All sectors - Over 10 years (jobs)		242	294	359	337	356	310
On-Site or In-Plant Training - All sectors - None (jobs)		4,080	5,067	6,343	6,126	6,487	5,571
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		15,489	19,065	23,830	22,948	24,165	20,899
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		4,105	5,148	6,445	6,079	6,457	5,720
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,657	2,169	2,766	2,577	2,773	2,481
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		201	264	342	324	349	312
Wage income - All (million \$2019)		1,314	1,631	2,040	1,961	2,087	1,856

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	350	323	285	238	196	170	160
Final energy use - Residential (PJ)	99.2	92.9	85.6	76.5	69.1	64.8	63
Final energy use - Commercial (PJ)	70.6	70.6	68.1	64.4	61.3	60.1	60.4
Final energy use - Industry (PJ)	201	206	208	206	206	204	203

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)		2.03	2.09	3.69	3.94	2.98	3.07

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	3.71	173	342	935	1,528	2,001	2,475
Vehicle stocks - LDV – All others (1000 units)	2,064	1,965	1,866	1,360	854	483	112
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		398	1,016	1,653	2,501	2,725	2,596
Public EV charging plugs - DC Fast (1000 units)	0.053		0.878		3.92		6.35
Public EV charging plugs - L2 (1000 units)	0.175		21.1		94.3		153

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 (%)	29.5	45.1	80.4	88.3	88.7	88.6	88.6
Sales of space heating units - Electric Resistance (%)	28.6	27.1	11.4	7.85	7.68	7.79	7.8
Sales of space heating units - Gas (%)	30.2	16.4	4.98	2.47	2.38	2.36	2.35
Sales of space heating units - Fossil (%)	11.7	11.3	3.21	1.36	1.27	1.25	1.25
Sales of water heating units - Electric Heat Pump (%)	0	12.1	64	75.6	76.1	76.1	76.1
Sales of water heating units - Electric Resistance (%)	67.2	69.3	30.5	21.8	21.4	21.4	21.4
Sales of water heating units - Gas Furnace (%)	29.2	16.1	3.02	0.128	0	0	0
Sales of water heating units - Other (%)	3.59	2.49	2.46	2.47	2.48	2.48	2.49
Sales of cooking units - Electric Resistance (%)	75.8	81	96.7	99.8	100	100	100
Sales of cooking units - Gas (%)	24.2	19	3.26	0.164	0	0	0

Table 43: E+RE- 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)		2.27	2.78				

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 (%)	9.46	29.3	77	90.8	91.9	92	92
Sales of space heating units - Electric Resistance (%)	4.72	4.61	4.92	6.26	6.57	6.57	6.55
Sales of space heating units - Gas Furnace (%)	85.8	63.2	17.5	2.95	1.48	1.43	1.43
Sales of space heating units - Fossil (%)	0	2.89	0.56	0.024	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.153	10.6	55.7	65.7	66.1	66.2	66.2
Sales of water heating units - Electric Resistance (%)	5.64	9.97	28	32.1	32.3	32.3	32.3
Sales of water heating units - Gas Furnace (%)	92.7	77.8	14.7	0.62	0	0	0
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric Resistance (%)	43.5	55.3	83.4	88.9	89.2	89.2	89.1
Sales of cooking units - Gas (%)	56.5	44.7	16.6	11.1	10.8	10.8	10.9
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		8,123	9,222				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,610	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	11,309	9,801	8,049	10,629	12,114	12,194	14,760
Installed thermal - Nuclear (MW)	1,440	1,440	1,440	1,440	1,440	1,440	1,840
Installed renewables - Rooftop PV (MW)	16.9	27.3	38.6	55	78.1	108	146
Installed renewables - Solar - Base land use assumptions (MW)	49.1	2,182	2,854	4,094	7,495	12,385	12,385
Installed renewables - Solar - Constrained land use assumptions (MW)	49.1	2,357	4,482	6,491	12,991	15,897	15,993
Installed renewables - Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	420
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion \$2018)		0.952	0.805	1.37	3.54	4.8	0
Capital invested - Solar PV - Constrained (billion \$2018)		3.09	2.54	2.21	6.75	2.85	0.089
Capital invested - Wind - Constrained (billion \$2018)		0	0	0	0	0	0.445

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	112	1,477	2,771	5,143	11,643	20,968	20,968
Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Offshore Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	112	4,533	8,599	12,450	24,940	30,501	30,686
Wind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	1,052

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

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0

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)							-374
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-213
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,218
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,599
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,234
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-283
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,261
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-497
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,692
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-17,371
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-560
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-746
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,798
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-3,809
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-10,469
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-546
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4,891
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,528
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,356
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-33,702
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-746
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,278
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-8,378
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-5,109
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-15,703
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-809
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-6,522

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-6,558
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-50,122
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-5,019
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							61.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							162
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,637
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							941
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)							40.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							216
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							32.3
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,007
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							4,096
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							91.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							168
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,954
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,416
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)							58.6
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							323
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							234
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,027
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							7,273



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 - High - Accelerate regeneration (1000 hectares)							122
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							173
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,272
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,882
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)							76.8
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							431
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							186
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,664
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,807

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 <sub>2</sub> e/y)							-172
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO <sub>2</sub> e/y)							-3,250
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO <sub>2</sub> e/y)							-34.3
Carbon sink potential - Moderate deployment - Total (1000 tCO <sub>2</sub> e/y)							-3,456
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO <sub>2</sub> e/y)							-172
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO <sub>2</sub> e/y)							-6,293
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO <sub>2</sub> e/y)							-68.6
Carbon sink potential - Aggressive deployment - Total (1000 tCO <sub>2</sub> e/y)							-6,534
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							69.5
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							939

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							62.4
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,070
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							69.5
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,815
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							125
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							2,009

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)		24.9	0.026	0.024	0.016	0.01	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		10.3	6.12	3.09	1.95	0.99	0.438
Premature deaths from air pollution - Mobile - On-Road (deaths)		49	49.2	47.7	42.8	33.9	23.1
Premature deaths from air pollution - Gas Stations (deaths)		6.67	6.69	6.42	5.73	4.53	3.13
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		4.73	4.24	3.71	3.04	2.27	1.53
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.217	0.205	0.193	0.17	0.132	0.093
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.1	1.08	1.05	0.945	0.741	0.521
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.942	0.898	0.85	0.798	0.747	0.692
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.38	3.32	3.15	2.77	2.21	1.64
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.59	0.535	0.482	0.417	0.346	0.278
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.293	0.263	0.233	0.204	0.176	0.15
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.537	0.215	0.212	0.207	0.206	0.199
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		29.7	26.7	23	19.9	17.5	12.2
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		221	0.234	0.211	0.138	0.085	0.005

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		91.1	54.2	27.4	17.2	8.77	3.88
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		436	438	424	380	301	205
Monetary damages from air pollution - Gas Stations (million \$2019)		59.1	59.2	56.9	50.7	40.2	27.7
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		41.9	37.6	32.9	26.9	20.1	13.6
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		1.92	1.82	1.71	1.51	1.17	0.828
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		9.75	9.61	9.33	8.38	6.57	4.62
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		8.34	7.95	7.52	7.07	6.61	6.13
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		29.9	29.4	27.9	24.5	19.6	14.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		5.23	4.73	4.27	3.69	3.06	2.46
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		2.6	2.33	2.06	1.81	1.56	1.33
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		4.74	1.9	1.87	1.83	1.81	1.75
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		264	237	204	177	155	108

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		201	1,320	1,223	1,792	1,805	1,598
By economic sector - Construction (jobs)		5,228	7,252	9,825	10,499	12,251	16,027
By economic sector - Manufacturing (jobs)		4,440	5,199	5,241	5,370	5,769	6,038
By economic sector - Mining (jobs)		4,846	4,151	3,480	2,774	2,361	1,450
By economic sector - Other (jobs)		391	459	885	1,444	1,927	3,104
By economic sector - Pipeline (jobs)		553	1,076	1,223	653	659	705
By economic sector - Professional (jobs)		2,967	4,043	4,809	7,185	8,347	9,438
By economic sector - Trade (jobs)		2,608	2,628	3,120	4,126	4,683	5,580
By economic sector - Utilities (jobs)		6,131	8,185	9,858	9,491	10,811	12,998
By resource sector - Biomass (jobs)		647	3,513	4,036	7,433	8,350	7,554
By resource sector - CO2 (jobs)		15.2	5,481	7,513	3,169	4,030	4,915
By resource sector - Coal (jobs)		218	0	0	0	0	0
By resource sector - Grid (jobs)		6,357	6,937	9,079	12,372	15,061	19,978
By resource sector - Natural Gas (jobs)		6,223	4,835	3,987	3,798	3,149	1,775
By resource sector - Nuclear (jobs)		727	715	704	693	682	672
By resource sector - Oil (jobs)		10,239	9,126	8,155	7,198	6,115	3,811
By resource sector - Solar (jobs)		2,158	2,610	5,170	8,040	10,421	16,910
By resource sector - Wind (jobs)		780	1,096	1,018	631	806	1,323
By education level - All sectors - High school diploma or less (jobs)		11,163	14,546	16,950	18,494	20,720	24,394

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

Item	2020	2025	2030	2035	2040	2045	2050
By education level - All sectors - Associates degree or some college (jobs)		8,244	10,364	12,213	13,043	14,780	17,749
By education level - All sectors - Bachelors degree (jobs)		6,254	7,373	8,226	9,140	10,141	11,439
By education level - All sectors - Masters or professional degree (jobs)		1,497	1,782	1,994	2,301	2,572	2,908
By education level - All sectors - Doctoral degree (jobs)		204	247	279	357	402	448
Related work experience - All sectors - None (jobs)		3,873	4,979	5,806	6,333	7,120	8,389
Related work experience - All sectors - Up to 1 year (jobs)		5,170	6,718	7,842	8,852	9,975	11,757
Related work experience - All sectors - 1 to 4 years (jobs)		10,091	12,528	14,376	15,649	17,499	20,386
Related work experience - All sectors - 4 to 10 years (jobs)		6,459	7,960	9,212	9,901	11,114	13,032
Related work experience - All sectors - Over 10 years (jobs)		1,771	2,129	2,428	2,599	2,906	3,375
On-the-Job Training - All sectors - None (jobs)		1,497	1,821	2,108	2,380	2,678	3,139
On-the-Job Training - All sectors - Up to 1 year (jobs)		18,284	22,918	26,219	29,045	32,473	37,612
On-the-Job Training - All sectors - 1 to 4 years (jobs)		5,650	7,077	8,306	8,740	9,854	11,780
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,670	2,177	2,656	2,777	3,169	3,884
On-the-Job Training - All sectors - Over 10 years (jobs)		261	320	373	392	440	523
On-Site or In-Plant Training - All sectors - None (jobs)		4,383	5,518	6,359	7,045	7,905	9,256
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		16,576	20,716	23,763	26,220	29,341	34,081
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		4,406	5,517	6,458	6,837	7,699	9,174
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,781	2,280	2,745	2,873	3,259	3,932
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		217	282	339	360	411	496
Wage income - All (million \$2019)		1,397	1,747	2,015	2,212	2,497	2,910

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	351	326	298	275	258	238	214
Final energy use - Residential (PJ)	99.2	93.3	89.2	84.7	79.1	73.1	68.2
Final energy use - Commercial (PJ)	70.6	70.8	69.9	68.7	66.7	64.8	63.6
Final energy use - Industry (PJ)	201	207	209	208	209	207	206

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)		1.69	1.71	2.12	2.18	3.13	3.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	2.87	52.7	102	333	564	1,075	1,585
Vehicle stocks - LDV – All others (1000 units)	2,072	2,072	2,072	1,966	1,859	1,433	1,006

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	63.7	135	456	1,438	2,094
Public EV charging plugs - DC Fast (1000 units)	0.053		0.263		1.45		4.06
Public EV charging plugs - L2 (1000 units)	0.175		6.32		34.8		97.8

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 (%)	29.5	38.3	42.3	54.1	71.8	83.3	87.2
Sales of space heating units - Electric Resistance (%)	28.6	30.1	28.3	23	15.1	10.1	8.37
Sales of space heating units - Gas (%)	30.2	18.6	17.3	13.8	8.07	4.19	2.84
Sales of space heating units - Fossil (%)	11.7	12.9	12.1	9.17	5.03	2.44	1.57
Sales of water heating units - Electric Heat Pump (%)	0	2.08	7.99	25	51.1	68.1	74
Sales of water heating units - Electric Resistance (%)	67.2	76.8	72.5	59.6	40.1	27.4	23
Sales of water heating units - Gas Furnace (%)	29.2	18.6	17	12.9	6.35	2.02	0.528
Sales of water heating units - Other (%)	3.59	2.49	2.47	2.49	2.51	2.49	2.49
Sales of cooking units - Electric Resistance (%)	75.7	76.4	78.6	84.4	92.6	97.6	99.4
Sales of cooking units - Gas (%)	24.3	23.6	21.4	15.6	7.42	2.39	0.644
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		2.25	2.65				

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 (%)	9.46	20.2	25.6	41.4	66.1	83.2	89.6
Sales of space heating units - Electric Resistance (%)	4.72	4.61	4.65	4.77	5.23	5.91	6.33
Sales of space heating units - Gas Furnace (%)	85.8	71.8	66.6	51.4	27.5	10.5	3.93
Sales of space heating units - Fossil (%)	0	3.34	3.16	2.39	1.19	0.387	0.102
Sales of water heating units - Electric Heat Pump (%)	0.153	1.96	7.08	21.8	44.4	59.2	64.3
Sales of water heating units - Electric Resistance (%)	5.64	6.47	8.38	14.4	23.5	29.5	31.6
Sales of water heating units - Gas Furnace (%)	92.7	90	83	62.2	30.5	9.74	2.53
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric Resistance (%)	43.5	47.1	51.3	61.6	76.1	85	88
Sales of cooking units - Gas (%)	56.5	52.9	48.7	38.4	23.9	15	12
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		8,119	9,209				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,610	514	0	0	0	0	0
Installed thermal - Natural gas (MW)	11,309	11,425	10,510	9,315	7,770	4,599	5,086
Installed thermal - Nuclear (MW)	1,440	1,440	1,440	1,440	1,440	1,440	1,440
Capital invested - Biomass power plant (billion \$2018)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
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	10.1	11.5	24	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	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	11,378	24,305	51,189	51,189	51,189
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	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	9	19	40	40	40
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	5	5
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment - Cumulative 5-yr (million \$2018)		0	9,299	10,565	21,971	4,675	0
Biomass purchases (million \$2018/y)		0	701	1,498	3,156	3,563	3,563

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	11.3	24.1	50.7	56.7	57
Annual - BECCS (MMT)		0	11.3	24	50.6	56.7	56.5
Annual - NGCC (MMT)		0	0	0.1	0.08	0.07	0.56
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	11.3	35.4	86.1	143	200
Cumulative - BECCS (MMT)		0	11.3	35.3	86	143	199
Cumulative - NGCC (MMT)		0	0	0.1	0.18	0.25	0.81
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	487	973	1,214	1,214	1,214
Spur (km)		0	350	822	1,958	2,566	2,471
All (km)		0	837	1,795	3,172	3,780	3,685
Cumulative investment - Trunk (million \$2018)		0	3,096	6,192	8,002	8,002	8,002
Cumulative investment - Spur (million \$2018)		0	434	909	2,297	2,923	2,787
Cumulative investment - All (million \$2018)		0	3,530	7,100	10,298	10,924	10,789

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	7.39	36.4	71.3	98.5	104
Injection wells (wells)		0	8	34	60	100	124
Resource characterization, appraisal, permitting costs (million \$2020)		32.8	810	1,299	1,299	1,299	1,299
Wells and facilities construction costs (million \$2020)		0	257	1,000	1,782	2,980	3,700

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)							-374
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-213
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,218
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,599
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,234
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-283
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,261
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-497
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,692
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-17,371
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-560
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-746
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,798
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-3,809
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-10,469
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-546
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4,891
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,528
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,356
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-33,702
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-746
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,278
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-8,378
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-5,109
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-15,703

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-809
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-6,522
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-6,558
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-50,122
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-5,019
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							61.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							162
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,637
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							941
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)							40.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							216
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							32.3
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,007
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							4,096
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							91.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							168
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,954
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,416
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)							58.6
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							323
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							234



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 - Restore productivity (1000 hectares)							2,027
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							7,273
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							122
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							173
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,272
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,882
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)							76.8
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							431
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							186
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,664
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,807

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)							-637
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-2,929
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-29.1
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)							-3,594
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-637
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-5,685

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-58.1
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)							-6,380
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							257
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							848
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							52.9
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							119
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							265
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,542
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							257
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							4,057
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							106
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							119
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							265
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							4,803

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)		107	71.4	48.7	39.3	35.9	35.6
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		10.7	11.3	11.9	11.4	11.6	12
Premature deaths from air pollution - Mobile - On-Road (deaths)		49	49.9	50.9	52	53.2	54.3
Premature deaths from air pollution - Gas Stations (deaths)		6.65	6.75	6.82	6.94	7.04	7.12

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		4.65	4.16	3.73	3.46	3.33	3.23
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.212	0.181	0.134	0.09	0.057	0.038
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.03	0.978	0.946	0.933	0.923	0.907
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.984	0.983	0.975	0.964	0.951	0.933
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.39	3.26	2.96	2.65	2.52	2.58
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.613	0.611	0.598	0.574	0.554	0.543
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.307	0.312	0.317	0.322	0.326	0.331
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.15	0.795	0.641	0.602	0.576	0.534
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		29.9	31.4	31.9	30.4	30	28
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		950	633	432	349	318	316
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		94.8	100	105	101	103	106
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		436	444	452	463	473	483
Monetary damages from air pollution - Gas Stations (million \$2019)		58.8	59.7	60.4	61.5	62.4	63.1
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		41.2	36.9	33.1	30.6	29.5	28.6
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		1.88	1.6	1.19	0.8	0.503	0.333
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		9.13	8.67	8.38	8.27	8.18	8.04
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		8.71	8.7	8.64	8.54	8.42	8.26
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		30	28.9	26.2	23.4	22.3	22.8
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		5.43	5.4	5.29	5.08	4.9	4.81
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		2.71	2.76	2.81	2.85	2.89	2.93
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		10.1	7.02	5.65	5.31	5.08	4.72

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		265	278	284	270	267	248

Table 65: REF scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		195	184	183	166	166	173
By economic sector - Construction (jobs)		4,454	4,695	5,105	5,618	6,498	6,754
By economic sector - Manufacturing (jobs)		3,348	3,517	3,595	3,679	3,602	3,544
By economic sector - Mining (jobs)		4,911	4,120	3,436	2,774	2,300	1,790
By economic sector - Other (jobs)		192	204	248	413	587	491
By economic sector - Pipeline (jobs)		569	598	610	577	582	570
By economic sector - Professional (jobs)		2,731	2,610	2,631	2,794	3,082	2,941
By economic sector - Trade (jobs)		2,465	2,280	2,192	2,223	2,373	2,196
By economic sector - Utilities (jobs)		6,477	6,539	6,941	7,105	7,961	8,941
By resource sector - Biomass (jobs)		613	581	550	508	511	512
By resource sector - CO2 (jobs)		0	0.053	0.068	0.073	0.08	0.086
By resource sector - Coal (jobs)		352	192	182	65.7	0	0
By resource sector - Grid (jobs)		6,864	7,292	7,969	7,561	8,740	11,447
By resource sector - Natural Gas (jobs)		6,475	6,398	6,525	7,054	7,639	7,053
By resource sector - Nuclear (jobs)		727	715	704	693	682	672
By resource sector - Oil (jobs)		10,286	9,235	8,375	7,608	7,012	6,111
By resource sector - Solar (jobs)			183	450	1,479	2,328	1,441
By resource sector - Wind (jobs)		25.6	152	187	380	239	163
By education level - All sectors - High school diploma or less (jobs)		10,231	10,108	10,284	10,506	11,328	11,558
By education level - All sectors - Associates degree or some college (jobs)		7,609	7,497	7,638	7,852	8,509	8,661
By education level - All sectors - Bachelors degree (jobs)		5,889	5,617	5,522	5,496	5,745	5,648
By education level - All sectors - Masters or professional degree (jobs)		1,421	1,348	1,323	1,318	1,384	1,358
By education level - All sectors - Doctoral degree (jobs)		191	179	175	176	185	175
Related work experience - All sectors - None (jobs)		3,591	3,525	3,576	3,656	3,946	4,007
Related work experience - All sectors - Up to 1 year (jobs)		4,683	4,600	4,658	4,765	5,132	5,198
Related work experience - All sectors - 1 to 4 years (jobs)		9,408	9,159	9,202	9,316	9,946	10,009
Related work experience - All sectors - 4 to 10 years (jobs)		6,019	5,868	5,908	6,001	6,423	6,472
Related work experience - All sectors - Over 10 years (jobs)		1,641	1,596	1,598	1,610	1,704	1,713
On-the-Job Training - All sectors - None (jobs)		1,376	1,324	1,316	1,333	1,420	1,406
On-the-Job Training - All sectors - Up to 1 year (jobs)		16,916	16,472	16,532	16,727	17,817	17,923
On-the-Job Training - All sectors - 1 to 4 years (jobs)		5,252	5,165	5,252	5,374	5,808	5,912
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,567	1,559	1,612	1,679	1,857	1,910
On-the-Job Training - All sectors - Over 10 years (jobs)		232	228	229	235	251	248
On-Site or In-Plant Training - All sectors - None (jobs)		4,022	3,904	3,916	3,987	4,261	4,256
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		15,352	14,961	15,028	15,210	16,219	16,344

Table 65: REF 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)		4,090	4,022	4,086	4,175	4,505	4,583
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,676	1,659	1,703	1,759	1,927	1,970
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		202	202	210	218	239	247
Wage income - All (million \$2019)		1,314	1,293	1,312	1,338	1,441	1,469

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	350	326	299	283	283	291	302
Final energy use - Residential (PJ)	99.2	93.5	91	89.7	89.7	90.9	92.4
Final energy use - Commercial (PJ)	70.6	71.9	72.2	72.2	72.8	74.9	78.5
Final energy use - Industry (PJ)	201	210	218	222	228	232	238

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)		2.32	2.41	3.75	3.99	3.1	3.21

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 (%)	26.6	55.5	56.3	57.6	58.8	60.4	62.7
Sales of space heating units - Electric Resistance (%)	29.8	23.9	23.5	22.8	21.8	20.4	18
Sales of space heating units - Gas (%)	31.4	13.8	13.3	12.9	12.8	12.7	12.7
Sales of space heating units - Fossil (%)	12.2	6.81	6.91	6.74	6.58	6.52	6.54
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	67.2	78.4	78.5	78.3	78.1	78.1	78
Sales of water heating units - Gas Furnace (%)	29.2	19.2	19	19.2	19.4	19.4	19.5
Sales of water heating units - Other (%)	3.59	2.49	2.47	2.49	2.52	2.51	2.52
Sales of cooking units - Electric Resistance (%)	75.5	75.5	75.5	75.5	75.5	75.5	75.5
Sales of cooking units - Gas (%)	24.5	24.5	24.5	24.5	24.5	24.5	24.5
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		2.2	2.3				

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 (%)	9.46	31.9	71.2	79	79.3	79.4	79.4
Sales of space heating units - Electric Resistance (%)	4.72	6.4	12	15.8	18.7	19.2	19.2
Sales of space heating units - Gas Furnace (%)	85.8	59	16.4	5.24	1.95	1.48	1.43
Sales of space heating units - Fossil (%)	0	2.67	0.47	0.024	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.153	0.153	0.147	0.149	0.149	0.145	0.148
Sales of water heating units - Electric Resistance (%)	5.64	5.74	5.58	5.66	5.62	5.55	5.6
Sales of water heating units - Gas Furnace (%)	92.7	92.5	92.7	92.6	92.7	92.7	92.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric Resistance (%)	43.5	45.6	45.9	45.7	46	45.9	45.7
Sales of cooking units - Gas (%)	56.5	54.4	54.1	54.3	54	54.1	54.3
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		7,974	8,300				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,610	514	514	514	0	0	0
Installed thermal - Natural gas (MW)	11,309	11,833	12,981	12,256	11,003	15,039	21,477
Installed thermal - Nuclear (MW)	1,440	1,440	1,440	1,440	1,440	1,440	1,440
Installed renewables - Rooftop PV (MW)	16.9	27.3	38.6	55	78.1	108	146
Installed renewables - Solar - Base land use assumptions (MW)	49.1	49.1	49.1	347	1,971	4,007	4,940

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	112	112	112	315	3,278	7,193	8,028
Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
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)	-32.9		-14.9				-12.1
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-4.27		-7.13				-7.5
Business-as-usual carbon sink - Total (Mt CO2e/y)	-37.1		-22				-19.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-374
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-213
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,218
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,599
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,234
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-283
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,261
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-497
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,692
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-17,371
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-560

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-746
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,798
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-3,809
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-10,469
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-546
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4,891
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,528
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,356
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-33,702
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-746
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,278
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-8,378
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-5,109
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-15,703
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-809
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-6,522
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-6,558
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-50,122
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-5,019
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							61.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							162
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,637
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							941
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)							40.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							216
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							32.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,007
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							4,096
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							91.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							168
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,954
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,416
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)							58.6
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							323
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							234
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,027
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							7,273
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							122
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							173
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,272
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,882
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)							76.8
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							431
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							186
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,664
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,807