



Net-Zero America - Montana data

October 29, 2021 (updated January 9, 2022)

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

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Table 1: *E+ scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		3.29	0.003	0.003	0.002	0.001	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		0.922	0.508	0.374	0.336	0.223	0.091
Premature deaths from air pollution - Mobile - On-Road (deaths)		3.53	3.22	2.38	1.33	0.581	0.21
Premature deaths from air pollution - Gas Stations (deaths)		0.312	0.28	0.207	0.12	0.057	0.027
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		0.706	0.593	0.409	0.227	0.107	0.042
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.04	0.035	0.023	0.012	0.006	0.002
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		0.166	0.154	0.121	0.08	0.043	0.019
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.058	0.054	0.051	0.047	0.043	0.04
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		0.429	0.373	0.271	0.166	0.09	0.043
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.12	0.094	0.072	0.053	0.037	0.023
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.056	0.046	0.037	0.028	0.02	0.013
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.525	0.055	0.048	0.041	0.035	0.033
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		8.09	7.55	6.83	5.24	3.87	2.38
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		29.2	0.026	0.026	0.021	0.013	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		8.17	4.5	3.32	2.98	1.97	0.803
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		31.4	28.6	21.2	11.8	5.17	1.86
Monetary damages from air pollution - Gas Stations (million \$2019)		2.76	2.48	1.83	1.06	0.508	0.236
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		6.26	5.26	3.62	2.01	0.951	0.37
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		0.354	0.309	0.207	0.108	0.05	0.022
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		1.47	1.36	1.07	0.708	0.38	0.17
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		0.513	0.482	0.449	0.417	0.385	0.352
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		3.8	3.3	2.4	1.47	0.793	0.382

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)		1.06	0.831	0.639	0.472	0.329	0.208
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		0.499	0.408	0.325	0.247	0.177	0.113
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		4.63	0.483	0.428	0.358	0.312	0.292
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		71.9	67	60.7	46.5	34.4	21.1

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		0.872	1.77	0.676	76.7	272	294
By economic sector - Construction (jobs)		2,399	3,833	5,465	8,640	8,210	6,043
By economic sector - Manufacturing (jobs)		1,497	2,045	2,563	3,035	2,679	2,117
By economic sector - Mining (jobs)		1,560	977	757	523	420	316
By economic sector - Other (jobs)		217	311	496	775	806	888
By economic sector - Pipeline (jobs)		183	299	187	155	166	159
By economic sector - Professional (jobs)		1,335	1,882	2,909	4,527	4,834	4,530
By economic sector - Trade (jobs)		1,510	1,433	1,893	2,645	2,715	2,563
By economic sector - Utilities (jobs)		1,595	3,291	5,419	10,163	9,060	4,634
By resource sector - Biomass (jobs)		3.74	4.88	1.93	231	993	1,256
By resource sector - CO2 (jobs)		37.3	1,182	508	539	966	1,161
By resource sector - Coal (jobs)		1,275	289	38.3	28.4	22.1	18.5
By resource sector - Grid (jobs)		2,033	4,723	10,165	20,133	17,461	7,783
By resource sector - Natural Gas (jobs)		1,057	866	678	516	356	306
By resource sector - Nuclear (jobs)		0	0.003	0.007	0	0	0
By resource sector - Oil (jobs)		2,936	2,511	2,051	1,458	1,047	650
By resource sector - Solar (jobs)		1,359	1,349	1,681	1,805	1,929	3,262
By resource sector - Wind (jobs)		1,596	3,149	4,566	5,829	6,389	7,106
By education level - All sectors - High school diploma or less (jobs)		4,374	5,905	8,243	12,828	12,198	8,793
By education level - All sectors - Associates degree or some college (jobs)		3,105	4,446	6,295	9,892	9,378	6,842
By education level - All sectors - Bachelors degree (jobs)		2,222	2,919	4,015	6,076	5,866	4,524
By education level - All sectors - Masters or professional degree (jobs)		521	703	994	1,533	1,503	1,188
By education level - All sectors - Doctoral degree (jobs)		76.2	100	141	211	218	195
Related work experience - All sectors - None (jobs)		1,455	2,029	2,844	4,451	4,247	3,101
Related work experience - All sectors - Up to 1 year (jobs)		2,066	2,764	3,875	5,984	5,756	4,306
Related work experience - All sectors - 1 to 4 years (jobs)		3,768	5,089	7,110	11,021	10,517	7,760
Related work experience - All sectors - 4 to 10 years (jobs)		2,376	3,315	4,639	7,207	6,864	5,069
Related work experience - All sectors - Over 10 years (jobs)		632	875	1,221	1,877	1,779	1,307
On-the-Job Training - All sectors - None (jobs)		577	757	1,043	1,580	1,525	1,179
On-the-Job Training - All sectors - Up to 1 year (jobs)		6,918	9,227	12,861	19,810	18,976	14,113

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)		2,075	2,991	4,226	6,657	6,295	4,539
On-the-Job Training - All sectors - 4 to 10 years (jobs)		630	961	1,378	2,223	2,109	1,513
On-the-Job Training - All sectors - Over 10 years (jobs)		97.6	136	183	270	257	199
On-Site or In-Plant Training - All sectors - None (jobs)		1,650	2,263	3,147	4,824	4,651	3,555
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		6,278	8,386	11,704	18,070	17,271	12,772
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		1,630	2,317	3,267	5,133	4,854	3,499
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		659	983	1,395	2,230	2,117	1,525
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		79.7	123	177	284	269	192
Wage income - All (million \$2019)		567	788	1,118	1,771	1,709	1,256

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		38.1	33.4	26.3	19.3	13.8	9.02
Oil consumption - Cumulative (million bbls)							802
Oil production - Annual (million bbls)		27.9	28	28	22.2	18	12
Natural gas consumption - Annual (tcf)		67.4	56.8	45.5	34.3	21.6	15
Natural gas consumption - Cumulative (tcf)							1,372
Natural gas production - Annual (tcf)		51.4	48.6	42.3	35.8	28.4	22

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	114	107	94.2	79	65.2	56.7	53
Final energy use - Residential (PJ)	52.9	50.4	48	42.8	36.5	31.6	28.2
Final energy use - Commercial (PJ)	39.7	39.7	38.9	36.8	34.2	32.3	31.5
Final energy use - Industry (PJ)	59.8	61.8	62	63.1	66.8	68.2	69.6

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)		0.684	0.713	1.5	1.62	1.36	1.44

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	4.71	156	307	835	1,364	1,787	2,209
Vehicle stocks - LDV – All others (1000 units)	1,842	1,754	1,666	1,214	762	431	100
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		355	907	1,474	2,231	2,430	2,316
Public EV charging plugs - DC Fast (1000 units)	0.064		0.767		3.41		5.52
Public EV charging plugs - L2 (1000 units)	0.076		18.5		82.2		133

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 (%)	6.38	15	36.8	80.8	89	89.6	89.4
Sales of space heating units - Electric Resistance (%)	7.67	12.7	10	4.36	3.39	3.35	3.38
Sales of space heating units - Gas (%)	73.2	53.7	38.1	7.52	2.07	1.74	1.73
Sales of space heating units - Fossil (%)	12.7	18.7	15.1	7.32	5.58	5.36	5.5
Sales of water heating units - Electric Heat Pump (%)	0	0.885	12.1	36.6	40.9	41.1	41.1
Sales of water heating units - Electric Resistance (%)	14.1	27	35.5	53.8	57.2	57.4	57.4
Sales of water heating units - Gas Furnace (%)	84.6	70.7	51	8.14	0.479	0	0
Sales of water heating units - Other (%)	1.29	1.44	1.45	1.46	1.47	1.47	1.48
Sales of cooking units - Electric Resistance (%)	45.7	57.3	92.7	99.6	100	100	100
Sales of cooking units - Gas (%)	54.3	42.7	7.31	0.368	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		0.766	0.814				

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 (%)	1.5	8.17	31.2	81.3	90.2	90.8	90.8
Sales of space heating units - Electric Resistance (%)	1.52	3.43	4.91	8.08	8.65	8.7	8.7
Sales of space heating units - Gas Furnace (%)	96.2	88.2	63.9	10.6	1.1	0.5	0.497
Sales of space heating units - Fossil (%)	0.745	0.218	0.042	0.002	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.014	1.08	14.4	43.7	48.9	49.2	49.2
Sales of water heating units - Electric Resistance (%)	0.703	2.51	15.8	44.8	50.1	50.4	50.4
Sales of water heating units - Gas Furnace (%)	99.1	96	69.4	11.1	0.657	0	0
Sales of water heating units - Other (%)	0.168	0.382	0.381	0.382	0.381	0.382	0.382
Sales of cooking units - Electric Resistance (%)	41.9	54.6	83	88.6	88.9	88.9	88.9
Sales of cooking units - Gas (%)	58.1	45.4	17	11.4	11.1	11.1	11.1
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		2,913	3,241				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,811	1,811	0	0	0	0	0
Installed thermal - Natural gas (MW)	411	411	418	426	491	401	298
Installed thermal - Nuclear (MW)	0	0	0.001	0.004	0	0	0
Installed renewables - Rooftop PV (MW)	238	367	491	639	816	1,022	1,266
Installed renewables - Wind - Base land use assumptions (MW)	1,441	1,441	6,018	18,405	42,142	61,045	62,633
Installed renewables - Wind - Constrained land use assumptions (MW)	1,441	1,441	11,208	25,011	44,085	60,076	61,441
Capital invested - Wind - Base (billion \$2018)		0	6.09	15.4	28.1	21.2	1.68
Capital invested - Wind - Constrained (billion \$2018)		0	14.1	16.9	22.7	17.6	1.66
Capital invested - Biomass power plant (billion \$2018)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Base land use assumptions (GWh)	5,019	5,019	21,196	63,764	144,835	208,681	213,989
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Constrained land use assumptions (GWh)	5,019	5,019	38,178	84,129	142,676	189,294	193,309
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	1	7	11
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment - Cumulative 5-yr (million \$2018)		0	0	0	651	2,428	1,352
Biomass purchases (million \$2018/y)		0	0	0	51.6	244	351

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0.02	0.86	3.99	5.78
Annual - BECCS (MMT)		0	0	0	0.84	3.96	5.7
Annual - NGCC (MMT)		0	0	0.02	0.03	0.03	0.09
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0.02	0.88	4.87	10.7
Cumulative - BECCS (MMT)		0	0	0	0.84	4.8	10.5
Cumulative - NGCC (MMT)		0	0	0.02	0.05	0.08	0.17
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	631	631	631	631	631
Spur (km)		0	171	348	345	949	1,476

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	803	979	976	1,581	2,108
Cumulative investment - Trunk (million \$2018)		0	911	911	911	911	911
Cumulative investment - Spur (million \$2018)		0	89.1	185	191	529	807
Cumulative investment - All (million \$2018)		0	1,000	1,096	1,101	1,440	1,718

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	1.1	3.52	6.32	9.47	13.1
Injection wells (wells)		0	2	8	14	23	28
Resource characterization, appraisal, permitting costs (million \$2020)		70.3	211	281	281	281	281
Wells and facilities construction costs (million \$2020)		0	58.5	228	406	680	844

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)							-2,162
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-158
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,818
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-62.7
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-630
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-740
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-9,080
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-739
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-2,545
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-18,935
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-3,239
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-554
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,077
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-92
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-1,260
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,427
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-13,620
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-5,249
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-5,047

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-35,565
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-4,315
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-950
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,336
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-123
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-1,890
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,115
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-18,160
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-9,758
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-52,197
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-7,549
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							353
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							121
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,433
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							22.7
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)							106
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							600
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							48.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,514
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							4,198
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							529
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							125
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,587
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							34.2

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 - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							153
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							900
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							347
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							3,049
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							7,726
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							706
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							129
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,741
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							45.4
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)							201
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							1,201
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							277
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							2,502
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,802

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 tCO ₂ e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO ₂ e/y)							-2,050
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-190
Carbon sink potential - Moderate deployment - Total (1000 tCO ₂ e/y)							-2,239

Table 16: *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)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-3,913
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-379
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-4,292
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							3,176
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							293
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							3,469
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							6,058
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							586
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							6,645

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)		3.29	0.003	0.003	0.002	0.001	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		0.956	0.458	0.286	0.18	0.101	0.06
Premature deaths from air pollution - Mobile - On-Road (deaths)		3.58	3.52	3.34	2.93	2.27	1.51
Premature deaths from air pollution - Gas Stations (deaths)		0.317	0.311	0.291	0.254	0.198	0.134
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		0.711	0.647	0.578	0.491	0.385	0.276
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.041	0.04	0.036	0.029	0.024	0.018
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		0.167	0.166	0.164	0.154	0.131	0.104
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.058	0.054	0.051	0.047	0.043	0.04
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		0.432	0.417	0.391	0.343	0.277	0.207

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.12	0.101	0.085	0.071	0.059	0.048
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.056	0.049	0.043	0.037	0.031	0.026
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.494	0.056	0.053	0.048	0.036	0.019
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		8.08	7.32	6.4	5.62	4.95	3.36
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		29.2	0.026	0.026	0.021	0.013	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		8.47	4.06	2.54	1.59	0.897	0.529
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		31.8	31.3	29.7	26.1	20.2	13.5
Monetary damages from air pollution - Gas Stations (million \$2019)		2.81	2.75	2.58	2.25	1.75	1.18
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		6.3	5.73	5.12	4.35	3.41	2.45
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		0.361	0.358	0.318	0.259	0.209	0.163
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		1.48	1.47	1.45	1.37	1.16	0.917
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		0.513	0.482	0.449	0.417	0.385	0.352
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		3.82	3.69	3.46	3.04	2.45	1.83
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		1.06	0.892	0.753	0.63	0.521	0.425
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		0.499	0.438	0.381	0.327	0.277	0.23
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		4.36	0.494	0.466	0.421	0.319	0.17
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		71.7	65	56.8	49.9	43.9	29.9

Table 18: E- scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		1.06	1.36	0.519	139	383	294
By economic sector - Construction (jobs)		2,280	4,188	5,057	8,370	10,406	7,624
By economic sector - Manufacturing (jobs)		1,482	2,118	2,320	3,013	3,593	2,674
By economic sector - Mining (jobs)		1,506	1,014	874	717	656	506
By economic sector - Other (jobs)		209	315	458	743	946	1,009
By economic sector - Pipeline (jobs)		184	394	223	213	265	266
By economic sector - Professional (jobs)		1,257	1,904	2,699	4,515	6,036	5,440

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Trade (jobs)		1,423	1,466	1,829	2,697	3,401	3,128
By economic sector - Utilities (jobs)		1,321	3,627	4,683	9,523	11,952	6,320
By resource sector - Biomass (jobs)		4.03	3.66	1.72	583	1,630	1,213
By resource sector - CO2 (jobs)		38	1,996	874	945	1,656	1,964
By resource sector - Coal (jobs)		1,028	181	41.9	33.6	22.5	10.3
By resource sector - Grid (jobs)		1,565	4,794	8,412	18,420	22,705	10,186
By resource sector - Natural Gas (jobs)		1,056	806	594	560	607	684
By resource sector - Nuclear (jobs)		0	0.004	0.007	0	0	0
By resource sector - Oil (jobs)		2,953	2,605	2,307	1,987	1,658	1,100
By resource sector - Solar (jobs)		1,371	1,363	1,581	1,730	2,010	3,282
By resource sector - Wind (jobs)		1,649	3,279	4,333	5,670	7,350	8,824
By education level - All sectors - High school diploma or less (jobs)		4,099	6,329	7,585	12,569	15,794	11,140
By education level - All sectors - Associates degree or some college (jobs)		2,900	4,772	5,771	9,624	12,077	8,698
By education level - All sectors - Bachelors degree (jobs)		2,100	3,084	3,733	6,009	7,564	5,701
By education level - All sectors - Masters or professional degree (jobs)		491	739	922	1,514	1,928	1,485
By education level - All sectors - Doctoral degree (jobs)		72.7	103	133	212	275	238
Related work experience - All sectors - None (jobs)		1,363	2,175	2,617	4,359	5,492	3,931
Related work experience - All sectors - Up to 1 year (jobs)		1,941	2,945	3,568	5,878	7,430	5,402
Related work experience - All sectors - 1 to 4 years (jobs)		3,533	5,428	6,559	10,805	13,571	9,831
Related work experience - All sectors - 4 to 10 years (jobs)		2,229	3,546	4,276	7,050	8,848	6,437
Related work experience - All sectors - Over 10 years (jobs)		595	933	1,125	1,837	2,298	1,661
On-the-Job Training - All sectors - None (jobs)		546	804	969	1,561	1,964	1,478
On-the-Job Training - All sectors - Up to 1 year (jobs)		6,498	9,816	11,863	19,473	24,525	17,810
On-the-Job Training - All sectors - 1 to 4 years (jobs)		1,940	3,218	3,879	6,475	8,110	5,790
On-the-Job Training - All sectors - 4 to 10 years (jobs)		585	1,043	1,263	2,154	2,708	1,934
On-the-Job Training - All sectors - Over 10 years (jobs)		93.2	146	170	266	330	251
On-Site or In-Plant Training - All sectors - None (jobs)		1,556	2,410	2,908	4,742	5,983	4,470
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		5,893	8,930	10,791	17,745	22,327	16,139
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		1,525	2,490	3,001	4,998	6,259	4,459
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		615	1,065	1,283	2,168	2,723	1,950
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		74.1	133	161	275	346	245
Wage income - All (million \$2019)		531	842	1,031	1,735	2,210	1,599

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	114	108	97.9	90.4	84.6	78	70.1
Final energy use - Residential (PJ)	52.9	50.4	48.8	47.5	46.1	44.2	41.9
Final energy use - Commercial (PJ)	39.7	39.8	39.5	39.3	39	38.5	38.2
Final energy use - Industry (PJ)	59.8	62	62.6	64.9	69.5	70.8	71.6

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)		0.533	0.545	0.763	0.799	1.2	1.28

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	3.64	48.1	92.5	298	504	959	1,415
Vehicle stocks - LDV – All others (1000 units)	1,850	1,850	1,850	1,754	1,659	1,279	898
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	56.9	121	407	1,283	1,868
Public EV charging plugs - DC Fast (1000 units)	0.064		0.231		1.26		3.54
Public EV charging plugs - L2 (1000 units)	0.076		5.57		30.4		85.3

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 (%)	6.38	13.4	14.6	18.9	28.9	41.1	47.9
Sales of space heating units - Electric Resistance (%)	7.67	12.8	12.6	12.2	11.2	9.66	8.73
Sales of space heating units - Gas (%)	73.2	54.8	53.7	51.3	45	36.6	31.3
Sales of space heating units - Fossil (%)	12.7	18.9	19	17.6	14.9	12.7	12
Sales of water heating units - Electric Heat Pump (%)	0	0.236	0.883	3.03	8.23	14.8	18.7
Sales of water heating units - Electric Resistance (%)	14.1	26.5	27.1	28.9	33	37.9	40.9
Sales of water heating units - Gas Furnace (%)	84.6	71.8	70.5	66.6	57.3	45.8	39
Sales of water heating units - Other (%)	1.29	1.45	1.46	1.47	1.48	1.48	1.48
Sales of cooking units - Electric Resistance (%)	45.5	46.9	51.9	65.1	83.3	94.6	98.6
Sales of cooking units - Gas (%)	54.5	53.1	48.1	34.9	16.7	5.38	1.45
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		0.764	0.811				

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 (%)	1.5	6.8	8.07	12.3	22.6	35.6	43.2
Sales of space heating units - Electric Resistance (%)	1.52	3.34	3.42	3.7	4.38	5.25	5.76
Sales of space heating units - Gas Furnace (%)	96.2	89.6	88.3	83.8	72.8	59	50.9
Sales of space heating units - Fossil (%)	0.745	0.256	0.248	0.218	0.176	0.148	0.138
Sales of water heating units - Electric Heat Pump (%)	0.014	0.311	1.08	3.65	9.87	17.8	22.4
Sales of water heating units - Electric Resistance (%)	0.703	1.74	2.51	5.07	11.2	19.1	23.7
Sales of water heating units - Gas Furnace (%)	99.1	97.6	96	90.9	78.5	62.8	53.5
Sales of water heating units - Other (%)	0.168	0.382	0.381	0.382	0.381	0.382	0.382
Sales of cooking units - Electric Resistance (%)	41.9	46.2	50.2	60.8	75.4	84.6	87.8
Sales of cooking units - Gas (%)	58.1	53.8	49.8	39.2	24.6	15.4	12.2
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		2,913	3,236				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,811	987	0	0	0	0	0
Installed thermal - Natural gas (MW)	411	411	414	452	997	1,781	2,573
Installed thermal - Nuclear (MW)	0	0	0.002	0.004	0	0	0

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)							-2,162
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-158
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,818
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-62.7
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-630
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-740
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-9,080
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-739
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-2,545
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-18,935
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-3,239
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-554
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,077
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-92
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-1,260
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,427
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-13,620
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-5,249
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-5,047
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-35,565
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-4,315
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-950
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,336
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-123
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-1,890

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,115
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-18,160
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-9,758
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-52,197
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-7,549
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							353
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							121
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,433
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							22.7
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)							106
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							600
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							48.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,514
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							4,198
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							529
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							125
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,587
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							34.2
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)							153
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							900
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							347

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 - Restore productivity (1000 hectares)							3,049
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							7,726
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							706
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							129
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,741
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							45.4
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)							201
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							1,201
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							277
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							2,502
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,802

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-2,050
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-190
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-2,239
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-3,913
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-379
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-4,292

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							3,176
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							293
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							3,469
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							6,058
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							586
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							6,645

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)		3.29	0.003	0.003	0.002	0.001	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		0.842	0.418	0.216	0.17	0.103	0.043
Premature deaths from air pollution - Mobile - On-Road (deaths)		3.53	3.22	2.38	1.33	0.581	0.21
Premature deaths from air pollution - Gas Stations (deaths)		0.312	0.28	0.207	0.12	0.057	0.027
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		0.706	0.593	0.409	0.227	0.107	0.042
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.04	0.035	0.023	0.012	0.006	0.002
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		0.166	0.154	0.121	0.08	0.043	0.019
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.058	0.054	0.051	0.047	0.043	0.04
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		0.429	0.373	0.271	0.166	0.09	0.043
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.12	0.094	0.072	0.053	0.037	0.023
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.056	0.046	0.037	0.028	0.02	0.013
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.604	0.055	0.048	0.04	0.035	0.002

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		7.98	7.46	6.44	4.58	2.83	0.456
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		29.2	0.026	0.026	0.021	0.013	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		7.46	3.7	1.91	1.51	0.909	0.379
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		31.4	28.6	21.2	11.8	5.17	1.86
Monetary damages from air pollution - Gas Stations (million \$2019)		2.76	2.48	1.83	1.06	0.508	0.236
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		6.26	5.26	3.62	2.01	0.951	0.37
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		0.354	0.309	0.207	0.108	0.05	0.022
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		1.47	1.36	1.07	0.708	0.38	0.17
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		0.513	0.482	0.449	0.417	0.385	0.352
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		3.8	3.3	2.4	1.47	0.793	0.382
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		1.06	0.831	0.639	0.472	0.329	0.208
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		0.499	0.408	0.325	0.247	0.177	0.113
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		5.33	0.484	0.424	0.351	0.306	0.019
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		70.9	66.3	57.2	40.7	25.1	4.05

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		0.877	1.82	0.673	70.6	232	295
By economic sector - Construction (jobs)		2,341	3,658	9,675	13,606	14,841	19,478
By economic sector - Manufacturing (jobs)		1,674	2,259	3,986	4,797	4,737	6,997
By economic sector - Mining (jobs)		1,523	913	634	377	190	21.1
By economic sector - Other (jobs)		214	332	815	1,165	1,355	1,972
By economic sector - Pipeline (jobs)		181	163	133	93.8	57.2	13.3
By economic sector - Professional (jobs)		1,299	2,004	4,953	7,037	8,284	11,233
By economic sector - Trade (jobs)		1,475	1,495	2,921	3,933	4,535	6,205
By economic sector - Utilities (jobs)		1,393	3,023	11,818	17,357	18,409	23,603
By resource sector - Biomass (jobs)		3.41	5.13	1.81	230	862	1,299
By resource sector - CO2 (jobs)		0	0.001	0	0.001	0.001	0.001
By resource sector - Coal (jobs)		1,144	208	79.5	67.3	59.3	14.5
By resource sector - Grid (jobs)		1,727	5,340	23,707	35,197	37,160	47,860
By resource sector - Natural Gas (jobs)		1,021	833	739	645	600	479
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		2,936	2,498	1,997	1,333	764	97.6

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

Item	2020	2025	2030	2035	2040	2045	2050
By resource sector - Solar (jobs)		1,477	1,500	1,766	2,046	2,255	4,000
By resource sector - Wind (jobs)		1,793	3,465	6,646	8,919	10,939	16,067
By education level - All sectors - High school diploma or less (jobs)		4,302	5,798	14,684	20,361	22,034	29,158
By education level - All sectors - Associates degree or some college (jobs)		3,038	4,339	11,326	15,790	17,124	22,730
By education level - All sectors - Bachelors degree (jobs)		2,180	2,906	6,955	9,550	10,439	13,875
By education level - All sectors - Masters or professional degree (jobs)		507	704	1,737	2,413	2,672	3,557
By education level - All sectors - Doctoral degree (jobs)		74.5	102	234	323	370	497
Related work experience - All sectors - None (jobs)		1,423	1,982	5,084	7,071	7,679	10,166
Related work experience - All sectors - Up to 1 year (jobs)		2,040	2,747	6,839	9,471	10,320	13,741
Related work experience - All sectors - 1 to 4 years (jobs)		3,690	5,009	12,608	17,471	18,984	25,148
Related work experience - All sectors - 4 to 10 years (jobs)		2,325	3,245	8,246	11,442	12,432	16,474
Related work experience - All sectors - Over 10 years (jobs)		623	865	2,160	2,982	3,226	4,289
On-the-Job Training - All sectors - None (jobs)		568	752	1,803	2,478	2,707	3,604
On-the-Job Training - All sectors - Up to 1 year (jobs)		6,804	9,147	22,693	31,361	34,101	45,294
On-the-Job Training - All sectors - 1 to 4 years (jobs)		2,026	2,903	7,613	10,622	11,506	15,221
On-the-Job Training - All sectors - 4 to 10 years (jobs)		606	914	2,517	3,554	3,869	5,088
On-the-Job Training - All sectors - Over 10 years (jobs)		97.6	134	311	422	456	610
On-Site or In-Plant Training - All sectors - None (jobs)		1,624	2,237	5,508	7,612	8,313	11,073
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		6,170	8,301	20,702	28,632	31,105	41,285
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		1,594	2,256	5,874	8,184	8,861	11,724
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		636	937	2,528	3,554	3,866	5,082
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		77.4	118	324	456	495	654
Wage income - All (million \$2019)		553	771	1,998	2,813	3,095	4,140

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	114	107	94.2	79	65.2	56.7	53
Final energy use - Residential (PJ)	52.9	50.4	48	42.8	36.5	31.6	28.2
Final energy use - Commercial (PJ)	39.7	39.7	38.9	36.8	34.2	32.3	31.5
Final energy use - Industry (PJ)	59.8	61.8	62	63.1	66.8	68.2	69.6

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)		0.684	0.713	1.5	1.62	1.36	1.44

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	4.71	156	307	835	1,364	1,787	2,209
Vehicle stocks - LDV – All others (1000 units)	1,842	1,754	1,666	1,214	762	431	100
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		355	907	1,474	2,231	2,430	2,316
Public EV charging plugs - DC Fast (1000 units)	0.064		0.767		3.41		5.52
Public EV charging plugs - L2 (1000 units)	0.076		18.5		82.2		133

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 (%)	6.38	15	36.8	80.8	89	89.6	89.4
Sales of space heating units - Electric Resistance (%)	7.67	12.7	10	4.36	3.39	3.35	3.38
Sales of space heating units - Gas (%)	73.2	53.7	38.1	7.52	2.07	1.74	1.73
Sales of space heating units - Fossil (%)	12.7	18.7	15.1	7.32	5.58	5.36	5.5
Sales of water heating units - Electric Heat Pump (%)	0	0.885	12.1	36.6	40.9	41.1	41.1
Sales of water heating units - Electric Resistance (%)	14.1	27	35.5	53.8	57.2	57.4	57.4
Sales of water heating units - Gas Furnace (%)	84.6	70.7	51	8.14	0.479	0	0
Sales of water heating units - Other (%)	1.29	1.44	1.45	1.46	1.47	1.47	1.48
Sales of cooking units - Electric Resistance (%)	45.7	57.3	92.7	99.6	100	100	100
Sales of cooking units - Gas (%)	54.3	42.7	7.31	0.368	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		0.766	0.814				

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 (%)	1.5	8.17	31.2	81.3	90.2	90.8	90.8
Sales of space heating units - Electric Resistance (%)	1.52	3.43	4.91	8.08	8.65	8.7	8.7
Sales of space heating units - Gas Furnace (%)	96.2	88.2	63.9	10.6	1.1	0.5	0.497
Sales of space heating units - Fossil (%)	0.745	0.218	0.042	0.002	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.014	1.08	14.4	43.7	48.9	49.2	49.2
Sales of water heating units - Electric Resistance (%)	0.703	2.51	15.8	44.8	50.1	50.4	50.4
Sales of water heating units - Gas Furnace (%)	99.1	96	69.4	11.1	0.657	0	0
Sales of water heating units - Other (%)	0.168	0.382	0.381	0.382	0.381	0.382	0.382
Sales of cooking units - Electric Resistance (%)	41.9	54.6	83	88.6	88.9	88.9	88.9
Sales of cooking units - Gas (%)	58.1	45.4	17	11.4	11.1	11.1	11.1
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		2,913	3,241				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,811	987	117	117	117	117	0
Installed thermal - Natural gas (MW)	411	411	440	1,335	2,218	2,993	2,799
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0

Table 34: E+RE+ scenario - PILLAR 2: Clean Electricity - Generating capacity (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Installed renewables - Rooftop PV (MW)	238	367	491	639	816	1,022	1,266
Installed renewables - Wind - Base land use assumptions (MW)	1,441	1,441	6,674	37,727	82,379	123,393	176,023
Installed renewables - Solar - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Wind - Constrained land use assumptions (MW)	1,557	1,557	12,386	40,922	81,492	108,332	169,391
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Wind - Base (billion \$2018)		0	6.97	38.5	52.8	46	55.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Base land use assumptions (GWh)	5,019	5,019	23,442	129,875	279,627	412,833	575,095
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Constrained land use assumptions (GWh)	10,038	10,038	83,567	265,683	500,981	644,227	955,367
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-2,162
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-158
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,818
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-62.7
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-630
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-740
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-9,080
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-739
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-2,545
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-18,935
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-3,239
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-554
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,077
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-92
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-1,260

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO ₂ e/y)							-1,427
Carbon sink potential - Mid - Reforest cropland (1000 tCO ₂ e/y)							-13,620
Carbon sink potential - Mid - Reforest pasture (1000 tCO ₂ e/y)							-5,249
Carbon sink potential - Mid - Restore productivity (1000 tCO ₂ e/y)							-5,047
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO ₂ e/y)							-35,565
Carbon sink potential - High - Accelerate regeneration (1000 tCO ₂ e/y)							-4,315
Carbon sink potential - High - Avoid deforestation (1000 tCO ₂ e/y)							-950
Carbon sink potential - High - Extend rotation length (1000 tCO ₂ e/y)							-7,336
Carbon sink potential - High - Improve plantations (1000 tCO ₂ e/y)							-123
Carbon sink potential - High - Increase retention of HWP (1000 tCO ₂ e/y)							-1,890
Carbon sink potential - High - Increase trees outside forests (1000 tCO ₂ e/y)							-2,115
Carbon sink potential - High - Reforest cropland (1000 tCO ₂ e/y)							-18,160
Carbon sink potential - High - Reforest pasture (1000 tCO ₂ e/y)							-9,758
Carbon sink potential - High - All (not counting overlap) (1000 tCO ₂ e/y)							-52,197
Carbon sink potential - High - Restore productivity (1000 tCO ₂ e/y)							-7,549
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							353
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							121
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,433
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							22.7
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)							106
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							600
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							48.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,514
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							4,198
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							529

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 - Mid - Avoid deforestation (over 30 years) (1000 hectares)							125
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,587
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							34.2
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)							153
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							900
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							347
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							3,049
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							7,726
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							706
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							129
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,741
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							45.4
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)							201
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							1,201
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							277
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							2,502
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,802

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

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

Table 37: *E+RE+ 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)							-2,050
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-190
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-2,239
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-3,913
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-379
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-4,292
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							3,176
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							293
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							3,469
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							6,058
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							586
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							6,645

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)		3.29	0.003	0.003	0.002	0.001	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		0.922	0.508	0.494	0.562	0.289	0.077
Premature deaths from air pollution - Mobile - On-Road (deaths)		3.53	3.22	2.38	1.33	0.581	0.21
Premature deaths from air pollution - Gas Stations (deaths)		0.312	0.28	0.207	0.12	0.057	0.027
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		0.706	0.593	0.409	0.227	0.107	0.042
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.04	0.035	0.023	0.012	0.006	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 - Residential - Other (deaths)		0.166	0.154	0.121	0.08	0.043	0.019
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.058	0.054	0.051	0.047	0.043	0.04
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		0.429	0.373	0.271	0.166	0.09	0.043
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.12	0.094	0.072	0.053	0.037	0.023
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.056	0.046	0.037	0.028	0.02	0.013
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.447	0.054	0.048	0.04	0.035	0.002
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		8.17	7.81	7.49	6.14	5.01	3.62
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		29.2	0.026	0.026	0.021	0.013	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		8.17	4.5	4.38	4.98	2.56	0.684
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		31.4	28.6	21.2	11.8	5.17	1.86
Monetary damages from air pollution - Gas Stations (million \$2019)		2.76	2.48	1.83	1.06	0.508	0.236
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		6.26	5.26	3.62	2.01	0.951	0.37
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		0.354	0.309	0.207	0.108	0.05	0.022
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		1.47	1.36	1.07	0.708	0.38	0.17
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		0.513	0.482	0.449	0.417	0.385	0.352
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		3.8	3.3	2.4	1.47	0.793	0.382
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		1.06	0.831	0.639	0.472	0.329	0.208
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		0.499	0.408	0.325	0.247	0.177	0.113
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		3.95	0.477	0.426	0.354	0.313	0.018
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		72.6	69.3	66.6	54.5	44.4	32.2

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		0,997	1,43	0,478	111	307	293
By economic sector - Construction (jobs)		2,343	3,467	3,128	5,511	5,887	4,278
By economic sector - Manufacturing (jobs)		1,613	1,590	1,776	2,208	1,945	1,533
By economic sector - Mining (jobs)		1,531	1,043	900	673	611	504
By economic sector - Other (jobs)		212	248	296	507	558	630
By economic sector - Pipeline (jobs)		186	429	239	215	267	283
By economic sector - Professional (jobs)		1,287	1,439	1,547	2,822	3,237	2,688
By economic sector - Trade (jobs)		1,461	1,228	1,225	1,763	1,874	1,599
By economic sector - Utilities (jobs)		1,568	2,907	2,476	6,200	6,583	3,364
By resource sector - Biomass (jobs)		3.49	3.66	1.64	416	1,202	1,218
By resource sector - CO2 (jobs)		38.4	2,269	1,001	1,056	1,855	2,212
By resource sector - Coal (jobs)		1,192	317	79.7	67.5	59.8	14.5
By resource sector - Grid (jobs)		1,972	2,938	3,733	11,187	11,520	4,378
By resource sector - Natural Gas (jobs)		1,093	938	862	1,061	824	761
By resource sector - Nuclear (jobs)		0	0.005	0.014	0	0	0
By resource sector - Oil (jobs)		2,935	2,511	2,051	1,458	1,074	764
By resource sector - Solar (jobs)		1,522	1,319	1,451	1,583	1,627	3,049
By resource sector - Wind (jobs)		1,446	2,056	2,407	3,181	3,108	2,776
By education level - All sectors - High school diploma or less (jobs)		4,332	5,213	4,872	8,437	8,988	6,341
By education level - All sectors - Associates degree or some college (jobs)		3,078	3,914	3,643	6,430	6,800	4,807
By education level - All sectors - Bachelors degree (jobs)		2,204	2,539	2,409	4,007	4,252	3,105
By education level - All sectors - Masters or professional degree (jobs)		514	602	580	998	1,076	794
By education level - All sectors - Doctoral degree (jobs)		74.6	83.3	83.3	138	153	125
Related work experience - All sectors - None (jobs)		1,442	1,795	1,669	2,921	3,119	2,216
Related work experience - All sectors - Up to 1 year (jobs)		2,046	2,404	2,285	3,929	4,207	3,046
Related work experience - All sectors - 1 to 4 years (jobs)		3,730	4,469	4,192	7,222	7,666	5,452
Related work experience - All sectors - 4 to 10 years (jobs)		2,355	2,920	2,719	4,707	4,986	3,544
Related work experience - All sectors - Over 10 years (jobs)		630	764	722	1,230	1,292	914
On-the-Job Training - All sectors - None (jobs)		572	663	628	1,044	1,112	826
On-the-Job Training - All sectors - Up to 1 year (jobs)		6,859	8,051	7,621	13,029	13,864	9,931
On-the-Job Training - All sectors - 1 to 4 years (jobs)		2,056	2,651	2,447	4,325	4,575	3,203
On-the-Job Training - All sectors - 4 to 10 years (jobs)		619	866	779	1,431	1,531	1,070
On-the-Job Training - All sectors - Over 10 years (jobs)		97.6	121	113	180	188	142
On-Site or In-Plant Training - All sectors - None (jobs)		1,637	1,977	1,865	3,171	3,381	2,481
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		6,222	7,329	6,924	11,872	12,619	9,000
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		1,615	2,050	1,899	3,341	3,533	2,474
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		649	886	800	1,443	1,543	1,081
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		79	109	99.8	183	195	135
Wage income - All (million \$2019)		562	696	657	1,160	1,251	888

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	114	107	94.2	79	65.2	56.7	53
Final energy use - Residential (PJ)	52.9	50.4	48	42.8	36.5	31.6	28.2
Final energy use - Commercial (PJ)	39.7	39.7	38.9	36.8	34.2	32.3	31.5
Final energy use - Industry (PJ)	59.8	61.8	62	63.1	66.8	68.2	69.6

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)		0.684	0.713	1.5	1.62	1.36	1.44

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	4.71	156	307	835	1,364	1,787	2,209
Vehicle stocks - LDV – All others (1000 units)	1,842	1,754	1,666	1,214	762	431	100
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		355	907	1,474	2,231	2,430	2,316
Public EV charging plugs - DC Fast (1000 units)	0.064		0.767		3.41		5.52
Public EV charging plugs - L2 (1000 units)	0.076		18.5		82.2		133

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 (%)	6.38	15	36.8	80.8	89	89.6	89.4
Sales of space heating units - Electric Resistance (%)	7.67	12.7	10	4.36	3.39	3.35	3.38
Sales of space heating units - Gas (%)	73.2	53.7	38.1	7.52	2.07	1.74	1.73
Sales of space heating units - Fossil (%)	12.7	18.7	15.1	7.32	5.58	5.36	5.5
Sales of water heating units - Electric Heat Pump (%)	0	0.885	12.1	36.6	40.9	41.1	41.1
Sales of water heating units - Electric Resistance (%)	14.1	27	35.5	53.8	57.2	57.4	57.4
Sales of water heating units - Gas Furnace (%)	84.6	70.7	51	8.14	0.479	0	0
Sales of water heating units - Other (%)	1.29	1.44	1.45	1.46	1.47	1.47	1.48
Sales of cooking units - Electric Resistance (%)	45.7	57.3	92.7	99.6	100	100	100
Sales of cooking units - Gas (%)	54.3	42.7	7.31	0.368	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		0.766	0.814				

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 (%)	1.5	8.17	31.2	81.3	90.2	90.8	90.8
Sales of space heating units - Electric Resistance (%)	1.52	3.43	4.91	8.08	8.65	8.7	8.7
Sales of space heating units - Gas Furnace (%)	96.2	88.2	63.9	10.6	1.1	0.5	0.497
Sales of space heating units - Fossil (%)	0.745	0.218	0.042	0.002	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.014	1.08	14.4	43.7	48.9	49.2	49.2
Sales of water heating units - Electric Resistance (%)	0.703	2.51	15.8	44.8	50.1	50.4	50.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	99.1	96	69.4	11.1	0.657	0	0
Sales of water heating units - Other (%)	0.168	0.382	0.381	0.382	0.381	0.382	0.382
Sales of cooking units - Electric Resistance (%)	41.9	54.6	83	88.6	88.9	88.9	88.9
Sales of cooking units - Gas (%)	58.1	45.4	17	11.4	11.1	11.1	11.1
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		2,913	3,241				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,811	1,811	117	117	117	117	0
Installed thermal - Natural gas (MW)	411	411	411	426	2,130	2,045	1,992
Installed thermal - Nuclear (MW)	0	0	0.002	0.007	0	0	0
Installed renewables - Rooftop PV (MW)	238	367	491	639	816	1,022	1,266
Installed renewables - Wind - Base land use assumptions (MW)	1,441	1,441	3,931	6,085	19,629	31,569	31,569
Installed renewables - Solar - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Wind - Constrained land use assumptions (MW)	1,441	1,441	4,914	11,449	26,034	35,995	35,995
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Wind - Base (billion \$2018)		0	3.32	2.67	16	13.4	0
Capital invested - Wind - Constrained (billion \$2018)		0	4.62	8.11	17.2	11.2	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Base land use assumptions (GWh)	5,019	5,019	13,948	21,445	67,977	109,001	109,001
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Constrained land use assumptions (GWh)	5,019	5,019	16,784	39,009	87,483	118,400	118,400
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)							-2,162
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-158
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,818
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-62.7
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-630
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-740
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-9,080

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-739
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-2,545
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-18,935
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-3,239
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-554
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,077
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-92
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-1,260
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,427
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-13,620
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-5,249
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-5,047
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-35,565
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-4,315
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-950
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,336
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-123
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-1,890
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,115
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-18,160
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-9,758
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-52,197
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-7,549
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							353
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							121
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,433
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							22.7
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0

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 - Low - Increase trees outside forests (1000 hectares)							106
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							600
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							48.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,514
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							4,198
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							529
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							125
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,587
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							34.2
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)							153
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							900
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							347
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							3,049
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							7,726
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							706
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							129
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,741
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							45.4
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)							201
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							1,201

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 - Reforest pasture (1000 hectares)							277
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							2,502
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,802

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)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-2,050
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-190
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-2,239
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-3,913
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-379
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-4,292
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							3,176
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							293
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							3,469
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							6,058
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							586
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							6,645

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)		3.29	0.003	0.003	0.002	0.001	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		0.904	0.437	0.307	0.247	0.156	0.065
Premature deaths from air pollution - Mobile - On-Road (deaths)		3.58	3.52	3.34	2.93	2.27	1.51
Premature deaths from air pollution - Gas Stations (deaths)		0.317	0.311	0.291	0.254	0.198	0.134
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		0.711	0.647	0.578	0.491	0.385	0.276
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.041	0.04	0.036	0.029	0.024	0.018
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		0.167	0.166	0.164	0.154	0.131	0.104
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.058	0.054	0.051	0.047	0.043	0.04
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		0.432	0.417	0.391	0.343	0.277	0.207
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.12	0.101	0.085	0.071	0.059	0.048
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.056	0.049	0.043	0.037	0.031	0.026
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.521	0.056	0.053	0.048	0.043	0.037
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		8.08	7.32	6.4	5.62	4.95	3.36
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		29.2	0.026	0.026	0.021	0.013	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		8.01	3.87	2.72	2.19	1.38	0.578
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		31.8	31.3	29.7	26.1	20.2	13.5
Monetary damages from air pollution - Gas Stations (million \$2019)		2.81	2.75	2.58	2.25	1.75	1.18
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		6.3	5.73	5.12	4.35	3.41	2.45
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		0.361	0.358	0.318	0.259	0.209	0.163
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		1.48	1.47	1.45	1.37	1.16	0.917
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		0.513	0.482	0.449	0.417	0.385	0.352
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		3.82	3.69	3.46	3.04	2.45	1.83

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		1.06	0.892	0.753	0.63	0.521	0.425
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		0.499	0.438	0.381	0.327	0.277	0.23
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		4.6	0.492	0.466	0.425	0.377	0.328
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		71.7	65	56.8	49.9	43.9	29.9

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		0.972	1.36	0.509	283	336	367
By economic sector - Construction (jobs)		2,292	4,253	4,738	6,116	7,373	6,059
By economic sector - Manufacturing (jobs)		1,495	2,144	2,107	2,222	2,542	2,306
By economic sector - Mining (jobs)		1,516	1,011	879	746	677	485
By economic sector - Other (jobs)		210	319	434	572	704	840
By economic sector - Pipeline (jobs)		183	400	226	217	269	267
By economic sector - Professional (jobs)		1,269	1,935	2,534	3,635	4,451	4,420
By economic sector - Trade (jobs)		1,438	1,480	1,746	2,187	2,566	2,519
By economic sector - Utilities (jobs)		1,326	3,686	4,234	6,266	7,805	4,706
By resource sector - Biomass (jobs)		3.86	3.66	1.72	1,186	1,555	1,731
By resource sector - CO2 (jobs)		37.9	2,041	893	992	1,717	1,976
By resource sector - Coal (jobs)		1,056	181	41.9	34	26.9	21
By resource sector - Grid (jobs)		1,579	4,861	7,467	11,725	14,355	7,341
By resource sector - Natural Gas (jobs)		1,043	802	602	472	379	350
By resource sector - Nuclear (jobs)		0	0.004	0.007	0	0	0
By resource sector - Oil (jobs)		2,953	2,605	2,307	2,021	1,666	1,060
By resource sector - Solar (jobs)		1,368	1,359	1,521	1,594	1,793	3,262
By resource sector - Wind (jobs)		1,689	3,375	4,065	4,219	5,231	6,229
By education level - All sectors - High school diploma or less (jobs)		4,129	6,413	7,058	9,350	11,204	9,045
By education level - All sectors - Associates degree or some college (jobs)		2,920	4,839	5,363	7,028	8,497	6,933
By education level - All sectors - Bachelors degree (jobs)		2,113	3,123	3,489	4,544	5,432	4,601
By education level - All sectors - Masters or professional degree (jobs)		494	749	862	1,151	1,385	1,196
By education level - All sectors - Doctoral degree (jobs)		73.1	105	125	169	204	194
Related work experience - All sectors - None (jobs)		1,372	2,204	2,436	3,236	3,895	3,175
Related work experience - All sectors - Up to 1 year (jobs)		1,956	2,985	3,322	4,417	5,300	4,411
Related work experience - All sectors - 1 to 4 years (jobs)		3,558	5,500	6,111	8,030	9,635	7,904
Related work experience - All sectors - 4 to 10 years (jobs)		2,244	3,594	3,983	5,206	6,267	5,148
Related work experience - All sectors - Over 10 years (jobs)		599	945	1,046	1,354	1,626	1,331
On-the-Job Training - All sectors - None (jobs)		549	814	906	1,182	1,414	1,203
On-the-Job Training - All sectors - Up to 1 year (jobs)		6,545	9,945	11,051	14,581	17,472	14,435

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

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - All sectors - 1 to 4 years (jobs)		1,953	3,263	3,607	4,720	5,702	4,602
On-the-Job Training - All sectors - 4 to 10 years (jobs)		589	1,059	1,176	1,561	1,899	1,526
On-the-Job Training - All sectors - Over 10 years (jobs)		93.8	148	159	198	237	203
On-Site or In-Plant Training - All sectors - None (jobs)		1,566	2,443	2,712	3,558	4,272	3,613
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		5,935	9,047	10,050	13,252	15,886	13,063
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		1,535	2,524	2,790	3,654	4,406	3,554
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		618	1,081	1,196	1,580	1,917	1,544
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		74.6	134	150	199	242	194
Wage income - All (million \$2019)		535	853	960	1,286	1,566	1,283

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	114	108	97.9	90.4	84.6	78	70.1
Final energy use - Residential (PJ)	52.9	50.4	48.8	47.5	46.1	44.2	41.9
Final energy use - Commercial (PJ)	39.7	39.8	39.5	39.3	39	38.5	38.2
Final energy use - Industry (PJ)	59.8	62	62.6	64.9	69.5	70.8	71.6

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)		0.533	0.545	0.763	0.799	1.2	1.28

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	3.64	48.1	92.5	298	504	959	1,415
Vehicle stocks - LDV – All others (1000 units)	1,850	1,850	1,850	1,754	1,659	1,279	898
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	56.9	121	407	1,283	1,868
Public EV charging plugs - DC Fast (1000 units)	0.064		0.231		1.26		3.54
Public EV charging plugs - L2 (1000 units)	0.076		5.57		30.4		85.3

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 (%)	6.38	13.4	14.6	18.9	28.9	41.1	47.9
Sales of space heating units - Electric Resistance (%)	7.67	12.8	12.6	12.2	11.2	9.66	8.73
Sales of space heating units - Gas (%)	73.2	54.8	53.7	51.3	45	36.6	31.3
Sales of space heating units - Fossil (%)	12.7	18.9	19	17.6	14.9	12.7	12
Sales of water heating units - Electric Heat Pump (%)	0	0.236	0.883	3.03	8.23	14.8	18.7
Sales of water heating units - Electric Resistance (%)	14.1	26.5	27.1	28.9	33	37.9	40.9
Sales of water heating units - Gas Furnace (%)	84.6	71.8	70.5	66.6	57.3	45.8	39
Sales of water heating units - Other (%)	1.29	1.45	1.46	1.47	1.48	1.48	1.48

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of cooking units - Electric Resistance (%)	45.5	46.9	51.9	65.1	83.3	94.6	98.6
Sales of cooking units - Gas (%)	54.5	53.1	48.1	34.9	16.7	5.38	1.45
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		0.764	0.811				

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 (%)	1.5	6.8	8.07	12.3	22.6	35.6	43.2
Sales of space heating units - Electric Resistance (%)	1.52	3.34	3.42	3.7	4.38	5.25	5.76
Sales of space heating units - Gas Furnace (%)	96.2	89.6	88.3	83.8	72.8	59	50.9
Sales of space heating units - Fossil (%)	0.745	0.256	0.248	0.218	0.176	0.148	0.138
Sales of water heating units - Electric Heat Pump (%)	0.014	0.311	1.08	3.65	9.87	17.8	22.4
Sales of water heating units - Electric Resistance (%)	0.703	1.74	2.51	5.07	11.2	19.1	23.7
Sales of water heating units - Gas Furnace (%)	99.1	97.6	96	90.9	78.5	62.8	53.5
Sales of water heating units - Other (%)	0.168	0.382	0.381	0.382	0.381	0.382	0.382
Sales of cooking units - Electric Resistance (%)	41.9	46.2	50.2	60.8	75.4	84.6	87.8
Sales of cooking units - Gas (%)	58.1	53.8	49.8	39.2	24.6	15.4	12.2
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		2,913	3,236				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,811	987	0	0	0	0	0
Installed thermal - Natural gas (MW)	411	411	413	426	436	354	244
Installed thermal - Nuclear (MW)	0	0	0.001	0.004	0	0	0
Capital invested - Biomass power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0.007	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	0	0.029	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	0	32.3	32.3
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	7.37	7.39

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	0	1	1
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	1	2
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	4	6	8
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
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	1	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	3,205	1,391	1,046
Biomass purchases (million \$2018/y)		0	0	0	276	394	484

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0.02	4.15	5.92	7.33
Annual - BECCS (MMT)		0	0	0	4.12	5.89	7.23
Annual - NGCC (MMT)		0	0	0.02	0.03	0.03	0.09
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0.02	4.17	10.1	17.4
Cumulative - BECCS (MMT)		0	0	0	4.12	10	17.2
Cumulative - NGCC (MMT)		0	0	0.02	0.05	0.08	0.17
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	631	631	631	631	631
Spur (km)		0	171	348	487	781	1,601
All (km)		0	803	979	1,119	1,413	2,232
Cumulative investment - Trunk (million \$2018)		0	911	911	911	911	911
Cumulative investment - Spur (million \$2018)		0	89.2	191	294	471	929
Cumulative investment - All (million \$2018)		0	1,000	1,101	1,204	1,382	1,840

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	2.77	10.7	21.4	28.6	30.9
Injection wells (wells)		0	5	20	35	59	73
Resource characterization, appraisal, permitting costs (million \$2020)		70.3	323	506	506	506	506
Wells and facilities construction costs (million \$2020)		0	152	593	1,057	1,767	2,194

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)							-2,162
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-158
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,818
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-62.7
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-630
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-740

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Reforest cropland (1000 tCO ₂ e/y)							-9,080
Carbon sink potential - Low - Reforest pasture (1000 tCO ₂ e/y)							-739
Carbon sink potential - Low - Restore productivity (1000 tCO ₂ e/y)							-2,545
Carbon sink potential - Low - All (not counting overlap) (1000 tCO ₂ e/y)							-18,935
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO ₂ e/y)							-3,239
Carbon sink potential - Mid - Avoid deforestation (1000 tCO ₂ e/y)							-554
Carbon sink potential - Mid - Extend rotation length (1000 tCO ₂ e/y)							-5,077
Carbon sink potential - Mid - Improve plantations (1000 tCO ₂ e/y)							-92
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO ₂ e/y)							-1,260
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO ₂ e/y)							-1,427
Carbon sink potential - Mid - Reforest cropland (1000 tCO ₂ e/y)							-13,620
Carbon sink potential - Mid - Reforest pasture (1000 tCO ₂ e/y)							-5,249
Carbon sink potential - Mid - Restore productivity (1000 tCO ₂ e/y)							-5,047
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO ₂ e/y)							-35,565
Carbon sink potential - High - Accelerate regeneration (1000 tCO ₂ e/y)							-4,315
Carbon sink potential - High - Avoid deforestation (1000 tCO ₂ e/y)							-950
Carbon sink potential - High - Extend rotation length (1000 tCO ₂ e/y)							-7,336
Carbon sink potential - High - Improve plantations (1000 tCO ₂ e/y)							-123
Carbon sink potential - High - Increase retention of HWP (1000 tCO ₂ e/y)							-1,890
Carbon sink potential - High - Increase trees outside forests (1000 tCO ₂ e/y)							-2,115
Carbon sink potential - High - Reforest cropland (1000 tCO ₂ e/y)							-18,160
Carbon sink potential - High - Reforest pasture (1000 tCO ₂ e/y)							-9,758
Carbon sink potential - High - All (not counting overlap) (1000 tCO ₂ e/y)							-52,197
Carbon sink potential - High - Restore productivity (1000 tCO ₂ e/y)							-7,549
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							353
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							121
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,433
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							22.7

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 - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							106
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							600
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							48.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,514
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							4,198
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							529
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							125
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,587
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							34.2
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)							153
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							900
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							347
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							3,049
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							7,726
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							706
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							129
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,741
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							45.4
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)							201

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 - Reforest cropland (1000 hectares)							1,201
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							277
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							2,502
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,802

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)							-41.1
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-2,020
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-186
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)							-2,247
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-41.1
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-3,856
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-373
Carbon sink potential - Aggressive deployment - Cropland to woody energy crops (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Pasture to energy crops (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-4,270
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							71.9
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							3,129
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							288
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							26.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							11.7
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							3,527
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							71.9
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							14,741
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							576
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							26.2
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							11.7
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							15,427

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)		6.77	3.79	1.87	1.44	1.28	1.2
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		1.03	0.922	0.906	0.677	0.625	0.45
Premature deaths from air pollution - Mobile - On-Road (deaths)		3.58	3.57	3.56	3.56	3.56	3.56
Premature deaths from air pollution - Gas Stations (deaths)		0.317	0.313	0.309	0.307	0.304	0.3
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		0.706	0.65	0.602	0.571	0.554	0.54
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.04	0.038	0.028	0.018	0.012	0.009
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		0.164	0.162	0.164	0.166	0.163	0.16
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.061	0.06	0.058	0.057	0.055	0.054
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		0.435	0.419	0.382	0.346	0.329	0.329
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.125	0.119	0.114	0.11	0.107	0.104
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.059	0.059	0.059	0.058	0.058	0.057
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.43	0.907	0.677	0.619	0.574	0.516

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		8.11	8.32	8.28	7.8	7.56	6.84
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		60	33.6	16.5	12.8	11.3	10.6
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		9.16	8.17	8.03	6	5.54	3.98
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		31.9	31.7	31.6	31.7	31.7	31.7
Monetary damages from air pollution - Gas Stations (million \$2019)		2.8	2.78	2.74	2.72	2.69	2.66
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		6.26	5.76	5.34	5.06	4.91	4.78
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		0.358	0.333	0.246	0.156	0.104	0.077
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		1.45	1.44	1.45	1.47	1.45	1.42
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		0.536	0.527	0.516	0.504	0.49	0.475
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		3.85	3.71	3.38	3.06	2.91	2.91
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		1.11	1.05	1.01	0.978	0.949	0.924
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		0.521	0.519	0.518	0.515	0.512	0.508
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		12.6	8	5.97	5.46	5.06	4.55
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		72	73.8	73.6	69.2	67.1	60.7

Table 65: REF scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		0.922	0.826	0.816	0.665	0.664	0.72
By economic sector - Construction (jobs)		1,507	2,087	2,000	2,433	2,380	2,835
By economic sector - Manufacturing (jobs)		925	1,218	1,423	1,449	1,094	1,170
By economic sector - Mining (jobs)		2,004	1,454	1,062	856	709	570
By economic sector - Other (jobs)		68.6	197	216	283	314	528
By economic sector - Pipeline (jobs)		186	189	190	184	185	180
By economic sector - Professional (jobs)		985	1,151	1,058	1,294	1,335	1,641
By economic sector - Trade (jobs)		1,624	1,437	1,174	1,238	1,216	1,399
By economic sector - Utilities (jobs)		1,384	1,480	1,155	1,531	1,361	1,367
By resource sector - Biomass (jobs)		3.56	3.33	3.09	2.76	2.83	2.87
By resource sector - CO2 (jobs)		0	0.045	0.057	0.061	0.067	0.072
By resource sector - Coal (jobs)		2,236	1,524	794	455	379	308
By resource sector - Grid (jobs)		1,693	1,818	1,353	2,415	2,023	1,989
By resource sector - Natural Gas (jobs)		1,082	1,122	1,121	1,010	1,006	986
By resource sector - Nuclear (jobs)		0	0.002	0.005	0.005	0	0
By resource sector - Oil (jobs)		2,968	2,641	2,389	2,200	2,062	1,876

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

Item	2020	2025	2030	2035	2040	2045	2050
By resource sector - Solar (jobs)			1,099	1,331	1,409	1,484	2,811
By resource sector - Wind (jobs)		700	1,007	1,287	1,777	1,638	1,719
By education level - All sectors - High school diploma or less (jobs)		3,777	3,959	3,540	3,950	3,635	4,074
By education level - All sectors - Associates degree or some college (jobs)		2,534	2,770	2,508	2,851	2,649	3,021
By education level - All sectors - Bachelors degree (jobs)		1,883	1,962	1,761	1,939	1,806	2,017
By education level - All sectors - Masters or professional degree (jobs)		430	456	410	461	438	499
By education level - All sectors - Doctoral degree (jobs)		59.7	65.8	60.2	68.5	67.7	79.8
Related work experience - All sectors - None (jobs)		1,213	1,305	1,177	1,326	1,233	1,397
Related work experience - All sectors - Up to 1 year (jobs)		1,755	1,855	1,666	1,862	1,717	1,950
Related work experience - All sectors - 1 to 4 years (jobs)		3,235	3,384	3,021	3,370	3,129	3,514
Related work experience - All sectors - 4 to 10 years (jobs)		1,964	2,113	1,905	2,143	1,995	2,247
Related work experience - All sectors - Over 10 years (jobs)		518	558	509	568	522	583
On-the-Job Training - All sectors - None (jobs)		483	513	462	511	478	545
On-the-Job Training - All sectors - Up to 1 year (jobs)		5,944	6,205	5,559	6,173	5,699	6,395
On-the-Job Training - All sectors - 1 to 4 years (jobs)		1,689	1,849	1,671	1,902	1,770	2,004
On-the-Job Training - All sectors - 4 to 10 years (jobs)		495	563	506	594	567	652
On-the-Job Training - All sectors - Over 10 years (jobs)		73.2	84.7	80.4	89.1	81.8	93.6
On-Site or In-Plant Training - All sectors - None (jobs)		1,339	1,457	1,327	1,486	1,382	1,578
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		5,414	5,641	5,043	5,605	5,175	5,803
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		1,344	1,457	1,314	1,489	1,383	1,563
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		526	589	530	614	584	666
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		61.7	70.9	65.1	76	71.3	81.5
Wage income - All (million \$2019)		485	515	464	526	496	560

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	114	108	98.9	93.7	93.4	95.8	99
Final energy use - Residential (PJ)	52.9	50.7	49.9	49.5	49.7	50.2	50.6
Final energy use - Commercial (PJ)	39.7	40.5	41.2	41.2	41.3	42.1	44
Final energy use - Industry (PJ)	59.8	64.3	67.6	71.3	75.8	81.9	87.9

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)		0.658	0.684	0.911	0.962	0.877	0.911

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 (%)	5.75	17	17.3	17.9	18.4	19	19.4
Sales of space heating units - Electric Resistance (%)	7.76	12.4	12.2	12.2	12.1	11.8	11.2
Sales of space heating units - Gas (%)	73.7	52.8	52.4	52.5	53.2	53.4	53
Sales of space heating units - Fossil (%)	12.8	17.8	18.1	17.5	16.3	15.8	16.4
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	14.1	26.3	26.5	26.7	26.9	27	27.1
Sales of water heating units - Gas Furnace (%)	84.6	72.2	72.1	71.9	71.6	71.5	71.4
Sales of water heating units - Other (%)	1.29	1.45	1.46	1.47	1.48	1.49	1.49
Sales of cooking units - Electric Resistance (%)	45	45	45	45	45	45	45
Sales of cooking units - Gas (%)	55	55	55	55	55	55	55
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		0.752	0.765				

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 (%)	1.5	13.9	46.9	73.9	78.3	78.8	78.8
Sales of space heating units - Electric Resistance (%)	1.52	4.25	8.7	15.6	19.9	20.6	20.7
Sales of space heating units - Gas Furnace (%)	96.2	81.6	44.3	10.4	1.72	0.56	0.498
Sales of space heating units - Fossil (%)	0.745	0.237	0.139	0.039	0.005	0	0
Sales of water heating units - Electric Heat Pump (%)	0.014	0.03	0.03	0.03	0.03	0.03	0.03
Sales of water heating units - Electric Resistance (%)	0.703	1.46	1.46	1.47	1.46	1.47	1.46
Sales of water heating units - Gas Furnace (%)	99.1	98.1	98.1	98.1	98.1	98.1	98.1
Sales of water heating units - Other (%)	0.168	0.382	0.381	0.382	0.381	0.382	0.382
Sales of cooking units - Electric Resistance (%)	41.9	44.7	44.7	44.6	44.4	44.5	44.6
Sales of cooking units - Gas (%)	58.1	55.3	55.3	55.4	55.6	55.5	55.4
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		2,877	3,019				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,811	1,811	1,811	0	0	0	0
Installed thermal - Natural gas (MW)	411	411	416	444	446	350	57.4
Installed thermal - Nuclear (MW)	0	0	0.001	0.003	0.004	0	0
Installed renewables - Rooftop PV (MW)	238	367	491	639	816	1,022	1,266
Installed renewables - Wind - Base land use assumptions (MW)	801	801	801	801	2,041	2,398	2,398
Installed renewables - Wind - Constrained land use assumptions (MW)	640	640	640	640	1,516	2,289	2,289

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Base land use assumptions (GWh)	5,019	5,019	5,019	5,019	12,620	16,622	16,622

Table 71: REF scenario - PILLAR 2: Clean Electricity - Generation (continued)

Item	2020	2025	2030	2035	2040	2045	2050
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)	-13.8		5.12				1.47
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.514		-1.07				-1.12
Business-as-usual carbon sink - Total (Mt CO2e/y)	-14.3		4.05				0.342

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)							-2,162
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-158
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,818
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-62.7
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-630
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-740
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-9,080
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-739
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-2,545
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-18,935
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-3,239
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-554
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,077
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-92
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-1,260
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,427
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-13,620
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-5,249
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-5,047
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-35,565
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-4,315
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-950

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,336
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-123
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-1,890
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,115
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-18,160
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-9,758
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-52,197
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-7,549
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							353
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							121
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,433
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							22.7
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)							106
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							600
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							48.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,514
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							4,198
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							529
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							125
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,587
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							34.2
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)							153

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 - Reforest cropland (1000 hectares)							900
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							347
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							3,049
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							7,726
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							706
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							129
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,741
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							45.4
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)							201
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							1,201
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							277
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							2,502
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,802