



## Net-Zero America - South Carolina 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)		30.4	0.049	0.046	0.036	0.025	0.002
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		21	16.7	9.98	7.89	3.95	1.45
Premature deaths from air pollution - Mobile - On-Road (deaths)		117	110	84.4	49.2	22.6	8.97
Premature deaths from air pollution - Gas Stations (deaths)		15.4	14.2	10.8	6.43	3.13	1.47
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		10.2	8.38	5.66	3.2	1.61	0.781
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		1.82	1.48	1.02	0.612	0.302	0.135
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		2.11	1.9	1.49	1.02	0.602	0.339
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		1.58	1.52	1.46	1.4	1.33	1.25
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		8.36	7.38	5.45	3.45	2.12	1.38
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.5	1.25	0.971	0.698	0.486	0.321
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.47	1.27	1.06	0.843	0.63	0.422
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.615	0.317	0.317	0.315	0.322	0.321
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		24.7	23.3	21.2	16.7	12.4	7.71
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		269	0.437	0.407	0.323	0.225	0.019
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		186	148	88.4	69.9	35	12.9
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,041	979	750	437	201	79.7
Monetary damages from air pollution - Gas Stations (million \$2019)		136	126	95.5	56.9	27.7	13
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		90.7	74.2	50.2	28.3	14.3	6.92
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		16.1	13.1	9.05	5.43	2.68	1.2
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		18.7	16.9	13.2	9.03	5.33	3.01
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		14	13.5	12.9	12.4	11.7	11
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		74	65.3	48.2	30.5	18.8	12.2

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)		13.3	11.1	8.59	6.18	4.31	2.84
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		13	11.2	9.36	7.46	5.58	3.74
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		5.43	2.79	2.8	2.78	2.84	2.84
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		220	207	189	148	110	68.5

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		182	370	141	326	739	941
By economic sector - Construction (jobs)		4,994	29,745	22,611	25,601	25,964	26,553
By economic sector - Manufacturing (jobs)		3,012	5,520	5,709	5,529	6,590	6,345
By economic sector - Mining (jobs)		1,727	1,235	795	478	270	148
By economic sector - Other (jobs)		444	5,801	4,138	5,127	5,206	6,122
By economic sector - Pipeline (jobs)		367	312	360	238	227	224
By economic sector - Professional (jobs)		2,907	11,791	9,166	11,012	11,907	12,958
By economic sector - Trade (jobs)		2,029	7,900	6,122	7,322	7,713	8,622
By economic sector - Utilities (jobs)		7,470	14,248	17,105	20,038	22,754	21,229
By resource sector - Biomass (jobs)		782	1,020	403	980	2,696	4,019
By resource sector - CO2 (jobs)		1.58	3.49	961	497	937	1,235
By resource sector - Coal (jobs)		744	0	0	0	0	0
By resource sector - Grid (jobs)		7,528	21,593	27,711	34,081	40,864	39,031
By resource sector - Natural Gas (jobs)		3,626	3,404	2,868	2,985	2,134	1,229
By resource sector - Nuclear (jobs)		2,635	2,593	2,552	2,512	2,126	1,604
By resource sector - Oil (jobs)		4,311	3,403	2,397	1,583	1,006	605
By resource sector - Solar (jobs)		3,490	44,695	29,093	32,489	30,224	34,635
By resource sector - Wind (jobs)		14.7	211	163	543	1,383	783
By education level - All sectors - High school diploma or less (jobs)		9,498	33,327	28,392	32,414	34,896	35,627
By education level - All sectors - Associates degree or some college (jobs)		7,133	24,566	21,342	24,465	26,256	26,755
By education level - All sectors - Bachelors degree (jobs)		5,082	14,733	12,759	14,563	15,670	16,043
By education level - All sectors - Masters or professional degree (jobs)		1,244	3,705	3,188	3,685	3,975	4,106
By education level - All sectors - Doctoral degree (jobs)		175	590	466	542	574	610
Related work experience - All sectors - None (jobs)		3,310	11,215	9,683	11,121	11,997	12,287
Related work experience - All sectors - Up to 1 year (jobs)		4,483	16,105	13,509	15,451	16,616	17,117
Related work experience - All sectors - 1 to 4 years (jobs)		8,428	27,336	23,629	27,051	29,107	29,710
Related work experience - All sectors - 4 to 10 years (jobs)		5,443	17,738	15,362	17,545	18,811	19,129
Related work experience - All sectors - Over 10 years (jobs)		1,468	4,527	3,965	4,501	4,840	4,899
On-the-Job Training - All sectors - None (jobs)		1,276	4,377	3,643	4,167	4,434	4,592
On-the-Job Training - All sectors - Up to 1 year (jobs)		15,329	49,561	42,688	48,832	52,752	54,029

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)		4,824	16,491	14,310	16,358	17,502	17,733
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,485	5,699	4,858	5,589	5,928	6,018
On-the-Job Training - All sectors - Over 10 years (jobs)		218	793	648	724	756	770
On-Site or In-Plant Training - All sectors - None (jobs)		3,752	12,688	10,722	12,257	13,121	13,482
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		13,908	45,130	38,931	44,533	48,075	49,191
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		3,739	12,773	11,066	12,650	13,550	13,748
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,543	5,658	4,837	5,550	5,892	5,975
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		189	672	591	681	734	745
Wage income - All (million \$2019)		1,208	3,771	3,330	3,854	4,209	4,336

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		97	83.4	63.6	45.3	30.8	19.7
Oil consumption - Cumulative (million bbls)							1,969
Oil production - Annual (million bbls)		0	0	0	0	0	0
Natural gas consumption - Annual (tcf)		254	214	172	129	81.4	56.4
Natural gas consumption - Cumulative (tcf)							5,174
Natural gas production - Annual (tcf)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	463	438	386	323	267	233	218
Final energy use - Residential (PJ)	158	150	141	129	119	115	113
Final energy use - Commercial (PJ)	114	114	111	106	101	100	102
Final energy use - Industry (PJ)	358	374	380	387	398	399	404

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		3.55	3.63	5.67	5.98	4.97	5.12

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	17.4	382	746	2,022	3,298	4,317	5,336
Vehicle stocks - LDV – All others (1000 units)	4,450	4,237	4,024	2,933	1,841	1,042	242
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		856	2,191	3,557	5,385	5,864	5,589
Public EV charging plugs - DC Fast (1000 units)	0.1		1.63		7.19		11.6
Public EV charging plugs - L2 (1000 units)	0.476		39.1		173		280

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 (%)	37.5	51.9	80.7	87.2	87.5	87.4	87.4
Sales of space heating units - Electric Resistance (%)	25.8	25.3	10.7	7.34	7.15	7.29	7.33
Sales of space heating units - Gas (%)	30.5	15	4.16	1.77	1.69	1.69	1.68
Sales of space heating units - Fossil (%)	6.1	7.81	4.43	3.7	3.67	3.6	3.59
Sales of water heating units - Electric Heat Pump (%)	0	12.1	64.1	75.7	76.2	76.2	76.1
Sales of water heating units - Electric Resistance (%)	67.7	70.5	30.6	21.7	21.3	21.3	21.3
Sales of water heating units - Gas Furnace (%)	28.2	14.7	2.78	0.118	0	0	0
Sales of water heating units - Other (%)	4.1	2.65	2.54	2.53	2.55	2.56	2.57
Sales of cooking units - Electric Resistance (%)	82.7	86.4	97.7	99.9	100	100	100
Sales of cooking units - Gas (%)	17.3	13.6	2.33	0.117	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		3.83	4.21				

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 (%)	10.1	27.5	70.6	83.9	85.2	85.2	85.2
Sales of space heating units - Electric Resistance (%)	9.29	8.33	10.3	12.4	12.9	12.8	12.8
Sales of space heating units - Gas Furnace (%)	78.5	60.3	18.3	3.66	1.98	1.94	1.94
Sales of space heating units - Fossil (%)	2.15	3.92	0.743	0.032	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.316	10.5	54.5	64.3	64.7	64.8	64.8
Sales of water heating units - Electric Resistance (%)	7.81	11	28.4	32.3	32.5	32.5	32.5
Sales of water heating units - Gas Furnace (%)	88	74.5	14.1	0.593	0	0	0
Sales of water heating units - Other (%)	3.86	4.03	2.99	2.74	2.74	2.73	2.73
Sales of cooking units - Electric Resistance (%)	32	46	79.9	86.5	86.9	86.9	86.9
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		15,755	17,550				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	5,499	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	6,450	8,600	11,247	11,752	9,484	6,600	6,693
Installed thermal - Nuclear (MW)	5,220	5,220	5,220	5,220	5,220	3,440	3,440
Installed renewables - Rooftop PV (MW)	353	569	805	1,146	1,626	2,248	3,044
Installed renewables - Solar - Base land use assumptions (MW)	1,471	1,471	31,120	43,975	57,724	67,821	78,649
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	0	0	0	2,121	11,769	11,769
Installed renewables - Solar - Constrained land use assumptions (MW)	1,239	1,239	30,205	46,067	57,155	66,560	74,890
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	2,531	12,529	12,529
Capital invested - Solar PV - Base (billion \$2018)		0	35.5	14.2	14.3	9.91	10

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Offshore Wind - Base (billion \$2018)		0	0	0	3.68	14.2	0
Capital invested - Solar PV - Constrained (billion \$2018)		2.3	37.4	16.2	10.5	9.49	9.42
Capital invested - Offshore Wind - Constrained (billion \$2018)		0	0	0	4.4	14.7	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	0.01	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	4.36	5.17	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	3,487	3,487	62,242	87,635	114,735	134,660	156,045
Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	7,713	42,161	42,161
Solar - Constrained land use assumptions (GWh)	2,906	2,906	60,261	91,569	113,397	132,008	148,392
Wind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	7,713	42,161	42,161
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	4,889	10,689	10,689
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	10.4	10.4

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	0	0	4	8	8
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	1	1
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	4	9
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	1	1
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	0	0	3,995	8,172	4,970
Biomass purchases (million \$2018/y)		0	0	0	175	556	808

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	1.72	9.44	19.9	26.4
Annual - BECCS (MMT)		0	0	0	4.67	15.4	21.7
Annual - NGCC (MMT)		0	0	1.72	1.45	1.11	1.12
Annual - Cement and lime (MMT)		0	0	0	3.32	3.42	3.53
Cumulative - All (MMT)		0	0	1.72	11.2	31	57.4
Cumulative - BECCS (MMT)		0	0	0	4.67	20	41.8



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

Item	2020	2025	2030	2035	2040	2045	2050
Cumulative - NGCC (MMT)		0	0	1.72	3.17	4.28	5.4
Cumulative - Cement and lime (MMT)		0	0	0	3.32	6.74	10.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	0	159	159	159	159
Spur (km)		0	0	18.7	690	1,298	1,616
All (km)		0	0	178	849	1,457	1,776
Cumulative investment - Trunk (million \$2018)		0	0	951	951	951	951
Cumulative investment - Spur (million \$2018)		0	0	11.3	767	1,307	1,655
Cumulative investment - All (million \$2018)		0	0	962	1,718	2,258	2,606

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	0	0	0	0	0
Injection wells (wells)		0	0	0	0	2	2
Resource characterization, appraisal, permitting costs (million \$2020)		3.29	7.9	10.5	10.5	10.5	10.5
Wells and facilities construction costs (million \$2020)		0	4.11	16	28.5	47.7	59.2

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)							-158
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,808
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,420
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,902
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-187
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-407
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-183
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-922
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-12,261
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-236
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-960
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,059
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,081
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-11,805

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)							-360
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-610
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,303
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-1,829
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-24,243
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-315
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,646
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,310
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-17,707
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-534
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-813
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-2,422
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-36,273
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,736
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							25.7
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							209
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,428
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							514
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)							26.7
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							26.9
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							11.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							549
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,791
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							38.6

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)							216
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,578
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							774
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)							38.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							40.3
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							86.2
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,105
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,876
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							51.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							223
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,727
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,028
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)							50.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							53.8
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							68.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							907
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,110

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)							-81.8

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)							-677
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-19.4
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-778
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-81.8
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,291
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-38.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-1,411
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							46.8
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							371
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							35.2
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							453
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							46.8
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							707
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							70.4
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							824

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)		30.4	0.049	0.046	0.036	0.025	0.002
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		19.9	13.1	5.23	1.96	0.644	0.341
Premature deaths from air pollution - Mobile - On-Road (deaths)		119	121	119	108	86.8	60.1
Premature deaths from air pollution - Gas Stations (deaths)		15.7	16	15.5	14	11.2	7.83
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		10.3	9.4	8.34	6.91	5.21	3.52
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		1.85	1.76	1.67	1.46	1.11	0.74

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)		2.14	2.15	2.14	1.98	1.62	1.2
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		1.58	1.52	1.46	1.4	1.33	1.25
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		8.43	8.39	8.1	7.2	5.81	4.32
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.51	1.38	1.25	1.08	0.911	0.742
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.47	1.36	1.24	1.11	0.986	0.861
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.596	0.317	0.32	0.32	0.322	0.312
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		24.7	22.4	19.3	16.8	14.9	10.6
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		269	0.437	0.407	0.323	0.225	0.019
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		176	116	46.3	17.4	5.7	3.02
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,058	1,078	1,057	961	772	534
Monetary damages from air pollution - Gas Stations (million \$2019)		139	141	138	124	99.6	69.4
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		91.5	83.3	73.9	61.3	46.2	31.2
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		16.4	15.6	14.8	12.9	9.87	6.56
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		19	19.1	19	17.5	14.3	10.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		14	13.5	12.9	12.4	11.7	11
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		74.6	74.3	71.7	63.7	51.4	38.2
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		13.4	12.2	11.1	9.6	8.06	6.57
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		13	12	11	9.86	8.73	7.62
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		5.26	2.8	2.82	2.82	2.84	2.75
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		219	199	172	150	132	94.3

Table 18: E- scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		222	284	109	462	989	942
By economic sector - Construction (jobs)		5,031	30,467	19,886	22,636	27,885	27,171
By economic sector - Manufacturing (jobs)		3,134	5,562	4,876	5,125	8,075	7,034
By economic sector - Mining (jobs)		1,867	1,295	961	690	474	270
By economic sector - Other (jobs)		448	6,057	3,586	4,511	5,414	6,143
By economic sector - Pipeline (jobs)		369	310	458	321	370	379
By economic sector - Professional (jobs)		2,995	11,931	7,995	10,062	13,146	13,035
By economic sector - Trade (jobs)		2,185	8,137	5,496	6,727	8,426	8,755
By economic sector - Utilities (jobs)		7,529	13,371	14,956	16,947	24,259	21,776
By resource sector - Biomass (jobs)		842	765	360	1,942	4,214	3,885
By resource sector - CO2 (jobs)		1.63	4.82	1,648	853	1,607	2,117
By resource sector - Coal (jobs)		1,332	299	0	0	0	0
By resource sector - Grid (jobs)		7,675	20,030	22,826	28,675	43,975	39,362
By resource sector - Natural Gas (jobs)		3,318	2,723	2,587	2,172	2,292	1,291
By resource sector - Nuclear (jobs)		2,635	2,593	2,552	2,160	1,629	1,604
By resource sector - Oil (jobs)		4,363	3,667	3,088	2,481	1,886	1,171
By resource sector - Solar (jobs)		3,599	47,112	25,116	28,669	31,394	34,836
By resource sector - Wind (jobs)		15.5	221	144	529	2,040	1,239
By education level - All sectors - High school diploma or less (jobs)		9,808	33,577	25,007	28,944	38,250	36,681
By education level - All sectors - Associates degree or some college (jobs)		7,310	24,709	18,762	21,650	28,616	27,516
By education level - All sectors - Bachelors degree (jobs)		5,212	14,809	11,320	13,084	17,196	16,489
By education level - All sectors - Masters or professional degree (jobs)		1,272	3,721	2,821	3,309	4,346	4,198
By education level - All sectors - Doctoral degree (jobs)		179	598	414	495	630	620
Related work experience - All sectors - None (jobs)		3,398	11,277	8,534	9,912	13,131	12,636
Related work experience - All sectors - Up to 1 year (jobs)		4,633	16,264	11,885	13,841	18,230	17,587
Related work experience - All sectors - 1 to 4 years (jobs)		8,671	27,487	20,852	24,121	31,831	30,554
Related work experience - All sectors - 4 to 10 years (jobs)		5,575	17,836	13,555	15,602	20,549	19,678
Related work experience - All sectors - Over 10 years (jobs)		1,503	4,549	3,498	4,005	5,298	5,049
On-the-Job Training - All sectors - None (jobs)		1,311	4,431	3,224	3,740	4,845	4,712
On-the-Job Training - All sectors - Up to 1 year (jobs)		15,803	49,858	37,652	43,709	57,904	55,580
On-the-Job Training - All sectors - 1 to 4 years (jobs)		4,933	16,580	12,600	14,465	19,047	18,244
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,511	5,738	4,275	4,922	6,415	6,173
On-the-Job Training - All sectors - Over 10 years (jobs)		223	806	573	646	826	795
On-Site or In-Plant Training - All sectors - None (jobs)		3,851	12,800	9,458	10,955	14,352	13,852
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		14,335	45,399	34,337	39,823	52,731	50,604
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		3,830	12,846	9,745	11,203	14,763	14,146
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,571	5,695	4,265	4,901	6,391	6,135
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		193	674	519	601	801	766
Wage income - All (million \$2019)		1,239	3,785	2,945	3,440	4,605	4,461

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	464	441	404	373	350	323	290
Final energy use - Residential (PJ)	158	151	147	142	135	128	122
Final energy use - Commercial (PJ)	114	115	113	112	109	107	107
Final energy use - Industry (PJ)	358	374	381	391	402	403	407

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		2.92	2.93	3.93	4.05	5.12	5.35

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	13.5	121	228	724	1,221	2,319	3,418
Vehicle stocks - LDV – All others (1000 units)	4,468	4,468	4,468	4,238	4,008	3,089	2,169
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	138	291	982	3,094	4,506
Public EV charging plugs - DC Fast (1000 units)	0.1		0.496		2.66		7.45
Public EV charging plugs - L2 (1000 units)	0.476		11.9		63.9		179

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 (%)	37.5	46.3	49.6	59.1	73.7	83	86.3
Sales of space heating units - Electric Resistance (%)	25.8	28.1	26.5	21.5	14	9.4	7.8
Sales of space heating units - Gas (%)	30.5	17.1	15.8	12.4	7.01	3.39	2.12
Sales of space heating units - Fossil (%)	6.1	8.46	8.09	7	5.31	4.17	3.78
Sales of water heating units - Electric Heat Pump (%)	0	2.08	8	25	51.1	68.2	74.1
Sales of water heating units - Electric Resistance (%)	67.7	78.2	73.7	60.5	40.4	27.4	22.9
Sales of water heating units - Gas Furnace (%)	28.2	17	15.7	11.9	5.84	1.86	0.487
Sales of water heating units - Other (%)	4.1	2.66	2.65	2.64	2.62	2.58	2.57
Sales of cooking units - Electric Resistance (%)	82.6	83.1	84.7	88.9	94.7	98.3	99.5
Sales of cooking units - Gas (%)	17.4	16.9	15.3	11.1	5.31	1.72	0.462
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		3.78	4.05				

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 (%)	10.1	19.3	24.3	38.5	60.9	76.8	82.9
Sales of space heating units - Electric Resistance (%)	9.29	8.02	8.23	8.98	10.4	11.8	12.5
Sales of space heating units - Gas Furnace (%)	78.5	68.1	63.3	49.4	27.1	10.9	4.44
Sales of space heating units - Fossil (%)	2.15	4.53	4.19	3.17	1.56	0.496	0.13
Sales of water heating units - Electric Heat Pump (%)	0.316	2.04	7.05	21.5	43.6	58	63
Sales of water heating units - Electric Resistance (%)	7.81	7.62	9.51	15.3	24.1	29.8	31.8

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 (%)	88	86.1	79.2	59.5	29.1	9.29	2.42
Sales of water heating units - Other (%)	3.86	4.23	4.21	3.8	3.27	2.9	2.77
Sales of cooking units - Electric Resistance (%)	32	36.2	40.9	53.4	71	81.7	85.5
Sales of cooking units - Gas (%)	68	63.8	59.1	46.6	29	18.3	14.5
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		15,746	17,554				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	5,499	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	6,450	7,811	7,128	6,628	6,185	5,668	5,630
Installed thermal - Nuclear (MW)	5,220	5,220	5,220	5,220	3,440	3,440	3,440

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)							-158
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,808
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,420
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,902
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-187
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-407
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-183
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-922
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-12,261
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-236
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-960
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,059
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,081
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-11,805
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-360
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-610
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,303
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-1,829
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-24,243



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)							-315
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,646
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,310
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-17,707
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-534
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-813
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-2,422
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-36,273
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,736
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							25.7
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							209
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,428
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							514
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)							26.7
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							26.9
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							11.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							549
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,791
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							38.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							216
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,578
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							774

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)							38.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							40.3
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							86.2
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,105
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,876
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							51.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							223
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,727
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,028
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)							50.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							53.8
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							68.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							907
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,110

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)							-81.8
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-677
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-19.4
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-778

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)							-81.8
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,291
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-38.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-1,411
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							46.8
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							371
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							35.2
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							453
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							46.8
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							707
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							70.4
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							824

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)		30.4	0.049	0.046	0.036	0.025	0.002
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		20.4	16	9.08	5.46	1.39	0.425
Premature deaths from air pollution - Mobile - On-Road (deaths)		117	110	84.4	49.2	22.6	8.97
Premature deaths from air pollution - Gas Stations (deaths)		15.4	14.2	10.8	6.43	3.13	1.47
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		10.2	8.38	5.66	3.2	1.61	0.781
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		1.82	1.48	1.02	0.612	0.302	0.135
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		2.11	1.9	1.49	1.02	0.602	0.339
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		1.58	1.52	1.46	1.4	1.33	1.25
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		8.36	7.38	5.45	3.45	2.12	1.38

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)		1.5	1.25	0.971	0.698	0.486	0.321
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.47	1.27	1.06	0.843	0.63	0.422
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.664	0.317	0.317	0.315	0.321	0.3
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		24.3	23	19.7	14.3	8.7	1.21
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		269	0.437	0.407	0.323	0.225	0.019
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		181	141	80.5	48.4	12.3	3.77
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,041	979	750	437	201	79.7
Monetary damages from air pollution - Gas Stations (million \$2019)		136	126	95.5	56.9	27.7	13
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		90.7	74.2	50.2	28.3	14.3	6.92
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		16.1	13.1	9.05	5.43	2.68	1.2
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		18.7	16.9	13.2	9.03	5.33	3.01
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		14	13.5	12.9	12.4	11.7	11
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		74	65.3	48.2	30.5	18.8	12.2
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		13.3	11.1	8.59	6.18	4.31	2.84
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		13	11.2	9.36	7.46	5.58	3.74
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		5.86	2.8	2.8	2.78	2.83	2.64
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		215	204	175	127	77.3	10.8

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		183	380	141	288	633	938
By economic sector - Construction (jobs)		18,671	25,335	30,825	27,742	30,160	26,713
By economic sector - Manufacturing (jobs)		3,987	5,641	8,423	7,278	7,560	10,924
By economic sector - Mining (jobs)		1,713	1,207	734	391	168	18
By economic sector - Other (jobs)		3,146	4,742	5,950	5,447	6,477	5,524
By economic sector - Pipeline (jobs)		359	300	212	135	73.1	25.5
By economic sector - Professional (jobs)		7,480	10,231	12,528	11,808	13,627	12,713

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Trade (jobs)		5,029	6,771	8,356	7,814	9,069	8,202
By economic sector - Utilities (jobs)		10,393	14,067	20,792	21,852	23,500	24,017
By resource sector - Biomass (jobs)		713	1,073	378	942	2,353	4,127
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		744	0	0	0	0	0
By resource sector - Grid (jobs)		13,274	22,043	37,316	40,823	45,639	48,477
By resource sector - Natural Gas (jobs)		3,356	2,861	2,191	2,199	1,961	1,505
By resource sector - Nuclear (jobs)		2,635	2,593	2,194	1,452	673	0
By resource sector - Oil (jobs)		4,312	3,358	2,300	1,362	638	0.022
By resource sector - Solar (jobs)		25,915	36,461	42,583	34,327	37,671	33,709
By resource sector - Wind (jobs)		13.6	286	998	1,651	2,330	1,258
By education level - All sectors - High school diploma or less (jobs)		21,883	29,685	37,911	35,576	39,243	38,406
By education level - All sectors - Associates degree or some college (jobs)		16,126	21,902	28,419	26,840	29,583	28,807
By education level - All sectors - Bachelors degree (jobs)		10,055	13,251	16,809	15,794	17,386	17,004
By education level - All sectors - Masters or professional degree (jobs)		2,505	3,320	4,199	3,973	4,411	4,261
By education level - All sectors - Doctoral degree (jobs)		393	516	622	574	643	597
Related work experience - All sectors - None (jobs)		7,379	10,005	12,868	12,169	13,473	13,146
Related work experience - All sectors - Up to 1 year (jobs)		10,526	14,294	18,134	16,925	18,737	18,323
Related work experience - All sectors - 1 to 4 years (jobs)		18,188	24,451	31,347	29,559	32,596	31,788
Related work experience - All sectors - 4 to 10 years (jobs)		11,821	15,851	20,356	19,168	21,064	20,485
Related work experience - All sectors - Over 10 years (jobs)		3,048	4,074	5,255	4,935	5,397	5,331
On-the-Job Training - All sectors - None (jobs)		2,895	3,872	4,862	4,515	4,990	4,792
On-the-Job Training - All sectors - Up to 1 year (jobs)		32,949	44,379	56,803	53,462	59,074	58,125
On-the-Job Training - All sectors - 1 to 4 years (jobs)		10,889	14,703	18,985	17,906	19,655	19,033
On-the-Job Training - All sectors - 4 to 10 years (jobs)		3,704	5,022	6,439	6,084	6,693	6,300
On-the-Job Training - All sectors - Over 10 years (jobs)		525	698	871	789	855	825
On-Site or In-Plant Training - All sectors - None (jobs)		8,390	11,279	14,299	13,353	14,741	14,320
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		29,993	40,405	51,782	48,761	53,845	52,910
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		8,431	11,391	14,698	13,857	15,224	14,775
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		3,709	4,999	6,395	6,035	6,629	6,265
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		438	600	786	749	827	806
Wage income - All (million \$2019)		2,508	3,387	4,389	4,198	4,676	4,629

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	463	438	386	323	267	233	218
Final energy use - Residential (PJ)	158	150	141	129	119	115	113
Final energy use - Commercial (PJ)	114	114	111	106	101	100	102
Final energy use - Industry (PJ)	358	374	380	387	398	399	404

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		3.55	3.63	5.67	5.98	4.97	5.12

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV - EV (1000 units)	17.4	382	746	2,022	3,298	4,317	5,336
Vehicle stocks - LDV - All others (1000 units)	4,450	4,237	4,024	2,933	1,841	1,042	242
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		856	2,191	3,557	5,385	5,864	5,589
Public EV charging plugs - DC Fast (1000 units)	0.1		1.63		7.19		11.6
Public EV charging plugs - L2 (1000 units)	0.476		39.1		173		280

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 (%)	37.5	51.9	80.7	87.2	87.5	87.4	87.4
Sales of space heating units - Electric Resistance (%)	25.8	25.3	10.7	7.34	7.15	7.29	7.33
Sales of space heating units - Gas (%)	30.5	15	4.16	1.77	1.69	1.69	1.68
Sales of space heating units - Fossil (%)	6.1	7.81	4.43	3.7	3.67	3.6	3.59
Sales of water heating units - Electric Heat Pump (%)	0	12.1	64.1	75.7	76.2	76.2	76.1
Sales of water heating units - Electric Resistance (%)	67.7	70.5	30.6	21.7	21.3	21.3	21.3
Sales of water heating units - Gas Furnace (%)	28.2	14.7	2.78	0.118	0	0	0
Sales of water heating units - Other (%)	4.1	2.65	2.54	2.53	2.55	2.56	2.57
Sales of cooking units - Electric Resistance (%)	82.7	86.4	97.7	99.9	100	100	100
Sales of cooking units - Gas (%)	17.3	13.6	2.33	0.117	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		3.83	4.21				

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 (%)	10.1	27.5	70.6	83.9	85.2	85.2	85.2
Sales of space heating units - Electric Resistance (%)	9.29	8.33	10.3	12.4	12.9	12.8	12.8
Sales of space heating units - Gas Furnace (%)	78.5	60.3	18.3	3.66	1.98	1.94	1.94
Sales of space heating units - Fossil (%)	2.15	3.92	0.743	0.032	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.316	10.5	54.5	64.3	64.7	64.8	64.8
Sales of water heating units - Electric Resistance (%)	7.81	11	28.4	32.3	32.5	32.5	32.5
Sales of water heating units - Gas Furnace (%)	88	74.5	14.1	0.593	0	0	0
Sales of water heating units - Other (%)	3.86	4.03	2.99	2.74	2.74	2.73	2.73
Sales of cooking units - Electric Resistance (%)	32	46	79.9	86.5	86.9	86.9	86.9
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		15,755	17,550				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	5,499	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	6,450	8,486	8,010	8,486	5,848	5,850	9,017
Installed thermal - Nuclear (MW)	5,220	5,220	5,220	3,440	2,410	0	0
Installed renewables - Rooftop PV (MW)	353	569	805	1,146	1,626	2,248	3,044
Installed renewables - Solar - Base land use assumptions (MW)	1,471	16,603	36,164	57,887	68,763	80,695	83,683
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	0	0	7,318	14,654	20,148	26,685
Installed renewables - Solar - Constrained land use assumptions (MW)	1,486	15,313	35,726	57,139	66,870	75,841	79,620
Installed renewables - Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	8,233	16,298	16,298	28,328
Capital invested - Solar PV - Base (billion \$2018)		20.3	23.4	24	11.3	11.7	2.77
Capital invested - Offshore Wind - Base (billion \$2018)		0	0	15	12.7	8.1	8.19

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	3,487	33,536	72,250	115,091	136,552	160,100	165,969
Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
OffshoreWind - Base land use assumptions (GWh)	0	0	0	26,149	52,616	73,446	98,879
Solar - Constrained land use assumptions (GWh)	6,973	61,832	142,590	227,013	265,410	300,816	315,651
Wind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	58,835	117,828	117,828	210,354

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)							-158
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,808
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,420
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,902
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-187
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-407
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-183
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-922
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-12,261

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)							-236
Carbon sink potential - Mid - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-960
Carbon sink potential - Mid - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-5,059
Carbon sink potential - Mid - Improve plantations (1000 tCO <sub>2</sub> e/y)							-2,081
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-11,805
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-360
Carbon sink potential - Mid - Reforest cropland (1000 tCO <sub>2</sub> e/y)							-610
Carbon sink potential - Mid - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-1,303
Carbon sink potential - Mid - Restore productivity (1000 tCO <sub>2</sub> e/y)							-1,829
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-24,243
Carbon sink potential - High - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-315
Carbon sink potential - High - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-1,646
Carbon sink potential - High - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-7,310
Carbon sink potential - High - Improve plantations (1000 tCO <sub>2</sub> e/y)							-2,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-17,707
Carbon sink potential - High - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-534
Carbon sink potential - High - Reforest cropland (1000 tCO <sub>2</sub> e/y)							-813
Carbon sink potential - High - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-2,422
Carbon sink potential - High - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-36,273
Carbon sink potential - High - Restore productivity (1000 tCO <sub>2</sub> e/y)							-2,736
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							25.7
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							209
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,428
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							514
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)							26.7
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							26.9



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)							11.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							549
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,791
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							38.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							216
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,578
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							774
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)							38.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							40.3
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							86.2
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,105
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,876
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							51.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							223
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,727
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,028
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)							50.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							53.8
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							68.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							907

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)							6,110

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)							-81.8
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-677
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-19.4
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-778
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-81.8
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,291
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-38.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-1,411
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							46.8
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							371
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							35.2
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							453
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							46.8
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							707
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							70.4
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							824

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)		30.4	0.049	0.046	0.036	0.025	0.002

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)		22.8	18.9	18.1	13.9	4.5	1.45
Premature deaths from air pollution - Mobile - On-Road (deaths)		117	110	84.4	49.2	22.6	8.97
Premature deaths from air pollution - Gas Stations (deaths)		15.4	14.2	10.8	6.43	3.13	1.47
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		10.2	8.38	5.66	3.2	1.61	0.781
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		1.82	1.48	1.02	0.612	0.302	0.135
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		2.11	1.9	1.49	1.02	0.602	0.339
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		1.58	1.52	1.46	1.4	1.33	1.25
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		8.36	7.38	5.45	3.45	2.12	1.38
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.5	1.25	0.971	0.698	0.486	0.321
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.47	1.27	1.06	0.843	0.63	0.422
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.567	0.316	0.317	0.315	0.322	0.299
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		25.1	24.4	24.1	20.8	17.6	13.2
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		269	0.437	0.407	0.323	0.225	0.019
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		202	168	161	123	39.9	12.9
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,041	979	750	437	201	79.7
Monetary damages from air pollution - Gas Stations (million \$2019)		136	126	95.5	56.9	27.7	13
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		90.7	74.2	50.2	28.3	14.3	6.92
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		16.1	13.1	9.05	5.43	2.68	1.2
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		18.7	16.9	13.2	9.03	5.33	3.01
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		14	13.5	12.9	12.4	11.7	11
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		74	65.3	48.2	30.5	18.8	12.2
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		13.3	11.1	8.59	6.18	4.31	2.84

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)		13	11.2	9.36	7.46	5.58	3.74
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		5	2.79	2.8	2.78	2.84	2.64
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		222	217	214	185	156	117

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		208	298	99.8	397	818	944
By economic sector - Construction (jobs)		9,003	10,749	16,938	14,615	16,772	15,873
By economic sector - Manufacturing (jobs)		2,713	2,925	2,947	3,220	3,664	3,325
By economic sector - Mining (jobs)		1,740	1,258	847	539	340	222
By economic sector - Other (jobs)		1,261	1,692	3,029	2,465	3,062	2,826
By economic sector - Pipeline (jobs)		376	327	510	351	400	430
By economic sector - Professional (jobs)		4,160	4,706	6,719	7,504	8,904	8,721
By economic sector - Trade (jobs)		2,872	3,204	4,595	4,410	5,209	5,000
By economic sector - Utilities (jobs)		7,876	9,184	12,807	20,160	21,337	22,229
By resource sector - Biomass (jobs)		729	765	342	1,482	3,205	3,923
By resource sector - CO2 (jobs)		1.65	5.55	1,863	963	1,816	2,392
By resource sector - Coal (jobs)		744	0	0	0	0	0
By resource sector - Grid (jobs)		8,547	11,584	18,084	21,094	24,478	25,563
By resource sector - Natural Gas (jobs)		3,315	3,678	2,833	3,249	3,365	2,710
By resource sector - Nuclear (jobs)		2,635	2,593	2,555	10,720	9,394	9,957
By resource sector - Oil (jobs)		4,310	3,403	2,397	1,583	1,054	743
By resource sector - Solar (jobs)		9,864	12,233	20,409	14,544	17,131	14,254
By resource sector - Wind (jobs)		65	82.2	8	23.8	63.4	27
By education level - All sectors - High school diploma or less (jobs)		12,698	14,604	20,749	22,174	25,251	24,823
By education level - All sectors - Associates degree or some college (jobs)		9,409	10,820	15,611	16,833	19,043	18,694
By education level - All sectors - Bachelors degree (jobs)		6,305	6,936	9,417	11,320	12,512	12,381
By education level - All sectors - Masters or professional degree (jobs)		1,563	1,728	2,364	2,905	3,222	3,201
By education level - All sectors - Doctoral degree (jobs)		234	256	350	429	479	471
Related work experience - All sectors - None (jobs)		4,349	4,989	7,107	7,721	8,789	8,660
Related work experience - All sectors - Up to 1 year (jobs)		6,050	6,943	9,842	10,671	12,156	11,944
Related work experience - All sectors - 1 to 4 years (jobs)		10,902	12,345	17,348	19,368	21,780	21,458
Related work experience - All sectors - 4 to 10 years (jobs)		7,055	7,985	11,299	12,564	14,084	13,860
Related work experience - All sectors - Over 10 years (jobs)		1,854	2,082	2,895	3,337	3,699	3,649
On-the-Job Training - All sectors - None (jobs)		1,699	1,912	2,689	3,027	3,387	3,325
On-the-Job Training - All sectors - Up to 1 year (jobs)		19,754	22,363	31,184	35,002	39,502	38,955
On-the-Job Training - All sectors - 1 to 4 years (jobs)		6,376	7,308	10,524	11,406	12,827	12,603
On-the-Job Training - All sectors - 4 to 10 years (jobs)		2,083	2,426	3,620	3,718	4,228	4,141

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)		297	335	475	509	563	545
On-Site or In-Plant Training - All sectors - None (jobs)		4,940	5,592	7,864	8,782	9,883	9,703
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		17,955	20,349	28,460	31,864	35,936	35,442
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		4,939	5,659	8,126	8,795	9,905	9,732
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		2,122	2,449	3,608	3,770	4,268	4,186
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		253	295	433	449	516	507
Wage income - All (million \$2019)		1,534	1,746	2,456	2,883	3,261	3,281

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	463	438	386	323	267	233	218
Final energy use - Residential (PJ)	158	150	141	129	119	115	113
Final energy use - Commercial (PJ)	114	114	111	106	101	100	102
Final energy use - Industry (PJ)	358	374	380	387	398	399	404

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		3.55	3.63	5.67	5.98	4.97	5.12

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	17.4	382	746	2,022	3,298	4,317	5,336
Vehicle stocks - LDV – All others (1000 units)	4,450	4,237	4,024	2,933	1,841	1,042	242
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		856	2,191	3,557	5,385	5,864	5,589
Public EV charging plugs - DC Fast (1000 units)	0.1		1.63		7.19		11.6
Public EV charging plugs - L2 (1000 units)	0.476		39.1		173		280

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 (%)	37.5	51.9	80.7	87.2	87.5	87.4	87.4
Sales of space heating units - Electric Resistance (%)	25.8	25.3	10.7	7.34	7.15	7.29	7.33
Sales of space heating units - Gas (%)	30.5	15	4.16	1.77	1.69	1.69	1.68
Sales of space heating units - Fossil (%)	6.1	7.81	4.43	3.7	3.67	3.6	3.59
Sales of water heating units - Electric Heat Pump (%)	0	12.1	64.1	75.7	76.2	76.2	76.1
Sales of water heating units - Electric Resistance (%)	67.7	70.5	30.6	21.7	21.3	21.3	21.3
Sales of water heating units - Gas Furnace (%)	28.2	14.7	2.78	0.118	0	0	0
Sales of water heating units - Other (%)	4.1	2.65	2.54	2.53	2.55	2.56	2.57
Sales of cooking units - Electric Resistance (%)	82.7	86.4	97.7	99.9	100	100	100
Sales of cooking units - Gas (%)	17.3	13.6	2.33	0.117	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)		3.83	4.21				

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 (%)	10.1	27.5	70.6	83.9	85.2	85.2	85.2
Sales of space heating units - Electric Resistance (%)	9.29	8.33	10.3	12.4	12.9	12.8	12.8
Sales of space heating units - Gas Furnace (%)	78.5	60.3	18.3	3.66	1.98	1.94	1.94
Sales of space heating units - Fossil (%)	2.15	3.92	0.743	0.032	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.316	10.5	54.5	64.3	64.7	64.8	64.8
Sales of water heating units - Electric Resistance (%)	7.81	11	28.4	32.3	32.5	32.5	32.5
Sales of water heating units - Gas Furnace (%)	88	74.5	14.1	0.593	0	0	0
Sales of water heating units - Other (%)	3.86	4.03	2.99	2.74	2.74	2.73	2.73
Sales of cooking units - Electric Resistance (%)	32	46	79.9	86.5	86.9	86.9	86.9
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		15,755	17,550				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	5,499	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	6,485	6,487	8,026	8,032	9,312	9,770	10,893
Installed thermal - Nuclear (MW)	5,220	5,220	5,220	5,222	7,094	9,709	12,099
Installed renewables - Rooftop PV (MW)	353	569	805	1,146	1,626	2,248	3,044
Installed renewables - Solar - Base land use assumptions (MW)	1,471	7,495	14,451	26,864	32,648	40,459	41,102
Installed renewables - Solar - Constrained land use assumptions (MW)	1,486	9,861	15,524	30,822	36,745	44,553	45,091
Installed renewables - Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion \$2018)		8.07	8.33	13.7	6.01	7.66	0.596
Capital invested - Solar PV - Constrained (billion \$2018)		11.2	6.78	16.9	6.15	7.66	0.498

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	3,487	15,460	29,258	53,860	65,319	80,718	81,989
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
Solar - Constrained land use assumptions (GWh)	3,487	20,088	31,297	61,561	73,246	88,648	89,707
Wind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
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)							-158
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,808
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,420
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,902
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-187
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-407
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-183
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-922
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-12,261
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-236
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-960
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,059
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,081
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-11,805
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-360
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-610
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,303
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-1,829
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-24,243
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-315
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,646
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,310
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-17,707
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-534
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-813
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-2,422
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-36,273

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,736
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							25.7
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							209
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,428
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							514
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)							26.7
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							26.9
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							11.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							549
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,791
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							38.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							216
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,578
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							774
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)							38.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							40.3
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							86.2
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,105
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,876
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							51.5



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 - Avoid deforestation (over 30 years) (1000 hectares)							223
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,727
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,028
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)							50.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							53.8
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							68.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							907
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,110

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 tCO2e/y)							-81.8
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-677
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-19.4
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-778
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-81.8
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,291
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-38.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-1,411
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							46.8
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							371
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							35.2

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 - Total (1000 hectares)							453
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							46.8
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							707
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							70.4
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							824

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)		30.4	0.049	0.046	0.036	0.025	0.002
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		21.8	14.4	6.94	4.27	2.24	0.928
Premature deaths from air pollution - Mobile - On-Road (deaths)		119	121	119	108	86.8	60.1
Premature deaths from air pollution - Gas Stations (deaths)		15.7	16	15.5	14	11.2	7.83
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		10.3	9.4	8.34	6.91	5.21	3.52
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		1.85	1.76	1.67	1.46	1.11	0.74
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		2.14	2.15	2.14	1.98	1.62	1.2
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		1.58	1.52	1.46	1.4	1.33	1.25
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		8.43	8.39	8.1	7.2	5.81	4.32
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.51	1.38	1.25	1.08	0.911	0.742
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.47	1.36	1.24	1.11	0.986	0.861
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.613	0.317	0.32	0.32	0.327	0.324
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		24.7	22.4	19.3	16.8	14.9	10.6
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		269	0.437	0.407	0.323	0.225	0.019
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		193	127	61.5	37.8	19.9	8.22
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,058	1,078	1,057	961	772	534

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Gas Stations (million \$2019)		139	141	138	124	99.6	69.4
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		91.5	83.3	73.9	61.3	46.2	31.2
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		16.4	15.6	14.8	12.9	9.87	6.56
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		19	19.1	19	17.5	14.3	10.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		14	13.5	12.9	12.4	11.7	11
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		74.6	74.3	71.7	63.7	51.4	38.2
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		13.4	12.2	11.1	9.6	8.06	6.57
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		13	12	11	9.86	8.73	7.62
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		5.41	2.8	2.82	2.83	2.88	2.86
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		219	199	172	150	132	94.3

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		203	284	106	350	620	1,001
By economic sector - Construction (jobs)		4,824	30,146	18,385	18,604	20,779	23,696
By economic sector - Manufacturing (jobs)		3,035	5,536	4,409	4,009	5,544	6,204
By economic sector - Mining (jobs)		1,739	1,294	964	721	474	254
By economic sector - Other (jobs)		433	5,979	3,239	3,579	3,993	5,396
By economic sector - Pipeline (jobs)		366	309	466	331	373	378
By economic sector - Professional (jobs)		2,826	11,768	7,378	8,247	9,709	11,923
By economic sector - Trade (jobs)		1,995	8,049	5,080	5,557	6,316	7,824
By economic sector - Utilities (jobs)		7,102	13,304	14,328	14,913	18,419	18,660
By resource sector - Biomass (jobs)		808	765	360	1,470	2,870	4,722
By resource sector - CO2 (jobs)		1.63	4.77	1,692	876	1,650	2,172
By resource sector - Coal (jobs)		744	0	0	0	0	0
By resource sector - Grid (jobs)		6,974	20,010	21,799	24,261	31,816	32,925
By resource sector - Natural Gas (jobs)		3,412	2,935	2,350	2,178	1,933	1,102
By resource sector - Nuclear (jobs)		2,635	2,593	2,552	2,336	1,879	1,604
By resource sector - Oil (jobs)		4,364	3,667	3,089	2,601	1,899	1,100
By resource sector - Solar (jobs)		3,570	46,468	22,392	22,314	22,979	30,895
By resource sector - Wind (jobs)		16.2	228	125	275	1,201	813
By education level - All sectors - High school diploma or less (jobs)		9,258	33,265	23,291	24,088	28,365	32,274
By education level - All sectors - Associates degree or some college (jobs)		6,918	24,469	17,472	18,040	21,269	24,118
By education level - All sectors - Bachelors degree (jobs)		4,963	14,664	10,575	10,992	12,867	14,640
By education level - All sectors - Masters or professional degree (jobs)		1,213	3,682	2,635	2,778	3,254	3,741

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

Item	2020	2025	2030	2035	2040	2045	2050
By education level - All sectors - Doctoral degree (jobs)		171	591	384	412	472	562
Related work experience - All sectors - None (jobs)		3,219	11,170	7,954	8,266	9,758	11,126
Related work experience - All sectors - Up to 1 year (jobs)		4,378	16,107	11,049	11,483	13,506	15,555
Related work experience - All sectors - 1 to 4 years (jobs)		8,207	27,224	19,449	20,161	23,698	26,902
Related work experience - All sectors - 4 to 10 years (jobs)		5,291	17,663	12,642	13,047	15,317	17,311
Related work experience - All sectors - Over 10 years (jobs)		1,430	4,506	3,264	3,354	3,948	4,442
On-the-Job Training - All sectors - None (jobs)		1,247	4,387	2,999	3,116	3,617	4,178
On-the-Job Training - All sectors - Up to 1 year (jobs)		14,955	49,384	35,095	36,469	43,023	49,094
On-the-Job Training - All sectors - 1 to 4 years (jobs)		4,677	16,421	11,747	12,083	14,185	15,969
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,431	5,681	3,984	4,107	4,787	5,393
On-the-Job Training - All sectors - Over 10 years (jobs)		213	798	531	536	615	701
On-Site or In-Plant Training - All sectors - None (jobs)		3,661	12,673	8,800	9,120	10,674	12,244
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		13,562	44,969	32,011	33,238	39,196	44,660
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		3,629	12,724	9,084	9,354	10,988	12,390
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,490	5,638	3,978	4,098	4,775	5,370
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		183	668	484	501	595	671
Wage income - All (million \$2019)		1,176	3,749	2,752	2,888	3,438	3,934

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	464	441	404	373	350	323	290
Final energy use - Residential (PJ)	158	151	147	142	135	128	122
Final energy use - Commercial (PJ)	114	115	113	112	109	107	107
Final energy use - Industry (PJ)	358	374	381	391	402	403	407

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		2.92	2.93	3.93	4.05	5.12	5.35

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	13.5	121	228	724	1,221	2,319	3,418
Vehicle stocks - LDV – All others (1000 units)	4,468	4,468	4,468	4,238	4,008	3,089	2,169
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	138	291	982	3,094	4,506
Public EV charging plugs - DC Fast (1000 units)	0.1		0.496		2.66		7.45
Public EV charging plugs - L2 (1000 units)	0.476		11.9		63.9		179

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 (%)	37.5	46.3	49.6	59.1	73.7	83	86.3
Sales of space heating units - Electric Resistance (%)	25.8	28.1	26.5	21.5	14	9.4	7.8
Sales of space heating units - Gas (%)	30.5	17.1	15.8	12.4	7.01	3.39	2.12
Sales of space heating units - Fossil (%)	6.1	8.46	8.09	7	5.31	4.17	3.78
Sales of water heating units - Electric Heat Pump (%)	0	2.08	8	25	51.1	68.2	74.1
Sales of water heating units - Electric Resistance (%)	67.7	78.2	73.7	60.5	40.4	27.4	22.9
Sales of water heating units - Gas Furnace (%)	28.2	17	15.7	11.9	5.84	1.86	0.487
Sales of water heating units - Other (%)	4.1	2.66	2.65	2.64	2.62	2.58	2.57
Sales of cooking units - Electric Resistance (%)	82.6	83.1	84.7	88.9	94.7	98.3	99.5
Sales of cooking units - Gas (%)	17.4	16.9	15.3	11.1	5.31	1.72	0.462
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		3.78	4.05				

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 (%)	10.1	19.3	24.3	38.5	60.9	76.8	82.9
Sales of space heating units - Electric Resistance (%)	9.29	8.02	8.23	8.98	10.4	11.8	12.5
Sales of space heating units - Gas Furnace (%)	78.5	68.1	63.3	49.4	27.1	10.9	4.44
Sales of space heating units - Fossil (%)	2.15	4.53	4.19	3.17	1.56	0.496	0.13
Sales of water heating units - Electric Heat Pump (%)	0.316	2.04	7.05	21.5	43.6	58	63
Sales of water heating units - Electric Resistance (%)	7.81	7.62	9.51	15.3	24.1	29.8	31.8
Sales of water heating units - Gas Furnace (%)	88	86.1	79.2	59.5	29.1	9.29	2.42
Sales of water heating units - Other (%)	3.86	4.23	4.21	3.8	3.27	2.9	2.77
Sales of cooking units - Electric Resistance (%)	32	36.2	40.9	53.4	71	81.7	85.5
Sales of cooking units - Gas (%)	68	63.8	59.1	46.6	29	18.3	14.5
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		15,746	17,554				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	5,499	2,251	0	0	0	0	0
Installed thermal - Natural gas (MW)	6,450	8,486	7,413	7,268	5,747	3,513	3,996
Installed thermal - Nuclear (MW)	5,220	5,220	5,220	5,220	4,333	3,440	3,440
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	0.008	0	0.047
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	7.26	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	0	0	8,149	8,149	8,149
Biomass w/ccu allam power plant (GWh)	0	0	0	0	7.93	7.93	55.2

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	0	0	7	7	7
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	1	1	2
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	5	12
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	1	1	2
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	1
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	0	0	6,674	4,475	6,984
Biomass purchases (million \$2018/y)		0	0	0	463	822	1,376

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	11.4	17.2	27
Annual - BECCS (MMT)		0	0	0	8.07	13.8	23.5
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	3.32	3.42	3.53
Cumulative - All (MMT)		0	0	0	11.4	28.6	55.6
Cumulative - BECCS (MMT)		0	0	0	8.07	21.9	45.4
Cumulative - NGCC (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	3.32	6.74	10.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	0	159	159	159	159
Spur (km)		0	0	0	773	1,018	1,489
All (km)		0	0	159	932	1,177	1,649
Cumulative investment - Trunk (million \$2018)		0	0	951	951	951	951
Cumulative investment - Spur (million \$2018)		0	0	0	993	1,199	1,755
Cumulative investment - All (million \$2018)		0	0	951	1,943	2,149	2,706

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	0	0	0	0	0
Injection wells (wells)		0	0	0	0	2	2
Resource characterization, appraisal, permitting costs (million \$2020)		3.29	7.9	10.5	10.5	10.5	10.5
Wells and facilities construction costs (million \$2020)		0	4.11	16	28.5	47.7	59.2

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)							-158
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,808
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,420
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,902
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-187
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-407
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-183
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-922
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-12,261
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-236
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-960
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,059
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,081
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-11,805
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-360
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-610
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,303
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-1,829
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-24,243
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-315
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,646
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,310
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-17,707
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-534
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-813
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-2,422
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-36,273

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,736
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							25.7
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							209
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,428
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							514
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)							26.7
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							26.9
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							11.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							549
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,791
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							38.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							216
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,578
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							774
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)							38.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							40.3
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							86.2
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,105
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,876
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							51.5



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 - High - Avoid deforestation (over 30 years) (1000 hectares)							223
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,727
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,028
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)							50.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							53.8
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							68.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							907
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,110

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)							-218
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-600
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-16.9
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)							-834
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-218
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,143
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-33.8
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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-1,395
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							132
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							328
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							30.7
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							45.9
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							85.4
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							623
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							132
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,546
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							61.4
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							45.9
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							85.4
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,871

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)		114	75.8	63.5	57.8	55.6	54.2
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		19.6	20.9	22.8	22.8	26.3	27.6
Premature deaths from air pollution - Mobile - On-Road (deaths)		119	123	127	131	136	141
Premature deaths from air pollution - Gas Stations (deaths)		15.6	16.1	16.5	17.1	17.6	18
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		10.2	9.29	8.58	8.19	8.11	8.07
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		1.79	1.51	1.11	0.763	0.512	0.372
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		2.04	2.02	2.03	2.08	2.14	2.2
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		1.65	1.67	1.68	1.69	1.69	1.68

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		8.47	8.34	7.78	7.16	6.96	7.22
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.56	1.53	1.47	1.39	1.33	1.31
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.54	1.61	1.69	1.76	1.82	1.9
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.18	0.862	0.73	0.704	0.694	0.663
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		24.8	26.6	27.6	26.7	26.9	25.6
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		1,014	672	563	513	493	480
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		173	185	202	202	233	244
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,057	1,092	1,127	1,167	1,208	1,251
Monetary damages from air pollution - Gas Stations (million \$2019)		138	143	146	151	155	160
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		90	82.3	76	72.6	71.9	71.5
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		15.9	13.4	9.85	6.76	4.53	3.29
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		18.1	17.9	18	18.5	19	19.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		14.6	14.8	14.9	14.9	14.9	14.9
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		75	73.8	68.9	63.4	61.6	64
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		13.8	13.5	13.1	12.3	11.8	11.6
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		13.6	14.3	14.9	15.5	16.2	16.8
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		10.4	7.61	6.44	6.22	6.12	5.85
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		220	236	245	237	239	227

Table 65: REF scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		193	173	171	139	139	150
By economic sector - Construction (jobs)		4,151	5,153	5,941	5,628	6,064	7,402
By economic sector - Manufacturing (jobs)		1,827	1,884	1,974	1,857	1,851	2,662
By economic sector - Mining (jobs)		1,913	1,542	1,255	940	800	680

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		210	449	584	673	808	1,237
By economic sector - Pipeline (jobs)		376	384	386	368	373	374
By economic sector - Professional (jobs)		2,731	2,855	3,055	2,810	2,881	3,460
By economic sector - Trade (jobs)		2,013	2,045	2,101	1,900	2,003	2,464
By economic sector - Utilities (jobs)		8,143	7,870	8,639	7,366	7,282	7,868
By resource sector - Biomass (jobs)		743	696	646	577	591	601
By resource sector - CO2 (jobs)		0	0.001	0.001	0.001	0.001	0.001
By resource sector - Coal (jobs)		1,477	1,050	995	359	0	0
By resource sector - Grid (jobs)		8,782	8,533	10,229	7,889	8,375	10,145
By resource sector - Natural Gas (jobs)		3,505	3,600	3,570	4,047	4,553	4,041
By resource sector - Nuclear (jobs)		2,635	2,593	2,552	2,160	1,629	1,604
By resource sector - Oil (jobs)		4,388	3,744	3,292	3,054	2,914	2,819
By resource sector - Solar (jobs)			2,063	2,752	3,528	4,132	6,624
By resource sector - Wind (jobs)		26.3	77.5	70.2	66.5	6.73	463
By education level - All sectors - High school diploma or less (jobs)		8,765	9,222	10,021	9,011	9,305	11,111
By education level - All sectors - Associates degree or some college (jobs)		6,625	6,930	7,553	6,824	7,043	8,375
By education level - All sectors - Bachelors degree (jobs)		4,811	4,838	5,093	4,553	4,561	5,310
By education level - All sectors - Masters or professional degree (jobs)		1,192	1,198	1,265	1,132	1,132	1,316
By education level - All sectors - Doctoral degree (jobs)		164	168	175	160	159	186
Related work experience - All sectors - None (jobs)		3,090	3,217	3,488	3,149	3,247	3,851
Related work experience - All sectors - Up to 1 year (jobs)		4,080	4,308	4,667	4,204	4,325	5,208
Related work experience - All sectors - 1 to 4 years (jobs)		7,926	8,167	8,779	7,877	8,050	9,497
Related work experience - All sectors - 4 to 10 years (jobs)		5,100	5,268	5,675	5,107	5,219	6,137
Related work experience - All sectors - Over 10 years (jobs)		1,361	1,397	1,497	1,343	1,360	1,604
On-the-Job Training - All sectors - None (jobs)		1,173	1,221	1,304	1,179	1,198	1,427
On-the-Job Training - All sectors - Up to 1 year (jobs)		14,281	14,719	15,793	14,161	14,455	17,148
On-the-Job Training - All sectors - 1 to 4 years (jobs)		4,508	4,712	5,131	4,630	4,767	5,625
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,405	1,501	1,660	1,510	1,576	1,850
On-the-Job Training - All sectors - Over 10 years (jobs)		188	202	218	201	205	246
On-Site or In-Plant Training - All sectors - None (jobs)		3,444	3,583	3,848	3,480	3,549	4,221
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		12,981	13,390	14,384	12,893	13,171	15,617
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		3,490	3,647	3,968	3,577	3,683	4,355
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,464	1,548	1,699	1,543	1,602	1,872
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		177	187	207	187	196	232
Wage income - All (million \$2019)		1,145	1,185	1,285	1,167	1,200	1,420

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	463	441	406	385	385	396	410

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Residential (PJ)	158	152	151	152	156	160	165
Final energy use - Commercial (PJ)	114	116	117	119	121	125	132
Final energy use - Industry (PJ)	358	383	402	413	428	438	452

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)		3.94	4.06	5.79	6.1	5.26	5.44

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 (%)	36.1	57.9	58.6	59.8	60.9	62.4	64.6
Sales of space heating units - Electric Resistance (%)	26.4	22.4	22.2	21.4	20.5	19.2	16.9
Sales of space heating units - Gas (%)	31.3	13.3	13.7	13.6	13.5	13.4	13.4
Sales of space heating units - Fossil (%)	6.23	6.42	5.5	5.15	5.08	5.05	5.09
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	67.7	79.8	79.8	79.6	79.5	79.5	79.4
Sales of water heating units - Gas Furnace (%)	28.2	17.5	17.5	17.7	17.8	17.8	17.9
Sales of water heating units - Other (%)	4.1	2.67	2.66	2.69	2.72	2.72	2.73
Sales of cooking units - Electric Resistance (%)	82.5	82.5	82.5	82.5	82.5	82.5	82.5
Sales of cooking units - Gas (%)	17.5	17.5	17.5	17.5	17.5	17.5	17.5
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		3.77	3.56				

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 (%)	10.1	29.8	65.1	72	72.3	72.3	72.4
Sales of space heating units - Electric Resistance (%)	9.29	9.59	14.9	20.3	25	25.7	25.7
Sales of space heating units - Gas Furnace (%)	78.5	56.5	17.5	6.45	2.54	1.99	1.94
Sales of space heating units - Fossil (%)	2.15	4.14	2.51	1.22	0.185	0.016	0
Sales of water heating units - Electric Heat Pump (%)	0.316	0.281	0.275	0.277	0.278	0.276	0.277
Sales of water heating units - Electric Resistance (%)	7.81	6.92	6.81	6.83	6.85	6.81	6.81
Sales of water heating units - Gas Furnace (%)	88	88.5	88.5	88.6	88.5	88.5	88.5
Sales of water heating units - Other (%)	3.86	4.28	4.39	4.33	4.38	4.4	4.38
Sales of cooking units - Electric Resistance (%)	32	34.3	34.3	34.3	34.4	34.3	34.3
Sales of cooking units - Gas (%)	68	65.7	65.7	65.7	65.6	65.7	65.7
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		15,522	16,121				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	5,499	2,807	2,807	2,807	0	0	0
Installed thermal - Natural gas (MW)	6,450	8,486	8,010	8,486	7,328	10,349	13,941

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Nuclear (MW)	5,220	5,220	5,220	5,220	3,440	3,440	3,440
Installed renewables - Rooftop PV (MW)	353	569	805	1,146	1,626	2,248	3,044
Installed renewables - Solar - Base land use assumptions (MW)	1,464	1,464	1,464	1,464	1,464	1,464	1,464
Installed renewables - Solar - Constrained land use assumptions (MW)	7.69	7.69	7.69	7.69	7.69	7.69	7.69

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	3,487	3,487	3,487	3,487	3,487	3,487	3,487
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)	-9.71		-9.95				-8.06
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-4.82		-8.04				-8.46
Business-as-usual carbon sink - Total (Mt CO2e/y)	-14.5		-18				-16.5

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)							-158
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,808
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,420
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,902
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-187
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-407
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-183
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-922
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-12,261
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-236
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-960
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,059
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,081
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-11,805
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-360

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-610
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,303
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-1,829
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-24,243
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-315
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,646
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,310
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-17,707
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-534
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-813
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-2,422
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-36,273
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,736
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							25.7
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							209
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,428
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							514
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)							26.7
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							26.9
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							11.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							549
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,791
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							38.6

Table 73: REF 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)							216
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,578
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							774
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)							38.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							40.3
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							86.2
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,105
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,876
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							51.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							223
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,727
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,028
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)							50.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							53.8
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							68.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							907
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,110