



## **Net-Zero America - Arkansas data**

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		36	0.024	0.023	0.018	0.012	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		12.8	7.24	3.84	3.21	1.41	0.695
Premature deaths from air pollution - Mobile - On-Road (deaths)		45.5	42.1	31.8	18.3	8.42	3.46
Premature deaths from air pollution - Gas Stations (deaths)		5.09	4.66	3.52	2.1	1.06	0.541
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		5.71	4.62	3.07	1.68	0.794	0.337
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.193	0.157	0.108	0.064	0.03	0.011
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.22	1.1	0.837	0.547	0.288	0.133
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		1.03	0.977	0.924	0.869	0.813	0.756
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		5.72	4.92	3.47	2.08	1.19	0.69
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.964	0.784	0.617	0.461	0.325	0.21
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.376	0.315	0.257	0.2	0.147	0.097
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.694	0.188	0.182	0.172	0.169	0.165
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		55.9	51.5	45.6	35.2	25.4	15.4
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		319	0.217	0.206	0.16	0.104	0.004
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		113	64.1	34	28.5	12.5	6.16
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		404	374	283	163	74.8	30.8
Monetary damages from air pollution - Gas Stations (million \$2019)		45.1	41.3	31.2	18.6	9.37	4.79
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		50.6	40.9	27.2	14.9	7.04	2.99
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		1.71	1.39	0.958	0.57	0.264	0.1
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		10.8	9.7	7.42	4.85	2.55	1.18
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		9.08	8.65	8.18	7.69	7.2	6.69
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		50.6	43.6	30.8	18.4	10.5	6.11

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)		8.53	6.94	5.47	4.08	2.88	1.86
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		3.33	2.79	2.27	1.77	1.3	0.857
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		6.12	1.66	1.6	1.52	1.49	1.46
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		496	457	404	313	226	137

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		122	247	317	757	1,358	1,310
By economic sector - Construction (jobs)		4,005	3,379	5,820	7,271	5,292	6,754
By economic sector - Manufacturing (jobs)		2,973	3,056	3,440	3,470	3,184	3,589
By economic sector - Mining (jobs)		4,370	3,274	2,308	1,469	913	501
By economic sector - Other (jobs)		300	209	732	1,118	628	712
By economic sector - Pipeline (jobs)		462	422	348	245	210	294
By economic sector - Professional (jobs)		2,676	2,117	2,971	4,049	4,040	4,592
By economic sector - Trade (jobs)		2,037	1,619	2,062	2,459	1,943	2,131
By economic sector - Utilities (jobs)		5,164	4,194	5,421	6,741	5,975	7,938
By resource sector - Biomass (jobs)		523	682	902	2,277	4,951	5,594
By resource sector - CO2 (jobs)		5.51	379	463	249	721	1,891
By resource sector - Coal (jobs)		901	80.8	0	0	0	0
By resource sector - Grid (jobs)		4,668	4,626	8,146	10,677	9,566	13,662
By resource sector - Natural Gas (jobs)		9,323	7,514	5,850	5,167	3,424	1,734
By resource sector - Nuclear (jobs)		744	276	0.01	0.011	0.023	0.035
By resource sector - Oil (jobs)		3,609	2,977	2,297	1,546	1,027	571
By resource sector - Solar (jobs)		1,672	1,023	4,468	6,424	2,929	2,849
By resource sector - Wind (jobs)		661	958	1,292	1,238	925	1,521
By education level - All sectors - High school diploma or less (jobs)		8,873	7,590	9,876	11,792	10,191	12,065
By education level - All sectors - Associates degree or some college (jobs)		6,779	5,683	7,357	8,662	7,151	8,592
By education level - All sectors - Bachelors degree (jobs)		5,041	4,109	4,836	5,536	4,792	5,544
By education level - All sectors - Masters or professional degree (jobs)		1,238	996	1,183	1,385	1,223	1,411
By education level - All sectors - Doctoral degree (jobs)		177	139	167	203	186	209
Related work experience - All sectors - None (jobs)		3,139	2,650	3,400	4,049	3,480	4,119
Related work experience - All sectors - Up to 1 year (jobs)		4,120	3,495	4,595	5,557	4,878	5,770
Related work experience - All sectors - 1 to 4 years (jobs)		8,143	6,800	8,491	9,940	8,456	9,943
Related work experience - All sectors - 4 to 10 years (jobs)		5,262	4,370	5,470	6,364	5,331	6,333
Related work experience - All sectors - Over 10 years (jobs)		1,443	1,201	1,463	1,668	1,398	1,656
On-the-Job Training - All sectors - None (jobs)		1,209	990	1,247	1,471	1,251	1,467
On-the-Job Training - All sectors - Up to 1 year (jobs)		14,672	12,331	15,423	18,181	15,830	18,558

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

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - All sectors - 1 to 4 years (jobs)		4,619	3,860	4,954	5,792	4,749	5,709
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,399	1,162	1,573	1,882	1,511	1,847
On-the-Job Training - All sectors - Over 10 years (jobs)		208	173	221	253	203	240
On-Site or In-Plant Training - All sectors - None (jobs)		3,565	2,966	3,754	4,449	3,816	4,468
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		13,309	11,176	14,003	16,481	14,269	16,782
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		3,573	2,995	3,843	4,498	3,711	4,449
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,481	1,228	1,616	1,910	1,547	1,876
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		179	152	202	241	201	245
Wage income - All (million \$2019)		1,117	942	1,170	1,380	1,201	1,429

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		54.3	46.3	34.6	23.5	14.8	7.61
Oil consumption - Cumulative (million bbls)							1,065
Oil production - Annual (million bbls)		6.5	6.52	6.52	5.16	4.2	2.79
Natural gas consumption - Annual (tcf)		279	235	189	142	89.4	62
Natural gas consumption - Cumulative (tcf)							5,687
Natural gas production - Annual (tcf)		720	681	593	501	397	309

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	324	303	265	220	179	155	146
Final energy use - Residential (PJ)	123	117	108	95.6	85.1	78.9	76.1
Final energy use - Commercial (PJ)	90	90.4	87	81.6	77.4	76.4	78.1
Final energy use - Industry (PJ)	236	242	246	246	250	250	255

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		2.42	2.48	3.87	4.09	4.01	4.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	3.85	235	465	1,273	2,081	2,727	3,373
Vehicle stocks - LDV – All others (1000 units)	2,812	2,678	2,543	1,853	1,164	658	153
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		542	1,384	2,253	3,409	3,714	3,539
Public EV charging plugs - DC Fast (1000 units)	0.043		1.12		5.01		8.11
Public EV charging plugs - L2 (1000 units)	0.243		26.9		120		195

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 (%)	11.9	27.2	74.3	84.8	85.3	85.2	85.2
Sales of space heating units - Electric Resistance (%)	34.9	33.8	14.2	9.82	9.65	9.82	9.86
Sales of space heating units - Gas (%)	45.1	27.1	5.9	1.18	0.978	0.957	0.954
Sales of space heating units - Fossil (%)	8.14	11.9	5.59	4.18	4.11	4.04	4.03
Sales of water heating units - Electric Heat Pump (%)	0	11.3	59.7	70.6	71.1	71.1	71.1
Sales of water heating units - Electric Resistance (%)	44.5	51.9	32.1	27.6	27.4	27.4	27.4
Sales of water heating units - Gas Furnace (%)	53.7	35.3	6.65	0.277	0	0	0
Sales of water heating units - Other (%)	1.86	1.52	1.52	1.49	1.49	1.5	1.5
Sales of cooking units - Electric Resistance (%)	52.7	62.8	93.6	99.7	100	100	100
Sales of cooking units - Gas (%)	47.3	37.2	6.37	0.321	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		2.31	2.82				

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 (%)	2.92	27.3	77.1	91.1	92.3	92.3	92.3
Sales of space heating units - Electric Resistance (%)	2.74	4.44	4.73	6.05	6.35	6.37	6.39
Sales of space heating units - Gas Furnace (%)	94.3	68.3	18.2	2.83	1.38	1.34	1.33
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.08	10.7	56.3	66.5	66.9	66.9	66.9
Sales of water heating units - Electric Resistance (%)	2.31	8.07	26.9	31.1	31.3	31.3	31.3
Sales of water heating units - Gas Furnace (%)	96.5	79.4	15	0.632	0	0	0
Sales of water heating units - Other (%)	1.07	1.78	1.78	1.78	1.79	1.79	1.8
Sales of cooking units - Electric Resistance (%)	30.1	44.4	79.2	86.1	86.5	86.5	86.5
Sales of cooking units - Gas (%)	69.9	55.6	20.8	13.9	13.5	13.5	13.5
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		10,539	12,307				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	5,487	609	0	0	0	0	0
Installed thermal - Natural gas (MW)	7,076	6,412	6,294	6,461	5,467	2,901	2,292
Installed thermal - Nuclear (MW)	1,845	942	0.002	0.006	0.009	0.017	0.029
Installed renewables - Rooftop PV (MW)	14.5	25.5	37.9	57.4	85.2	121	168
Installed renewables - Solar - Base land use assumptions (MW)	175	1,030	1,213	4,201	8,274	8,428	8,428
Installed renewables - Wind - Base land use assumptions (MW)	165	2,450	8,676	17,144	27,980	37,359	57,370
Installed renewables - Solar - Constrained land use assumptions (MW)	171	171	1,420	5,618	8,337	8,625	8,625
Installed renewables - Wind - Constrained land use assumptions (MW)	541	5,494	14,552	29,653	49,709	50,233	50,272
Capital invested - Solar PV - Base (billion \$2018)		1.14	0.219	3.29	4.23	0.151	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Wind - Base (billion \$2018)		3.48	8.29	10.5	12.8	10.5	21.2
Capital invested - Solar PV - Constrained (billion \$2018)		0.354	1.18	3.58	3.11	0.641	0
Capital invested - Wind - Constrained (billion \$2018)		7.97	11.9	18.7	25.5	0.59	24.8
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	0.022	0	0	0.032
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	4.37	0	0.029

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	409	2,043	2,391	8,094	15,883	16,176	16,176
Wind - Base land use assumptions (GWh)	315	8,268	28,699	57,011	91,910	120,376	180,483
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	390	390	2,766	10,770	15,974	16,525	16,525
Wind - Constrained land use assumptions (GWh)	1,989	19,254	49,424	95,999	152,043	153,872	154,011
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	4,907	4,907	4,940
Biomass w/ccu allam power plant (GWh)	0	0	0	21.7	21.7	21.7	53.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	4	4	5
Number of facilities - Allam power w ccu (quantity)	0	0	0	1	1	1	2
Number of facilities - Beccs hydrogen (quantity)	0	0	0	1	4	14	17
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	1	1	1	2
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	1	1	1	2
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	1,551	6,476	8,924	4,059
Biomass purchases (million \$2018/y)		0	0	79.9	391	858	1,068

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	1.95	9.81	21.3	26.4
Annual - BECCS (MMT)		0	0	1.95	9.81	21.3	26.4
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	1.95	11.8	33	59.5
Cumulative - BECCS (MMT)		0	0	1.95	11.8	33	59.5



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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	39.8	79.6	79.6	79.6	79.6
Spur (km)		0	0	60.8	341	815	1,619
All (km)		0	39.8	140	420	894	1,699
Cumulative investment - Trunk (million \$2018)		0	244	489	489	489	489
Cumulative investment - Spur (million \$2018)		0	0	50.8	323	846	1,537
Cumulative investment - All (million \$2018)		0	244	540	812	1,335	2,026

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	2.19	8.81	16.3	25.8	35.4
Injection wells (wells)		0	2	10	18	30	38
Resource characterization, appraisal, permitting costs (million \$2020)		14.2	255	404	404	404	404
Wells and facilities construction costs (million \$2020)		0	78.2	305	543	909	1,128

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)							-178
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-222
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,544
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,549
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-4,608
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-392
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-538
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-873
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,565
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-13,471
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-267
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-778
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,386
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,270
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-9,217

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-756
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-807
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-6,200
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,105
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-29,786
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-356
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,334
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-9,227
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,044
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-13,825
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,120
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,077
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-11,526
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-46,154
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,644
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							29.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							170
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,803
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							561
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)							56
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							35.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							56.8
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							931
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,642
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							43.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							175
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,254
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							844
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)							81.2
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							53.4
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							410
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,876
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,737
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							58.3
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							181
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,705
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,121
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)							106
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							71.2
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							327
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,539
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,110

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-243

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-5,130
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-32.4
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-5,405
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-243
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-10,076
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-64.8
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-10,383
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							96.4
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							1,507
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							58.9
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,662
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							96.4
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							2,955
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							118
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							3,170

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)		36	0.024	0.023	0.018	0.012	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		12.4	6.1	2.82	1.34	0.476	0.367
Premature deaths from air pollution - Mobile - On-Road (deaths)		46.1	46.1	44.7	40.1	31.8	21.8
Premature deaths from air pollution - Gas Stations (deaths)		5.19	5.18	4.97	4.44	3.53	2.46
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		5.76	5.2	4.57	3.75	2.78	1.84
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.198	0.187	0.176	0.155	0.123	0.09

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.23	1.24	1.23	1.12	0.889	0.635
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		1.03	0.977	0.924	0.869	0.813	0.756
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		5.78	5.71	5.44	4.77	3.77	2.74
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.965	0.85	0.749	0.643	0.539	0.443
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.376	0.338	0.301	0.265	0.23	0.197
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.662	0.19	0.186	0.18	0.17	0.15
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		55.7	49.1	41	34.6	29.8	21.1
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		319	0.217	0.206	0.16	0.104	0.004
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		110	54	25	11.9	4.22	3.25
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		410	410	397	357	283	194
Monetary damages from air pollution - Gas Stations (million \$2019)		45.9	45.9	44	39.3	31.3	21.8
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		51.1	46.1	40.5	33.2	24.6	16.3
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		1.75	1.65	1.56	1.37	1.09	0.795
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		10.9	11	10.9	9.92	7.88	5.62
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		9.08	8.65	8.18	7.69	7.2	6.69
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		51.1	50.5	48.2	42.2	33.4	24.3
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		8.54	7.53	6.63	5.69	4.77	3.92
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		3.33	2.99	2.66	2.34	2.04	1.75
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		5.84	1.67	1.64	1.59	1.5	1.32
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		495	436	364	307	265	187

Table 18: E- scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		148	190	486	1,287	1,876	1,310
By economic sector - Construction (jobs)		4,100	3,404	5,248	7,126	6,470	8,056
By economic sector - Manufacturing (jobs)		3,043	3,066	3,231	3,877	4,397	4,463
By economic sector - Mining (jobs)		4,409	3,209	2,233	1,528	1,158	750
By economic sector - Other (jobs)		314	212	624	1,020	691	759
By economic sector - Pipeline (jobs)		462	427	356	265	300	489
By economic sector - Professional (jobs)		2,748	2,029	2,943	5,165	5,718	5,000
By economic sector - Trade (jobs)		2,109	1,616	2,005	2,830	2,649	2,445
By economic sector - Utilities (jobs)		5,268	4,182	4,844	6,559	7,287	9,572
By resource sector - Biomass (jobs)		563	511	1,615	5,413	7,989	5,405
By resource sector - CO2 (jobs)		6.54	635	790	438	1,237	3,228
By resource sector - Coal (jobs)		1,089	176	0	0	0	0
By resource sector - Grid (jobs)		4,777	4,534	6,953	10,335	11,710	15,644
By resource sector - Natural Gas (jobs)		9,312	6,995	5,070	4,473	3,478	2,210
By resource sector - Nuclear (jobs)		744	276	0.011	0.014	0.026	0.041
By resource sector - Oil (jobs)		3,638	3,130	2,704	2,251	1,799	1,104
By resource sector - Solar (jobs)		1,774	1,075	3,696	5,542	2,968	2,846
By resource sector - Wind (jobs)		698	1,004	1,145	1,205	1,364	2,406
By education level - All sectors - High school diploma or less (jobs)		9,097	7,520	9,300	12,698	13,181	14,214
By education level - All sectors - Associates degree or some college (jobs)		6,928	5,643	6,801	9,019	9,121	10,237
By education level - All sectors - Bachelors degree (jobs)		5,137	4,059	4,585	6,137	6,356	6,522
By education level - All sectors - Masters or professional degree (jobs)		1,261	979	1,125	1,559	1,630	1,637
By education level - All sectors - Doctoral degree (jobs)		180	135	162	244	258	235
Related work experience - All sectors - None (jobs)		3,210	2,625	3,194	4,353	4,503	4,859
Related work experience - All sectors - Up to 1 year (jobs)		4,227	3,457	4,348	6,115	6,404	6,730
Related work experience - All sectors - 1 to 4 years (jobs)		8,323	6,730	7,968	10,662	10,944	11,755
Related work experience - All sectors - 4 to 10 years (jobs)		5,371	4,333	5,100	6,755	6,882	7,527
Related work experience - All sectors - Over 10 years (jobs)		1,471	1,191	1,362	1,772	1,812	1,973
On-the-Job Training - All sectors - None (jobs)		1,236	981	1,179	1,618	1,651	1,717
On-the-Job Training - All sectors - Up to 1 year (jobs)		15,011	12,196	14,572	19,879	20,722	21,807
On-the-Job Training - All sectors - 1 to 4 years (jobs)		4,715	3,832	4,575	5,987	6,023	6,823
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,429	1,155	1,441	1,909	1,888	2,209
On-the-Job Training - All sectors - Over 10 years (jobs)		212	173	205	265	261	288
On-Site or In-Plant Training - All sectors - None (jobs)		3,644	2,933	3,535	4,833	4,977	5,250
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		13,615	11,059	13,204	17,936	18,640	19,750
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		3,649	2,973	3,559	4,677	4,723	5,308
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,511	1,220	1,488	1,960	1,950	2,244
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		183	151	186	250	256	293
Wage income - All (million \$2019)		1,140	931	1,099	1,484	1,556	1,689

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	324	305	276	255	238	219	197
Final energy use - Residential (PJ)	123	118	114	110	103	94.4	86.6
Final energy use - Commercial (PJ)	90	90.7	90.4	89.6	87.6	85.4	84.4
Final energy use - Industry (PJ)	236	243	246	249	254	253	258

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		2.1	2.13	2.57	2.64	3.75	3.95

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	2.98	70.9	139	453	768	1,464	2,160
Vehicle stocks - LDV – All others (1000 units)	2,824	2,824	2,824	2,678	2,533	1,952	1,371
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	86.7	184	621	1,961	2,854
Public EV charging plugs - DC Fast (1000 units)	0.043		0.334		1.85		5.2
Public EV charging plugs - L2 (1000 units)	0.243		8.03		44.4		125

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 (%)	11.9	18.1	23.5	39	62.6	78	83.3
Sales of space heating units - Electric Resistance (%)	34.9	37.6	35.2	28.7	19	12.7	10.5
Sales of space heating units - Gas (%)	45.1	31.2	28.8	22	11.3	4.24	1.82
Sales of space heating units - Fossil (%)	8.14	13.1	12.5	10.3	7.08	5.03	4.32
Sales of water heating units - Electric Heat Pump (%)	0	1.94	7.45	23.3	47.7	63.6	69.1
Sales of water heating units - Electric Resistance (%)	44.5	55.7	53.5	47.1	37	30.5	28.2
Sales of water heating units - Gas Furnace (%)	53.7	40.9	37.5	28.1	13.8	4.37	1.13
Sales of water heating units - Other (%)	1.86	1.52	1.52	1.51	1.52	1.5	1.5
Sales of cooking units - Electric Resistance (%)	52.5	53.8	58.1	69.6	85.5	95.3	98.7
Sales of cooking units - Gas (%)	47.5	46.2	41.9	30.4	14.5	4.68	1.26
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		2.28	2.67				

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 (%)	2.92	17.8	23.5	40	65.6	83.3	89.8
Sales of space heating units - Electric Resistance (%)	2.74	4.44	4.48	4.65	5.07	5.74	6.19
Sales of space heating units - Gas Furnace (%)	94.3	77.8	72	55.4	29.3	11	3.97
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.08	1.96	7.15	22.1	45	59.9	65.1
Sales of water heating units - Electric Resistance (%)	2.31	4.44	6.56	12.7	22.2	28.4	30.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	96.5	91.8	84.5	63.4	31	9.91	2.58
Sales of water heating units - Other (%)	1.07	1.78	1.78	1.78	1.79	1.79	1.8
Sales of cooking units - Electric Resistance (%)	30.1	34.2	39	52	70.1	81.2	85
Sales of cooking units - Gas (%)	69.9	65.8	61	48	29.9	18.8	15
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		10,527	12,223				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	5,487	609	0	0	0	0	0
Installed thermal - Natural gas (MW)	7,080	6,462	6,521	6,341	4,765	2,675	2,709
Installed thermal - Nuclear (MW)	1,845	942	0.003	0.007	0.011	0.02	0.034

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)							-178
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-222
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,544
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,549
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-4,608
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-392
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-538
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-873
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,565
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-13,471
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-267
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-778
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,386
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,270
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-9,217
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-756
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-807
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-6,200
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,105
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-29,786



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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-356
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,334
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-9,227
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,044
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-13,825
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,120
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,077
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-11,526
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-46,154
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,644
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							29.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							170
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,803
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							561
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)							56
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							35.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							56.8
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							931
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,642
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							43.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							175
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,254
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							844

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							81.2
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							53.4
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							410
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,876
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,737
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							58.3
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							181
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,705
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,121
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)							106
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							71.2
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							327
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,539
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,110

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-243
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-5,130
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-32.4
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-5,405

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-243
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-10,076
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-64.8
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-10,383
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							96.4
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							1,507
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							58.9
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,662
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							96.4
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							2,955
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							118
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							3,170

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)		36	0.024	0.023	0.018	0.012	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		11.7	6.74	2.78	1.95	0.583	0.326
Premature deaths from air pollution - Mobile - On-Road (deaths)		45.5	42.1	31.8	18.3	8.42	3.46
Premature deaths from air pollution - Gas Stations (deaths)		5.09	4.66	3.52	2.1	1.06	0.541
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		5.71	4.62	3.07	1.68	0.794	0.337
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.193	0.157	0.108	0.064	0.03	0.011
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.22	1.1	0.837	0.547	0.288	0.133
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		1.03	0.977	0.924	0.869	0.813	0.756
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		5.72	4.92	3.47	2.08	1.19	0.69

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.964	0.784	0.617	0.461	0.325	0.21
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.376	0.315	0.257	0.2	0.147	0.097
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.778	0.189	0.181	0.172	0.168	0.131
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		54.8	50.6	42.1	29.9	17.6	2.21
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		319	0.217	0.206	0.16	0.104	0.004
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		104	59.7	24.6	17.2	5.17	2.89
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		404	374	283	163	74.8	30.8
Monetary damages from air pollution - Gas Stations (million \$2019)		45.1	41.3	31.2	18.6	9.37	4.79
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		50.6	40.9	27.2	14.9	7.04	2.99
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		1.71	1.39	0.958	0.57	0.264	0.1
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		10.8	9.7	7.42	4.85	2.55	1.18
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		9.08	8.65	8.18	7.69	7.2	6.69
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		50.6	43.6	30.8	18.4	10.5	6.11
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		8.53	6.94	5.47	4.08	2.88	1.86
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		3.33	2.79	2.27	1.77	1.3	0.857
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		6.86	1.66	1.6	1.51	1.49	1.15
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		486	449	374	266	156	19.7

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		122	254	297	689	1,159	1,311
By economic sector - Construction (jobs)		3,490	5,571	6,849	7,309	14,337	16,227
By economic sector - Manufacturing (jobs)		3,033	3,389	4,140	4,297	5,536	6,372
By economic sector - Mining (jobs)		4,266	3,108	1,990	1,129	490	43.7
By economic sector - Other (jobs)		207	709	931	1,119	2,818	2,999
By economic sector - Pipeline (jobs)		449	378	270	175	90.1	29.6
By economic sector - Professional (jobs)		2,463	2,960	3,382	4,046	7,801	9,058

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Trade (jobs)		1,895	2,156	2,282	2,399	4,609	5,170
By economic sector - Utilities (jobs)		5,004	4,681	6,314	7,016	11,995	15,668
By resource sector - Biomass (jobs)		477	717	800	2,251	4,306	5,768
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		901	80.8	0	0	0	0
By resource sector - Grid (jobs)		4,472	5,921	10,545	11,768	22,335	30,812
By resource sector - Natural Gas (jobs)		9,032	7,240	5,183	4,278	2,994	1,526
By resource sector - Nuclear (jobs)		744	276	0	0	0	0
By resource sector - Oil (jobs)		3,610	2,953	2,220	1,368	678	88.1
By resource sector - Solar (jobs)		969	4,932	5,848	6,701	16,301	15,211
By resource sector - Wind (jobs)		724	1,086	1,859	1,812	2,221	3,474
By education level - All sectors - High school diploma or less (jobs)		8,372	9,668	11,216	12,071	21,032	24,492
By education level - All sectors - Associates degree or some college (jobs)		6,405	7,197	8,370	8,889	15,513	18,116
By education level - All sectors - Bachelors degree (jobs)		4,809	4,953	5,374	5,624	9,514	11,047
By education level - All sectors - Masters or professional degree (jobs)		1,177	1,211	1,312	1,394	2,416	2,814
By education level - All sectors - Doctoral degree (jobs)		166	176	184	200	360	410
Related work experience - All sectors - None (jobs)		2,967	3,335	3,842	4,127	7,201	8,400
Related work experience - All sectors - Up to 1 year (jobs)		3,878	4,526	5,246	5,711	10,095	11,752
Related work experience - All sectors - 1 to 4 years (jobs)		7,722	8,443	9,558	10,129	17,454	20,310
Related work experience - All sectors - 4 to 10 years (jobs)		4,986	5,436	6,163	6,494	11,189	13,037
Related work experience - All sectors - Over 10 years (jobs)		1,375	1,467	1,647	1,716	2,896	3,380
On-the-Job Training - All sectors - None (jobs)		1,140	1,264	1,407	1,497	2,648	3,056
On-the-Job Training - All sectors - Up to 1 year (jobs)		13,926	15,332	17,401	18,611	32,065	37,366
On-the-Job Training - All sectors - 1 to 4 years (jobs)		4,362	4,864	5,612	5,914	10,270	11,981
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,304	1,520	1,784	1,894	3,402	3,966
On-the-Job Training - All sectors - Over 10 years (jobs)		196	224	252	262	449	510
On-Site or In-Plant Training - All sectors - None (jobs)		3,371	3,753	4,244	4,548	7,925	9,164
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		12,627	13,907	15,805	16,867	29,093	33,933
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		3,376	3,775	4,355	4,597	7,980	9,309
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,386	1,577	1,821	1,920	3,403	3,962
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		169	194	231	247	433	511
Wage income - All (million \$2019)		1,061	1,151	1,309	1,400	2,421	2,867

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	324	303	265	220	179	155	146
Final energy use - Residential (PJ)	123	117	108	95.6	85.1	78.9	76.1
Final energy use - Commercial (PJ)	90	90.4	87	81.6	77.4	76.4	78.1
Final energy use - Industry (PJ)	236	242	246	246	250	250	255

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		2.42	2.48	3.87	4.09	4.01	4.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV - EV (1000 units)	3.85	235	465	1,273	2,081	2,727	3,373
Vehicle stocks - LDV - All others (1000 units)	2,812	2,678	2,543	1,853	1,164	658	153
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		542	1,384	2,253	3,409	3,714	3,539
Public EV charging plugs - DC Fast (1000 units)	0.043		1.12		5.01		8.11
Public EV charging plugs - L2 (1000 units)	0.243		26.9		120		195

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 (%)	11.9	27.2	74.3	84.8	85.3	85.2	85.2
Sales of space heating units - Electric Resistance (%)	34.9	33.8	14.2	9.82	9.65	9.82	9.86
Sales of space heating units - Gas (%)	45.1	27.1	5.9	1.18	0.978	0.957	0.954
Sales of space heating units - Fossil (%)	8.14	11.9	5.59	4.18	4.11	4.04	4.03
Sales of water heating units - Electric Heat Pump (%)	0	11.3	59.7	70.6	71.1	71.1	71.1
Sales of water heating units - Electric Resistance (%)	44.5	51.9	32.1	27.6	27.4	27.4	27.4
Sales of water heating units - Gas Furnace (%)	53.7	35.3	6.65	0.277	0	0	0
Sales of water heating units - Other (%)	1.86	1.52	1.52	1.49	1.49	1.5	1.5
Sales of cooking units - Electric Resistance (%)	52.7	62.8	93.6	99.7	100	100	100
Sales of cooking units - Gas (%)	47.3	37.2	6.37	0.321	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		2.31	2.82				

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 (%)	2.92	27.3	77.1	91.1	92.3	92.3	92.3
Sales of space heating units - Electric Resistance (%)	2.74	4.44	4.73	6.05	6.35	6.37	6.39
Sales of space heating units - Gas Furnace (%)	94.3	68.3	18.2	2.83	1.38	1.34	1.33
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.08	10.7	56.3	66.5	66.9	66.9	66.9
Sales of water heating units - Electric Resistance (%)	2.31	8.07	26.9	31.1	31.3	31.3	31.3
Sales of water heating units - Gas Furnace (%)	96.5	79.4	15	0.632	0	0	0
Sales of water heating units - Other (%)	1.07	1.78	1.78	1.78	1.79	1.79	1.8
Sales of cooking units - Electric Resistance (%)	30.1	44.4	79.2	86.1	86.5	86.5	86.5
Sales of cooking units - Gas (%)	69.9	55.6	20.8	13.9	13.5	13.5	13.5
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		10,539	12,307				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	5,487	609	0	0	0	0	0
Installed thermal - Natural gas (MW)	7,080	6,372	6,521	6,461	5,454	5,494	7,734
Installed thermal - Nuclear (MW)	1,845	942	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	14.5	25.5	37.9	57.4	85.2	121	168
Installed renewables - Solar - Base land use assumptions (MW)	175	521	3,557	6,871	10,013	20,471	30,430
Installed renewables - Wind - Base land use assumptions (MW)	84.5	2,493	8,997	23,141	36,480	59,292	102,194
Installed renewables - Solar - Constrained land use assumptions (MW)	179	1,112	2,314	5,199	9,083	21,904	34,660
Installed renewables - Wind - Constrained land use assumptions (MW)	541	5,774	14,724	38,399	57,723	60,418	104,594
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion \$2018)		0.463	3.64	3.66	3.27	10.3	9.23
Capital invested - Wind - Base (billion \$2018)		3.54	8.66	17.5	15.8	25.6	45.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	409	1,067	6,857	13,206	19,204	39,180	58,106
Wind - Base land use assumptions (GWh)	315	8,421	29,861	76,570	117,863	186,498	305,189
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	818	4,380	8,972	20,009	34,879	83,626	131,845
Wind - Constrained land use assumptions (GWh)	3,977	40,471	100,043	243,924	347,631	365,116	642,486
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 tCO <sub>2</sub> e/y)							-178
Carbon sink potential - Low - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-222
Carbon sink potential - Low - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-3,544
Carbon sink potential - Low - Improve plantations (1000 tCO <sub>2</sub> e/y)							-1,549
Carbon sink potential - Low - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-4,608
Carbon sink potential - Low - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-392
Carbon sink potential - Low - Reforest cropland (1000 tCO <sub>2</sub> e/y)							-538
Carbon sink potential - Low - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-873
Carbon sink potential - Low - Restore productivity (1000 tCO <sub>2</sub> e/y)							-1,565
Carbon sink potential - Low - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-13,471

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-267
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-778
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,386
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,270
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-9,217
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-756
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-807
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-6,200
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,105
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-29,786
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-356
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,334
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-9,227
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,044
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-13,825
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,120
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,077
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-11,526
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-46,154
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,644
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							29.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							170
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,803
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							561
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)							56
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							35.6



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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							56.8
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							931
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,642
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							43.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							175
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,254
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							844
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)							81.2
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							53.4
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							410
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,876
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,737
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							58.3
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							181
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,705
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,121
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)							106
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							71.2
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							327
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,539

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,110

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-243
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-5,130
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-32.4
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-5,405
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-243
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-10,076
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-64.8
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-10,383
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							96.4
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							1,507
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							58.9
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,662
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							96.4
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							2,955
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							118
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							3,170

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)		36	0.024	0.023	0.018	0.012	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		13.2	7.33	7.68	6.19	2.1	0.672
Premature deaths from air pollution - Mobile - On-Road (deaths)		45.5	42.1	31.8	18.3	8.42	3.46
Premature deaths from air pollution - Gas Stations (deaths)		5.09	4.66	3.52	2.1	1.06	0.541
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		5.71	4.62	3.07	1.68	0.794	0.337
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.193	0.157	0.108	0.064	0.03	0.011
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.22	1.1	0.837	0.547	0.288	0.133
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		1.03	0.977	0.924	0.869	0.813	0.756
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		5.72	4.92	3.47	2.08	1.19	0.69
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.964	0.784	0.617	0.461	0.325	0.21
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.376	0.315	0.257	0.2	0.147	0.097
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.611	0.188	0.181	0.172	0.169	0.131
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		56.7	54.1	52.5	44.8	37.3	27.7
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		319	0.217	0.206	0.16	0.104	0.004
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		117	64.9	68	54.8	18.6	5.95
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		404	374	283	163	74.8	30.8
Monetary damages from air pollution - Gas Stations (million \$2019)		45.1	41.3	31.2	18.6	9.37	4.79
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		50.6	40.9	27.2	14.9	7.04	2.99
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		1.71	1.39	0.958	0.57	0.264	0.1
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		10.8	9.7	7.42	4.85	2.55	1.18
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		9.08	8.65	8.18	7.69	7.2	6.69
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		50.6	43.6	30.8	18.4	10.5	6.11
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		8.53	6.94	5.47	4.08	2.88	1.86

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		3.33	2.79	2.27	1.77	1.3	0.857
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		5.39	1.66	1.6	1.52	1.49	1.15
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		504	481	466	398	331	246

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		139	199	487	1,049	1,520	1,310
By economic sector - Construction (jobs)		3,593	4,288	5,166	5,582	4,996	5,935
By economic sector - Manufacturing (jobs)		2,843	2,601	2,623	2,961	2,921	2,532
By economic sector - Mining (jobs)		4,466	3,551	2,836	2,040	1,528	1,027
By economic sector - Other (jobs)		199	373	528	610	433	458
By economic sector - Pipeline (jobs)		475	476	451	357	383	599
By economic sector - Professional (jobs)		2,549	2,384	2,946	4,022	4,359	4,027
By economic sector - Trade (jobs)		1,941	1,856	2,009	2,246	2,067	1,882
By economic sector - Utilities (jobs)		5,396	4,882	5,384	6,313	6,068	6,970
By resource sector - Biomass (jobs)		488	511	1,669	3,923	5,955	5,442
By resource sector - CO2 (jobs)		6.98	723	899	488	1,390	3,644
By resource sector - Coal (jobs)		901	80.8	0	0	0	0
By resource sector - Grid (jobs)		4,788	4,873	7,071	8,685	8,222	9,068
By resource sector - Natural Gas (jobs)		9,598	8,417	7,476	7,275	5,728	3,889
By resource sector - Nuclear (jobs)		931	540	0.04	0.037	0.107	0.744
By resource sector - Oil (jobs)		3,608	2,977	2,297	1,546	1,065	706
By resource sector - Solar (jobs)		751	2,130	2,803	2,777	1,491	1,489
By resource sector - Wind (jobs)		529	359	214	486	426	501
By education level - All sectors - High school diploma or less (jobs)		8,619	8,442	9,398	10,670	10,404	10,690
By education level - All sectors - Associates degree or some college (jobs)		6,608	6,373	6,960	7,720	7,285	7,609
By education level - All sectors - Bachelors degree (jobs)		4,977	4,531	4,730	5,257	5,077	4,982
By education level - All sectors - Masters or professional degree (jobs)		1,224	1,109	1,172	1,332	1,306	1,269
By education level - All sectors - Doctoral degree (jobs)		173	157	168	201	204	191
Related work experience - All sectors - None (jobs)		3,064	2,961	3,269	3,702	3,591	3,685
Related work experience - All sectors - Up to 1 year (jobs)		3,985	3,880	4,339	5,025	4,970	5,045
Related work experience - All sectors - 1 to 4 years (jobs)		7,980	7,562	8,172	9,118	8,748	8,872
Related work experience - All sectors - 4 to 10 years (jobs)		5,154	4,883	5,250	5,807	5,520	5,670
Related work experience - All sectors - Over 10 years (jobs)		1,419	1,325	1,397	1,528	1,447	1,468
On-the-Job Training - All sectors - None (jobs)		1,177	1,111	1,193	1,340	1,293	1,297
On-the-Job Training - All sectors - Up to 1 year (jobs)		14,353	13,604	14,804	16,786	16,374	16,445
On-the-Job Training - All sectors - 1 to 4 years (jobs)		4,513	4,349	4,718	5,175	4,856	5,101
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,358	1,354	1,510	1,660	1,548	1,685

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

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - All sectors - Over 10 years (jobs)		200	193	204	220	204	212
On-Site or In-Plant Training - All sectors - None (jobs)		3,475	3,301	3,582	4,056	3,931	3,963
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		13,020	12,355	13,434	15,172	14,745	14,871
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		3,489	3,364	3,657	4,024	3,791	3,964
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,443	1,419	1,563	1,712	1,603	1,722
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		174	172	193	216	206	220
Wage income - All (million \$2019)		1,100	1,048	1,141	1,288	1,258	1,289

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	324	303	265	220	179	155	146
Final energy use - Residential (PJ)	123	117	108	95.6	85.1	78.9	76.1
Final energy use - Commercial (PJ)	90	90.4	87	81.6	77.4	76.4	78.1
Final energy use - Industry (PJ)	236	242	246	246	250	250	255

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		2.42	2.48	3.87	4.09	4.01	4.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	3.85	235	465	1,273	2,081	2,727	3,373
Vehicle stocks - LDV – All others (1000 units)	2,812	2,678	2,543	1,853	1,164	658	153
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		542	1,384	2,253	3,409	3,714	3,539
Public EV charging plugs - DC Fast (1000 units)	0.043		1.12		5.01		8.11
Public EV charging plugs - L2 (1000 units)	0.243		26.9		120		195

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 (%)	11.9	27.2	74.3	84.8	85.3	85.2	85.2
Sales of space heating units - Electric Resistance (%)	34.9	33.8	14.2	9.82	9.65	9.82	9.86
Sales of space heating units - Gas (%)	45.1	27.1	5.9	1.18	0.978	0.957	0.954
Sales of space heating units - Fossil (%)	8.14	11.9	5.59	4.18	4.11	4.04	4.03
Sales of water heating units - Electric Heat Pump (%)	0	11.3	59.7	70.6	71.1	71.1	71.1
Sales of water heating units - Electric Resistance (%)	44.5	51.9	32.1	27.6	27.4	27.4	27.4
Sales of water heating units - Gas Furnace (%)	53.7	35.3	6.65	0.277	0	0	0
Sales of water heating units - Other (%)	1.86	1.52	1.52	1.49	1.49	1.5	1.5
Sales of cooking units - Electric Resistance (%)	52.7	62.8	93.6	99.7	100	100	100
Sales of cooking units - Gas (%)	47.3	37.2	6.37	0.321	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		2.31	2.82				

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 (%)	2.92	27.3	77.1	91.1	92.3	92.3	92.3
Sales of space heating units - Electric Resistance (%)	2.74	4.44	4.73	6.05	6.35	6.37	6.39
Sales of space heating units - Gas Furnace (%)	94.3	68.3	18.2	2.83	1.38	1.34	1.33
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.08	10.7	56.3	66.5	66.9	66.9	66.9
Sales of water heating units - Electric Resistance (%)	2.31	8.07	26.9	31.1	31.3	31.3	31.3
Sales of water heating units - Gas Furnace (%)	96.5	79.4	15	0.632	0	0	0
Sales of water heating units - Other (%)	1.07	1.78	1.78	1.78	1.79	1.79	1.8
Sales of cooking units - Electric Resistance (%)	30.1	44.4	79.2	86.1	86.5	86.5	86.5
Sales of cooking units - Gas (%)	69.9	55.6	20.8	13.9	13.5	13.5	13.5
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		10,539	12,307				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	5,487	609	0	0	0	0	0
Installed thermal - Natural gas (MW)	7,078	6,414	7,876	7,937	7,050	4,258	3,649
Installed thermal - Nuclear (MW)	1,845	1,845	0	0.017	0.029	0.07	0.383
Installed renewables - Rooftop PV (MW)	14.5	25.5	37.9	57.4	85.2	121	168
Installed renewables - Solar - Base land use assumptions (MW)	175	175	1,722	3,538	5,392	5,392	5,392
Installed renewables - Wind - Base land use assumptions (MW)	0.1	1,797	3,255	3,299	6,944	11,877	21,830
Installed renewables - Solar - Constrained land use assumptions (MW)	179	1,535	3,314	4,910	8,160	10,857	10,857
Installed renewables - Wind - Constrained land use assumptions (MW)	454	3,673	6,982	7,306	12,631	18,491	36,708
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion \$2018)		0.463	1.85	2	1.93	0	0
Capital invested - Wind - Base (billion \$2018)		2.7	1.94	0.055	4.45	5.63	10.7
Capital invested - Solar PV - Constrained (billion \$2018)		1.81	2.13	1.76	3.38	2.64	0
Capital invested - Wind - Constrained (billion \$2018)		4.74	4.41	0.402	6.29	6.57	19.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	409	1,067	4,016	7,492	11,030	11,030	11,030
Wind - Base land use assumptions (GWh)	0.381	6,347	11,018	11,183	23,559	40,418	73,548
Offshore Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Constrained land use assumptions (GWh)	409	2,985	6,383	9,427	15,643	20,795	20,795
Wind - Constrained land use assumptions (GWh)	1,673	13,018	24,317	25,503	43,224	61,883	116,904
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)							-178
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-222
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,544
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,549
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-4,608
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-392
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-538
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-873
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,565
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-13,471
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-267
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-778
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,386
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,270
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-9,217
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-756
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-807
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-6,200
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,105
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-29,786
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-356
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,334
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-9,227
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,044
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-13,825

Table 47: E+RE- 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)							-1,120
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,077
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-11,526
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-46,154
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,644
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							29.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							170
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,803
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							561
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)							56
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							35.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							56.8
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							931
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,642
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							43.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							175
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,254
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							844
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)							81.2
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							53.4
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							410



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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,876
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,737
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							58.3
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							181
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,705
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,121
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)							106
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							71.2
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							327
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,539
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,110

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-243
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-5,130
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-32.4
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-5,405
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-243
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-10,076
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-64.8
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-10,383

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							96.4
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							1,507
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							58.9
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,662
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							96.4
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							2,955
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							118
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							3,170

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)		36	0.024	0.023	0.018	0.012	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		12.4	5.93	3.4	2.39	0.977	0.525
Premature deaths from air pollution - Mobile - On-Road (deaths)		46.1	46.1	44.7	40.1	31.8	21.8
Premature deaths from air pollution - Gas Stations (deaths)		5.19	5.18	4.97	4.44	3.53	2.46
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		5.76	5.2	4.57	3.75	2.78	1.84
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.198	0.187	0.176	0.155	0.123	0.09
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.23	1.24	1.23	1.12	0.889	0.635
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		1.03	0.977	0.924	0.869	0.813	0.756
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		5.78	5.71	5.44	4.77	3.77	2.74
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.965	0.85	0.749	0.643	0.539	0.443
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.376	0.338	0.301	0.265	0.23	0.197
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.69	0.19	0.186	0.181	0.177	0.17

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		55.7	49.1	41	34.6	29.8	21.1
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		319	0.217	0.206	0.16	0.104	0.004
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		110	52.6	30.1	21.1	8.66	4.65
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		410	410	397	357	283	194
Monetary damages from air pollution - Gas Stations (million \$2019)		45.9	45.9	44	39.3	31.3	21.8
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		51.1	46.1	40.5	33.2	24.6	16.3
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		1.75	1.65	1.56	1.37	1.09	0.795
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		10.9	11	10.9	9.92	7.88	5.62
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		9.08	8.65	8.18	7.69	7.2	6.69
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		51.1	50.5	48.2	42.2	33.4	24.3
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		8.54	7.53	6.63	5.69	4.77	3.92
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		3.33	2.99	2.66	2.34	2.04	1.75
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		6.09	1.67	1.64	1.6	1.56	1.5
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		495	436	364	307	265	187

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		136	190	724	1,397	1,435	1,417
By economic sector - Construction (jobs)		3,974	3,355	5,058	5,966	5,287	7,254
By economic sector - Manufacturing (jobs)		3,013	3,069	3,168	3,311	3,441	3,994
By economic sector - Mining (jobs)		4,337	3,190	2,262	1,589	1,174	714
By economic sector - Other (jobs)		304	208	567	783	539	650
By economic sector - Pipeline (jobs)		458	427	363	274	300	490
By economic sector - Professional (jobs)		2,661	1,985	3,151	4,885	4,786	5,134
By economic sector - Trade (jobs)		2,029	1,598	2,019	2,603	2,294	2,365
By economic sector - Utilities (jobs)		5,038	4,067	4,801	5,780	5,971	8,527
By resource sector - Biomass (jobs)		540	512	2,452	5,862	6,642	6,683
By resource sector - CO2 (jobs)		6.57	631	800	460	1,279	3,293
By resource sector - Coal (jobs)		901	80.8	0	0	0	0
By resource sector - Grid (jobs)		4,439	4,388	6,858	8,706	9,036	13,493
By resource sector - Natural Gas (jobs)		9,205	6,973	5,109	4,598	3,454	2,005
By resource sector - Nuclear (jobs)		744	276	0.012	0.012	0.023	0.04
By resource sector - Oil (jobs)		3,639	3,130	2,704	2,316	1,810	1,048

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

Item	2020	2025	2030	2035	2040	2045	2050
By resource sector - Solar (jobs)		1,747	1,062	3,200	4,018	2,204	2,445
By resource sector - Wind (jobs)		727	1,037	992	627	803	1,580
By education level - All sectors - High school diploma or less (jobs)		8,817	7,425	9,396	11,377	10,802	13,194
By education level - All sectors - Associates degree or some college (jobs)		6,722	5,561	6,759	7,960	7,524	9,387
By education level - All sectors - Bachelors degree (jobs)		5,006	4,005	4,641	5,592	5,319	6,166
By education level - All sectors - Masters or professional degree (jobs)		1,228	964	1,148	1,431	1,365	1,565
By education level - All sectors - Doctoral degree (jobs)		176	133	169	228	218	235
Related work experience - All sectors - None (jobs)		3,115	2,589	3,222	3,909	3,714	4,520
Related work experience - All sectors - Up to 1 year (jobs)		4,099	3,414	4,412	5,498	5,249	6,325
Related work experience - All sectors - 1 to 4 years (jobs)		8,083	6,639	8,019	9,571	9,051	10,909
Related work experience - All sectors - 4 to 10 years (jobs)		5,220	4,272	5,101	6,031	5,711	6,968
Related work experience - All sectors - Over 10 years (jobs)		1,432	1,175	1,360	1,580	1,502	1,824
On-the-Job Training - All sectors - None (jobs)		1,202	968	1,188	1,457	1,372	1,620
On-the-Job Training - All sectors - Up to 1 year (jobs)		14,578	12,038	14,754	17,943	17,101	20,410
On-the-Job Training - All sectors - 1 to 4 years (jobs)		4,578	3,777	4,544	5,282	4,974	6,236
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,384	1,135	1,425	1,675	1,565	2,016
On-the-Job Training - All sectors - Over 10 years (jobs)		207	171	203	231	216	265
On-Site or In-Plant Training - All sectors - None (jobs)		3,544	2,894	3,569	4,340	4,104	4,907
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		13,220	10,915	13,343	16,160	15,391	18,451
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		3,542	2,931	3,541	4,136	3,897	4,860
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,465	1,200	1,476	1,731	1,623	2,059
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		177	149	185	221	212	269
Wage income - All (million \$2019)		1,108	918	1,109	1,340	1,290	1,572

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	324	305	276	255	238	219	197
Final energy use - Residential (PJ)	123	118	114	110	103	94.4	86.6
Final energy use - Commercial (PJ)	90	90.7	90.4	89.6	87.6	85.4	84.4
Final energy use - Industry (PJ)	236	243	246	249	254	253	258

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		2.1	2.13	2.57	2.64	3.75	3.95

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	2.98	70.9	139	453	768	1,464	2,160
Vehicle stocks - LDV – All others (1000 units)	2,824	2,824	2,824	2,678	2,533	1,952	1,371
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	86.7	184	621	1,961	2,854
Public EV charging plugs - DC Fast (1000 units)	0.043		0.334		1.85		5.2
Public EV charging plugs - L2 (1000 units)	0.243		8.03		44.4		125

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 (%)	11.9	18.1	23.5	39	62.6	78	83.3
Sales of space heating units - Electric Resistance (%)	34.9	37.6	35.2	28.7	19	12.7	10.5
Sales of space heating units - Gas (%)	45.1	31.2	28.8	22	11.3	4.24	1.82
Sales of space heating units - Fossil (%)	8.14	13.1	12.5	10.3	7.08	5.03	4.32
Sales of water heating units - Electric Heat Pump (%)	0	1.94	7.45	23.3	47.7	63.6	69.1
Sales of water heating units - Electric Resistance (%)	44.5	55.7	53.5	47.1	37	30.5	28.2
Sales of water heating units - Gas Furnace (%)	53.7	40.9	37.5	28.1	13.8	4.37	1.13
Sales of water heating units - Other (%)	1.86	1.52	1.52	1.51	1.52	1.5	1.5
Sales of cooking units - Electric Resistance (%)	52.5	53.8	58.1	69.6	85.5	95.3	98.7
Sales of cooking units - Gas (%)	47.5	46.2	41.9	30.4	14.5	4.68	1.26
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		2.28	2.67				

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 (%)	2.92	17.8	23.5	40	65.6	83.3	89.8
Sales of space heating units - Electric Resistance (%)	2.74	4.44	4.48	4.65	5.07	5.74	6.19
Sales of space heating units - Gas Furnace (%)	94.3	77.8	72	55.4	29.3	11	3.97
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.08	1.96	7.15	22.1	45	59.9	65.1
Sales of water heating units - Electric Resistance (%)	2.31	4.44	6.56	12.7	22.2	28.4	30.5
Sales of water heating units - Gas Furnace (%)	96.5	91.8	84.5	63.4	31	9.91	2.58
Sales of water heating units - Other (%)	1.07	1.78	1.78	1.78	1.79	1.79	1.8
Sales of cooking units - Electric Resistance (%)	30.1	34.2	39	52	70.1	81.2	85
Sales of cooking units - Gas (%)	69.9	65.8	61	48	29.9	18.8	15
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		10,527	12,223				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	5,487	1,329	0	0	0	0	0
Installed thermal - Natural gas (MW)	7,079	6,416	6,180	6,222	4,765	2,662	2,067
Installed thermal - Nuclear (MW)	1,845	942	0.002	0.007	0.011	0.019	0.032

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

Item	2020	2025	2030	2035	2040	2045	2050
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	0.063
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	13.1	6.33	8.69	5.05

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	14,741	21,844	31,603	37,270
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	62.9

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	12	18	26	30
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	1
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	8	8	8
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	12,047	12,821	7,975	4,709
Biomass purchases (million \$2018/y)		0	0	886	1,910	2,497	2,840

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	14.6	30.6	40.3	45.8
Annual - BECCS (MMT)		0	0	14.6	30.6	40.3	45.8
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	14.6	45.2	85.5	131
Cumulative - BECCS (MMT)		0	0	14.6	45.2	85.5	131
Cumulative - NGCC (MMT)		0	0	0	0	0	0
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	39.8	79.6	119	119	119
Spur (km)		0	0	69.9	602	955	955
All (km)		0	39.8	150	721	1,074	1,074
Cumulative investment - Trunk (million \$2018)		0	284	569	853	853	853
Cumulative investment - Spur (million \$2018)		0	0	318	874	1,414	1,589
Cumulative investment - All (million \$2018)		0	284	887	1,728	2,267	2,443

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	3.69	15	30.9	41.4	45.1
Injection wells (wells)		0	4	14	26	42	54
Resource characterization, appraisal, permitting costs (million \$2020)		14.2	350	562	562	562	562
Wells and facilities construction costs (million \$2020)		0	111	432	770	1,288	1,600

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)							-178
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-222
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,544
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,549
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-4,608
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-392
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-538
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-873
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,565
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-13,471
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-267
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-778
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,386
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,270
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-9,217
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-756
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-807
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-6,200
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,105
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-29,786
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-356
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,334
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-9,227
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,044

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase retention of HWP (1000 tCO <sub>2e</sub> /y)							-13,825
Carbon sink potential - High - Increase trees outside forests (1000 tCO <sub>2e</sub> /y)							-1,120
Carbon sink potential - High - Reforest cropland (1000 tCO <sub>2e</sub> /y)							-1,077
Carbon sink potential - High - Reforest pasture (1000 tCO <sub>2e</sub> /y)							-11,526
Carbon sink potential - High - All (not counting overlap) (1000 tCO <sub>2e</sub> /y)							-46,154
Carbon sink potential - High - Restore productivity (1000 tCO <sub>2e</sub> /y)							-4,644
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							29.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							170
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,803
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							561
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)							56
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							35.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							56.8
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							931
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,642
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							43.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							175
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,254
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							844
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)							81.2
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							53.4
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							410



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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,876
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,737
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							58.3
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							181
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,705
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,121
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)							106
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							71.2
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							327
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,539
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,110

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-923
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-4,678
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-24.8
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)							-5,626
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-923
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-9,220

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-49.6
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)							-10,192
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							367
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							1,376
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							45.1
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							143
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							440
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							2,371
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							367
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							6,684
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							90.3
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							143
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							440
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							7,724

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)		146	91.5	60.1	47.3	42.6	42.2
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		13.8	13.5	14.2	10.8	8.5	7.64
Premature deaths from air pollution - Mobile - On-Road (deaths)		46.2	46.8	47.7	48.7	49.8	51
Premature deaths from air pollution - Gas Stations (deaths)		5.17	5.23	5.27	5.36	5.43	5.49

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		5.67	5.13	4.66	4.36	4.23	4.13
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.195	0.169	0.127	0.089	0.058	0.041
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.16	1.12	1.12	1.12	1.12	1.12
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		1.07	1.07	1.06	1.05	1.04	1.02
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		5.78	5.57	5.06	4.62	4.55	4.87
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.01	0.99	0.972	0.947	0.927	0.917
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.393	0.401	0.409	0.417	0.425	0.435
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.65	1.1	0.863	0.806	0.765	0.705
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		56.1	59.3	60.7	57.8	57.4	54.1
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		1,292	811	533	419	377	374
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		122	119	126	95.4	75.3	67.7
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		410	416	424	433	443	453
Monetary damages from air pollution - Gas Stations (million \$2019)		45.8	46.3	46.7	47.4	48.1	48.6
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		50.2	45.4	41.3	38.7	37.5	36.6
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		1.73	1.49	1.13	0.786	0.516	0.361
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		10.2	9.96	9.88	9.96	9.96	9.9
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		9.49	9.46	9.39	9.29	9.17	9.02
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		51.2	49.3	44.8	40.9	40.3	43.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		8.9	8.76	8.61	8.38	8.2	8.12
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		3.48	3.55	3.62	3.69	3.76	3.85
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		14.6	9.74	7.62	7.11	6.75	6.22

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		498	527	539	513	509	481

Table 65: REF scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		129	115	114	92.9	92.8	101
By economic sector - Construction (jobs)		3,693	3,595	3,912	3,282	3,283	3,312
By economic sector - Manufacturing (jobs)		2,421	2,505	2,597	2,436	2,272	2,168
By economic sector - Mining (jobs)		4,689	4,050	3,415	2,630	2,221	1,824
By economic sector - Other (jobs)		165	157	179	147	200	250
By economic sector - Pipeline (jobs)		472	497	506	476	480	473
By economic sector - Professional (jobs)		2,774	2,529	2,460	1,997	1,853	1,794
By economic sector - Trade (jobs)		2,253	2,036	1,936	1,562	1,526	1,497
By economic sector - Utilities (jobs)		6,354	5,729	5,910	4,568	3,845	3,421
By resource sector - Biomass (jobs)		497	465	432	386	395	402
By resource sector - CO2 (jobs)		0	0.023	0.029	0.031	0.035	0.037
By resource sector - Coal (jobs)		2,030	1,627	1,226	400	0	0
By resource sector - Grid (jobs)		6,271	5,480	6,293	4,018	3,275	3,386
By resource sector - Natural Gas (jobs)		9,524	9,442	9,399	8,962	8,759	7,499
By resource sector - Nuclear (jobs)		931	732	461	267	0.015	0.024
By resource sector - Oil (jobs)		3,657	3,178	2,827	2,587	2,425	2,228
By resource sector - Solar (jobs)			176	257	276	714	1,079
By resource sector - Wind (jobs)		40.8	114	133	292	205	247
By education level - All sectors - High school diploma or less (jobs)		9,174	8,522	8,536	6,978	6,470	6,152
By education level - All sectors - Associates degree or some college (jobs)		7,036	6,540	6,561	5,382	4,954	4,658
By education level - All sectors - Bachelors degree (jobs)		5,261	4,807	4,640	3,784	3,409	3,159
By education level - All sectors - Masters or professional degree (jobs)		1,298	1,180	1,135	919	824	763
By education level - All sectors - Doctoral degree (jobs)		182	165	156	127	115	108
Related work experience - All sectors - None (jobs)		3,260	3,025	3,024	2,481	2,290	2,160
Related work experience - All sectors - Up to 1 year (jobs)		4,219	3,894	3,865	3,138	2,895	2,755
Related work experience - All sectors - 1 to 4 years (jobs)		8,507	7,853	7,760	6,340	5,809	5,456
Related work experience - All sectors - 4 to 10 years (jobs)		5,474	5,065	5,020	4,116	3,768	3,526
Related work experience - All sectors - Over 10 years (jobs)		1,489	1,378	1,357	1,113	1,011	944
On-the-Job Training - All sectors - None (jobs)		1,240	1,134	1,103	895	817	768
On-the-Job Training - All sectors - Up to 1 year (jobs)		15,243	14,061	13,868	11,319	10,366	9,757
On-the-Job Training - All sectors - 1 to 4 years (jobs)		4,800	4,461	4,471	3,669	3,374	3,167
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,464	1,369	1,397	1,149	1,071	1,012
On-the-Job Training - All sectors - Over 10 years (jobs)		203	190	188	157	145	137
On-Site or In-Plant Training - All sectors - None (jobs)		3,654	3,368	3,315	2,712	2,480	2,329
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		13,849	12,775	12,612	10,287	9,423	8,869

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

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		3,712	3,448	3,454	2,833	2,607	2,452
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,549	1,447	1,466	1,209	1,124	1,059
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		187	176	180	149	139	131
Wage income - All (million \$2019)		1,172	1,097	1,097	909	840	796

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	324	305	279	263	263	271	282
Final energy use - Residential (PJ)	123	117	115	115	116	119	121
Final energy use - Commercial (PJ)	90	91.9	92.9	93.6	95.4	100	108
Final energy use - Industry (PJ)	236	248	257	261	270	278	287

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		2.28	2.33	3.46	3.64	3.57	3.72

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 (%)	8.95	36.6	37.8	39.7	41.3	43.3	46.3
Sales of space heating units - Electric Resistance (%)	36.2	30.2	29.6	28.9	27.9	26.1	23
Sales of space heating units - Gas (%)	46.5	24.5	23.8	22.8	22.3	22.1	22.2
Sales of space heating units - Fossil (%)	8.35	8.61	8.72	8.67	8.53	8.52	8.55
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	44.5	56.5	56.6	56.6	56.5	56.5	56.5
Sales of water heating units - Gas Furnace (%)	53.7	42	41.9	41.8	42	42	42
Sales of water heating units - Other (%)	1.86	1.52	1.52	1.52	1.53	1.53	1.53
Sales of cooking units - Electric Resistance (%)	52.1	52.1	52.1	52.1	52.1	52.1	52.1
Sales of cooking units - Gas (%)	47.9	47.9	47.9	47.9	47.9	47.9	47.9
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		2.25	2.32				

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 (%)	2.92	28.4	67	78.3	79.4	79.5	79.5
Sales of space heating units - Electric Resistance (%)	2.74	6.12	11.6	15.8	18.7	19.1	19.2
Sales of space heating units - Gas Furnace (%)	94.3	65.5	21.4	5.92	1.92	1.38	1.33
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.08	0.13	0.128	0.13	0.13	0.128	0.128
Sales of water heating units - Electric Resistance (%)	2.31	3.68	3.66	3.67	3.69	3.68	3.7
Sales of water heating units - Gas Furnace (%)	96.5	94.4	94.4	94.4	94.4	94.4	94.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Other (%)	1.07	1.78	1.78	1.78	1.79	1.79	1.8
Sales of cooking units - Electric Resistance (%)	30.1	32.3	32.3	32.3	32.3	32.3	32.3
Sales of cooking units - Gas (%)	69.9	67.7	67.7	67.7	67.7	67.7	67.7
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		10,305	10,816				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	5,487	4,929	4,029	3,129	0	0	0
Installed thermal - Natural gas (MW)	7,071	6,420	6,582	7,415	6,226	4,525	3,649
Installed thermal - Nuclear (MW)	1,845	1,845	942	943	0.007	0.012	0.02
Installed renewables - Rooftop PV (MW)	14.5	25.5	37.9	57.4	85.2	121	168
Installed renewables - Solar - Base land use assumptions (MW)	175	175	175	175	175	636	1,193
Installed renewables - Wind - Base land use assumptions (MW)	704	893	978	978	1,431	2,626	6,132

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	409	409	409	409	409	1,291	2,354
Wind - Base land use assumptions (GWh)	2,742	3,434	3,737	3,737	5,193	8,934	20,295
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)	-22.2		-14.6				-11.9
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-3.76		-6.27				-6.6
Business-as-usual carbon sink - Total (Mt CO2e/y)	-26		-20.9				-18.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-178
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-222
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,544
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,549
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-4,608
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-392
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-538
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-873
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,565
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-13,471

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-267
Carbon sink potential - Mid - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-778
Carbon sink potential - Mid - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-6,386
Carbon sink potential - Mid - Improve plantations (1000 tCO <sub>2</sub> e/y)							-2,270
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-9,217
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-756
Carbon sink potential - Mid - Reforest cropland (1000 tCO <sub>2</sub> e/y)							-807
Carbon sink potential - Mid - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-6,200
Carbon sink potential - Mid - Restore productivity (1000 tCO <sub>2</sub> e/y)							-3,105
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-29,786
Carbon sink potential - High - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-356
Carbon sink potential - High - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-1,334
Carbon sink potential - High - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-9,227
Carbon sink potential - High - Improve plantations (1000 tCO <sub>2</sub> e/y)							-3,044
Carbon sink potential - High - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-13,825
Carbon sink potential - High - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-1,120
Carbon sink potential - High - Reforest cropland (1000 tCO <sub>2</sub> e/y)							-1,077
Carbon sink potential - High - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-11,526
Carbon sink potential - High - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-46,154
Carbon sink potential - High - Restore productivity (1000 tCO <sub>2</sub> e/y)							-4,644
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							29.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							170
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,803
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							561
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)							56
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							35.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							56.8
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							931
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,642
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							43.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							175
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,254
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							844
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)							81.2
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							53.4
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							410
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,876
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,737
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							58.3
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							181
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,705
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,121
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)							106
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							71.2
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							327
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,539



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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,110