



Net-Zero America - Maine data

October 29, 2021 (updated January 9, 2022)

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

E. Larson, C. Greig, J. Jenkins, E. Mayfield, A. Pascale, C. Zhang, J. Drossman, R. Williams, S. Pacala, R. Socolow, EJ Baik, R. Birdsey, R. Duke, R. Jones, B. Haley, E. Leslie, K. Paustian, and A. Swan, Net-Zero America: Potential Pathways, Infrastructure, and Impacts, Final Report, Princeton University, Princeton, NJ, 29 October 2021. Report available at <https://net-zeroamerica.princeton.edu>.

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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)		14	0.017	0.017	0.016	0.009	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		3.96	2.23	1.42	1.31	0.807	0.376
Premature deaths from air pollution - Mobile - On-Road (deaths)		18.4	16.8	12.5	7.05	3.11	1.14
Premature deaths from air pollution - Gas Stations (deaths)		0.971	0.873	0.642	0.368	0.17	0.073
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		3.95	3.3	2.26	1.26	0.594	0.222
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		9.32	7.1	4.51	2.4	0.972	0.276
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.12	0.997	0.754	0.476	0.249	0.113
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.29	0.272	0.254	0.236	0.218	0.2
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.85	3.5	2.81	1.98	1.28	0.753
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		9.58	7.35	4.71	2.55	1.54	1.09
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.757	0.628	0.503	0.386	0.277	0.178
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.089	0.043	0.042	0.04	0.04	0.039
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		7.17	6.46	5.55	4.23	2.96	1.74
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		124	0.147	0.147	0.14	0.083	0.004
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		35.1	19.8	12.6	11.6	7.15	3.33
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		163	149	111	62.7	27.6	10.1
Monetary damages from air pollution - Gas Stations (million \$2019)		8.6	7.73	5.69	3.26	1.51	0.648
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		35	29.2	20.1	11.2	5.26	1.97
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		82.6	62.9	40	21.3	8.61	2.44
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		9.91	8.84	6.68	4.22	2.2	1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		2.57	2.41	2.25	2.09	1.93	1.77
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		34	31	24.9	17.6	11.3	6.66

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		84.8	65	41.7	22.6	13.6	9.64
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		6.7	5.56	4.46	3.41	2.45	1.57
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		0.786	0.377	0.367	0.353	0.35	0.34
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		63.6	57.3	49.3	37.5	26.3	15.5

Table 2: E+ scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		239	508	206	160	118	245
By economic sector - Construction (jobs)		1,741	2,193	2,796	3,686	5,341	19,362
By economic sector - Manufacturing (jobs)		1,135	1,515	1,694	1,599	2,161	5,491
By economic sector - Mining (jobs)		648	485	333	220	145	94.3
By economic sector - Other (jobs)		153	180	264	370	530	2,150
By economic sector - Pipeline (jobs)		98.9	121	72.1	70.3	56.4	70.6
By economic sector - Professional (jobs)		1,521	1,935	2,120	2,787	3,740	9,680
By economic sector - Trade (jobs)		900	985	1,169	1,503	2,030	5,617
By economic sector - Utilities (jobs)		1,079	1,430	1,934	2,988	5,286	23,803
By resource sector - Biomass (jobs)		1,028	1,401	586	482	430	1,046
By resource sector - CO2 (jobs)		0	272	0	112	111	313
By resource sector - Grid (jobs)		1,367	1,975	3,332	4,978	9,979	48,862
By resource sector - Natural Gas (jobs)		701	421	242	523	296	262
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		1,867	1,546	1,179	872	650	481
By resource sector - Solar (jobs)		984	770	611	737	1,055	5,994
By resource sector - Wind (jobs)		1,569	2,966	4,637	5,679	6,884	9,555
By education level - All sectors - High school diploma or less (jobs)		3,093	3,943	4,368	5,443	7,933	28,146
By education level - All sectors - Associates degree or some college (jobs)		2,221	2,775	3,285	4,239	6,235	21,718
By education level - All sectors - Bachelors degree (jobs)		1,702	2,029	2,264	2,842	4,031	12,918
By education level - All sectors - Masters or professional degree (jobs)		429	518	577	738	1,045	3,291
By education level - All sectors - Doctoral degree (jobs)		71.4	86.7	94.1	120	161	441
Related work experience - All sectors - None (jobs)		1,062	1,338	1,504	1,910	2,787	9,766
Related work experience - All sectors - Up to 1 year (jobs)		1,520	1,934	2,137	2,651	3,818	13,115
Related work experience - All sectors - 1 to 4 years (jobs)		2,736	3,382	3,819	4,833	7,005	23,944
Related work experience - All sectors - 4 to 10 years (jobs)		1,738	2,136	2,474	3,166	4,599	15,639
Related work experience - All sectors - Over 10 years (jobs)		459	562	653	823	1,197	4,049
On-the-Job Training - All sectors - None (jobs)		426	514	578	723	1,029	3,419
On-the-Job Training - All sectors - Up to 1 year (jobs)		5,084	6,335	7,032	8,780	12,662	42,987
On-the-Job Training - All sectors - 1 to 4 years (jobs)		1,482	1,846	2,184	2,825	4,160	14,596

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

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - All sectors - 4 to 10 years (jobs)		452	569	693	929	1,379	4,938
On-the-Job Training - All sectors - Over 10 years (jobs)		71	87.2	102	125	176	573
On-Site or In-Plant Training - All sectors - None (jobs)		1,258	1,568	1,756	2,207	3,150	10,442
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		4,566	5,676	6,341	7,940	11,490	39,275
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		1,160	1,444	1,693	2,177	3,202	11,252
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		474	589	708	941	1,387	4,916
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		58.5	74.2	89.8	118	177	629
Wage income - All (million \$2019)		400	498	567	727	1,067	3,682

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		42	37.9	31.3	24.9	19.9	15.7
Oil consumption - Cumulative (million bbls)							956
Oil production - Annual (million bbls)		0	0	0	0	0	0
Natural gas consumption - Annual (tcf)		36	30.3	24.3	18.3	11.5	7.99
Natural gas consumption - Cumulative (tcf)							732
Natural gas production - Annual (tcf)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	115	106	92.8	76.3	61.2	51.9	48
Final energy use - Residential (PJ)	77.2	68.5	59.5	49.6	40.9	34.8	31.1
Final energy use - Commercial (PJ)	35.3	33	31.4	29.1	26.7	25.2	24.5
Final energy use - Industry (PJ)	90.9	89.1	85.7	82.2	79.8	103	102

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		0.631	0.64	1.22	1.29	1.26	1.32

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV - EV (1000 units)	6.7	98.6	190	512	834	1,091	1,347
Vehicle stocks - LDV - All others (1000 units)	1,124	1,070	1,016	741	465	263	61.1
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		216	554	896	1,358	1,478	1,409
Public EV charging plugs - DC Fast (1000 units)	0.118		0.513		2.24		3.63
Public EV charging plugs - L2 (1000 units)	0.3		12.3		53.9		87.1

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 (%)	3	12.5	61.9	80.8	83.2	83.5	83.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Resistance (%)	1.39	1.41	1.15	0.541	0.387	0.388	0.424
Sales of space heating units - Gas (%)	6.74	3.55	2.57	0.511	0.068	0.03	0.029
Sales of space heating units - Fossil (%)	88.9	82.5	34.4	18.2	16.4	16.1	16.2
Sales of water heating units - Electric Heat Pump (%)	0	2.79	18.7	33.9	36.7	36.9	37
Sales of water heating units - Electric Resistance (%)	25.5	44.1	55.6	61.8	62.9	63	62.9
Sales of water heating units - Gas Furnace (%)	31.8	28.3	20.9	4	0.319	0.011	0
Sales of water heating units - Other (%)	42.8	24.8	4.76	0.282	0.088	0.088	0.088
Sales of cooking units - Electric Resistance (%)	64.2	71.8	95.2	99.8	100	100	100
Sales of cooking units - Gas (%)	35.8	28.2	4.82	0.243	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		1.25	1.28				

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 (%)	2.33	11	39.5	71.3	77.4	77.8	78
Sales of space heating units - Electric Resistance (%)	1.31	4.27	16.7	21.3	22	22.2	22
Sales of space heating units - Gas Furnace (%)	12.2	51.3	37.5	7.1	0.562	0.018	0
Sales of space heating units - Fossil (%)	84.1	33.4	6.38	0.27	0	0	0
Sales of water heating units - Electric Heat Pump (%)	4.05	3.58	15.8	40	45.3	45.8	45.9
Sales of water heating units - Electric Resistance (%)	19.4	12.5	23.7	47.2	52.2	52.5	52.5
Sales of water heating units - Gas Furnace (%)	58.2	78.7	58.4	11.2	0.896	0.03	0
Sales of water heating units - Other (%)	18.4	5.18	2.06	1.6	1.59	1.59	1.61
Sales of cooking units - Electric Resistance (%)	36.9	49.9	81.2	87.4	87.7	87.7	87.7
Sales of cooking units - Gas (%)	63.1	50.1	18.8	12.6	12.3	12.3	12.3
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		2,622	2,862				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Natural gas (MW)	1,556	568	308	308	1,766	1,762	1,762
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	86.1	150	176	205	239	277	319
Installed renewables - Solar - Base land use assumptions (MW)	85.4	85.4	85.4	85.4	85.4	85.4	4,582
Installed renewables - Wind - Base land use assumptions (MW)	1,011	1,011	1,011	1,011	1,011	1,011	1,052
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	0	0	0	0	3,018	28,436
Installed renewables - Solar - Constrained land use assumptions (MW)	85.4	85.4	85.4	614	940	940	4,197
Installed renewables - Wind - Constrained land use assumptions (MW)	1,011	1,011	1,011	1,011	1,011	1,011	1,011
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	32,868
Capital invested - Solar PV - Base (billion \$2018)		0	0	0	0	0	4.17

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Wind - Base (billion \$2018)		0	0	0	0	0	0.077
Capital invested - Offshore Wind - Base (billion \$2018)		0	0	0	0	5.07	33.7
Capital invested - Solar PV - Constrained (billion \$2018)		0.114	0	0	0	0.302	5.36
Capital invested - Wind - Constrained (billion \$2018)		0	0	0	0	0	0
Capital invested - Biomass power plant (billion \$2018)	0	0	0.184	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	176	176	176	176	176	176	8,224
Wind - Base land use assumptions (GWh)	4,130	4,130	4,130	4,130	4,130	4,130	4,304
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	15,250	142,922
Solar - Constrained land use assumptions (GWh)	176	176	176	1,129	1,717	1,717	7,529
Wind - Constrained land use assumptions (GWh)	4,130	4,130	4,130	4,130	4,130	4,130	4,130
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	15,250	142,922
Biomass power plant (GWh)	0	0	361	361	361	361	361
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	1	1	1	1	1
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	2
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	1	1	1	1	1	1
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment - Cumulative 5-yr (million \$2018)		0.039	205	0	0	0	2,372
Biomass purchases (million \$2018/y)		0.025	14.3	14.3	14.3	14.3	126

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	3.32	3.42	6.58
Annual - BECCS (MMT)		0	0	0	0	0	3.05
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	3.32	3.42	3.53

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

Item	2020	2025	2030	2035	2040	2045	2050
Cumulative - All (MMT)		0	0	0	3.32	6.74	13.3
Cumulative - BECCS (MMT)		0	0	0	0	0	3.05
Cumulative - NGCC (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	3.32	6.74	10.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	151	151	151	151	151
Spur (km)		0	0	0	116	116	498
All (km)		0	151	151	267	267	649
Cumulative investment - Trunk (million \$2018)		0	273	273	273	273	273
Cumulative investment - Spur (million \$2018)		0	0	0	115	116	350
Cumulative investment - All (million \$2018)		0	273	273	388	390	623

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-53.7
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-89.7
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,068
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-157
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,636
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-46.4
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-201
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-28.2
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,195
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-9,475
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-80.5
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-314
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-7,329
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-230

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-7,273
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-89.4
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-301
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-200
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,370
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-18,187
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-107
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-538
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-10,590
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-309
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-10,909
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-133
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-401
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-373
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-26,905
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,545
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							8.77
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							68.4
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,069
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							56.9
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)							6.63
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							13.3
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.84
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							711
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,936

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 - Accelerate regeneration (1000 hectares)							13.2
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							70.6
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,734
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							85.7
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)							9.61
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							19.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							13.3
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,432
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,379
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							17.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							72.9
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							5,400
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							114
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)							12.6
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							26.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							10.6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,175
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,829

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-164
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-5.04
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-169
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-312
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-10.1
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-322
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							91.1
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							9.16
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							100
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							173
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							18.3
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							191

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)		14	0.017	0.017	0.016	0.009	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		3.86	1.81	0.691	0.292	0.09	0.1
Premature deaths from air pollution - Mobile - On-Road (deaths)		18.7	18.5	17.6	15.5	12.1	8.08
Premature deaths from air pollution - Gas Stations (deaths)		0.992	0.98	0.925	0.809	0.627	0.421

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		3.97	3.59	3.14	2.57	1.91	1.26
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		9.46	8.43	7.54	6.34	4.81	3.33
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.13	1.08	1.02	0.911	0.733	0.539
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.29	0.272	0.254	0.236	0.218	0.2
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.86	3.8	3.7	3.41	2.92	2.35
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		9.64	8.08	6.56	5.16	4.3	3.66
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.757	0.673	0.59	0.51	0.433	0.362
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.086	0.043	0.042	0.041	0.04	0.037
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		7.14	6.13	4.91	4	3.33	2.34
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		124	0.147	0.147	0.14	0.083	0.004
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		34.2	16.1	6.12	2.58	0.799	0.888
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		166	164	156	138	107	71.8
Monetary damages from air pollution - Gas Stations (million \$2019)		8.79	8.68	8.19	7.16	5.55	3.73
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		35.2	31.8	27.8	22.8	16.9	11.2
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		83.8	74.7	66.8	56.2	42.6	29.5
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		10	9.59	9.05	8.07	6.49	4.78
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		2.57	2.41	2.25	2.09	1.93	1.77
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		34.1	33.7	32.7	30.2	25.9	20.8
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		85.3	71.5	58	45.7	38	32.4
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		6.7	5.96	5.23	4.51	3.84	3.2
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		0.76	0.378	0.37	0.359	0.351	0.328

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		63.4	54.4	43.6	35.5	29.6	20.8

Table 18: E- scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		292	465	180	121	100	246
By economic sector - Construction (jobs)		1,751	2,305	2,628	3,323	5,923	24,254
By economic sector - Manufacturing (jobs)		1,168	1,554	1,563	1,501	2,652	7,099
By economic sector - Mining (jobs)		653	509	395	298	216	143
By economic sector - Other (jobs)		154	183	248	335	576	2,526
By economic sector - Pipeline (jobs)		99.6	147	80.7	95.5	85.6	114
By economic sector - Professional (jobs)		1,550	1,868	2,037	2,607	4,096	11,916
By economic sector - Trade (jobs)		905	1,009	1,182	1,468	2,268	6,909
By economic sector - Utilities (jobs)		1,064	1,489	1,617	2,238	5,771	30,548
By resource sector - Biomass (jobs)		1,106	1,251	597	508	426	1,015
By resource sector - CO2 (jobs)		0	467	0	191	191	537
By resource sector - Grid (jobs)		1,328	1,876	2,729	3,740	11,036	62,755
By resource sector - Natural Gas (jobs)		701	419	182	147	141	262
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		1,884	1,637	1,422	1,202	978	729
By resource sector - Solar (jobs)		1,003	795	556	676	1,174	6,152
By resource sector - Wind (jobs)		1,615	3,084	4,443	5,522	7,742	12,304
By education level - All sectors - High school diploma or less (jobs)		3,161	4,027	4,085	4,854	8,882	35,464
By education level - All sectors - Associates degree or some college (jobs)		2,246	2,849	3,055	3,754	6,955	27,378
By education level - All sectors - Bachelors degree (jobs)		1,723	2,050	2,151	2,593	4,510	16,241
By education level - All sectors - Masters or professional degree (jobs)		435	518	547	673	1,162	4,125
By education level - All sectors - Doctoral degree (jobs)		72.6	85.4	91	113	178	546
Related work experience - All sectors - None (jobs)		1,082	1,366	1,407	1,700	3,111	12,298
Related work experience - All sectors - Up to 1 year (jobs)		1,554	1,964	2,006	2,386	4,273	16,478
Related work experience - All sectors - 1 to 4 years (jobs)		2,779	3,442	3,585	4,330	7,827	30,159
Related work experience - All sectors - 4 to 10 years (jobs)		1,759	2,183	2,319	2,833	5,135	19,709
Related work experience - All sectors - Over 10 years (jobs)		465	574	612	738	1,342	5,110
On-the-Job Training - All sectors - None (jobs)		432	523	549	660	1,151	4,285
On-the-Job Training - All sectors - Up to 1 year (jobs)		5,179	6,429	6,612	7,899	14,175	54,110
On-the-Job Training - All sectors - 1 to 4 years (jobs)		1,499	1,898	2,030	2,499	4,638	18,416
On-the-Job Training - All sectors - 4 to 10 years (jobs)		456	589	642	815	1,525	6,223
On-the-Job Training - All sectors - Over 10 years (jobs)		71.9	90	95.8	114	198	720
On-Site or In-Plant Training - All sectors - None (jobs)		1,280	1,592	1,651	1,989	3,518	13,115
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		4,647	5,769	5,959	7,134	12,862	49,454

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

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		1,174	1,483	1,576	1,929	3,574	14,195
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		477	609	659	831	1,538	6,197
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		59	76.5	83	104	196	794
Wage income - All (million \$2019)		406	507	533	652	1,191	4,640

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	115	107	97.2	89.2	82.9	75.5	66.9
Final energy use - Residential (PJ)	77.2	68.8	62.6	57.4	52.4	47.4	42.8
Final energy use - Commercial (PJ)	35.3	33	32	31	30	29	28.3
Final energy use - Industry (PJ)	90.9	89.2	86.1	83	81.1	104	103

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		0.484	0.475	0.654	0.668	1.11	1.17

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	5.19	32.2	59.2	184	309	586	863
Vehicle stocks - LDV – All others (1000 units)	1,128	1,128	1,128	1,070	1,012	780	548
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	35	73.4	248	780	1,136
Public EV charging plugs - DC Fast (1000 units)	0.118		0.159		0.833		2.32
Public EV charging plugs - L2 (1000 units)	0.3		3.82		20		55.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	3	2.62	5.43	13.6	26.9	36.8	40.8
Sales of space heating units - Electric Resistance (%)	1.39	1.43	1.43	1.44	1.28	1.11	1.03
Sales of space heating units - Gas (%)	6.74	3.62	3.58	3.39	2.96	2.45	2.07
Sales of space heating units - Fossil (%)	88.9	92.3	89.6	81.5	68.9	59.6	56.1
Sales of water heating units - Electric Heat Pump (%)	0	0.324	1.24	4.01	9.3	14.5	17.2
Sales of water heating units - Electric Resistance (%)	25.5	41.9	42.4	44.6	47.8	50.5	51.8
Sales of water heating units - Gas Furnace (%)	31.8	28.7	28.4	26.9	23.4	18.8	16
Sales of water heating units - Other (%)	42.8	29.1	28	24.5	19.5	16.2	15
Sales of cooking units - Electric Resistance (%)	64.1	65	68.3	77	89	96.5	99
Sales of cooking units - Gas (%)	35.9	35	31.7	23	11	3.54	0.953
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		1.25	1.38				

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 (%)	2.33	6.89	8.48	13.3	22.8	32.7	38.1
Sales of space heating units - Electric Resistance (%)	1.31	1.76	2.43	4.48	7.93	10.5	11.3
Sales of space heating units - Gas Furnace (%)	12.2	52.1	51	48.4	42.5	34.6	29.5
Sales of space heating units - Fossil (%)	84.1	39.2	38.1	33.9	26.8	22.3	21
Sales of water heating units - Electric Heat Pump (%)	4.05	2.68	3.38	5.63	11.1	17.9	22
Sales of water heating units - Electric Resistance (%)	19.4	11.6	11.9	14.5	19.6	26	29.9
Sales of water heating units - Gas Furnace (%)	58.2	79.9	79.4	75.1	65.2	52.6	44.8
Sales of water heating units - Other (%)	18.4	5.77	5.34	4.75	4.17	3.55	3.28
Sales of cooking units - Electric Resistance (%)	36.9	40.7	44.7	56.5	72.7	82.9	86.4
Sales of cooking units - Gas (%)	63.1	59.3	55.3	43.5	27.3	17.1	13.6
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		2,622	2,866				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Natural gas (MW)	1,556	568	3.8	3.8	3.8	121	1,014
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-53.7
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-89.7
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,068
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-157
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,636
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-46.4
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-201
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-28.2
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,195
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-9,475
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-80.5
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-314
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-7,329
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-230
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-7,273

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-89.4
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-301
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-200
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,370
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-18,187
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-107
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-538
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-10,590
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-309
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-10,909
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-133
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-401
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-373
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-26,905
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,545
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							8.77
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							68.4
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,069
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							56.9
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)							6.63
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							13.3
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.84
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							711
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,936
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							13.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							70.6
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,734
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							85.7
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)							9.61
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							19.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							13.3
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,432
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,379
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							17.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							72.9
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							5,400
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							114
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)							12.6
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							26.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							10.6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,175
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,829

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-164
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-5.04
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-169
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-312
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-10.1
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-322
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							91.1
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							9.16
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							100
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							173
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							18.3
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							191

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)		14	0.017	0.017	0.016	0.009	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		3.68	1.98	1.09	0.848	0.287	0.103
Premature deaths from air pollution - Mobile - On-Road (deaths)		18.4	16.8	12.5	7.05	3.11	1.14
Premature deaths from air pollution - Gas Stations (deaths)		0.971	0.873	0.642	0.368	0.17	0.073
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		3.95	3.3	2.26	1.26	0.594	0.222
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		9.32	7.1	4.51	2.4	0.972	0.276

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.12	0.997	0.754	0.476	0.249	0.113
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.29	0.272	0.254	0.236	0.218	0.2
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.85	3.5	2.81	1.98	1.28	0.753
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		9.58	7.35	4.71	2.55	1.54	1.09
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.757	0.628	0.503	0.386	0.277	0.178
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.096	0.043	0.042	0.04	0.04	0.036
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		7	6.33	5.1	3.55	1.99	0.211
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		124	0.147	0.147	0.14	0.083	0.004
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		32.6	17.5	9.62	7.52	2.54	0.916
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		163	149	111	62.7	27.6	10.1
Monetary damages from air pollution - Gas Stations (million \$2019)		8.6	7.73	5.69	3.26	1.51	0.648
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		35	29.2	20.1	11.2	5.26	1.97
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		82.6	62.9	40	21.3	8.61	2.44
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		9.91	8.84	6.68	4.22	2.2	1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		2.57	2.41	2.25	2.09	1.93	1.77
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		34	31	24.9	17.6	11.3	6.66
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		84.8	65	41.7	22.6	13.6	9.64
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		6.7	5.56	4.46	3.41	2.45	1.57
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		0.851	0.377	0.366	0.353	0.35	0.315
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		62.2	56.2	45.2	31.5	17.7	1.88

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		241	500	203	132	105	237
By economic sector - Construction (jobs)		1,806	2,235	3,702	5,141	13,750	32,631
By economic sector - Manufacturing (jobs)		1,178	1,651	2,433	2,059	3,978	8,155
By economic sector - Mining (jobs)		646	479	322	201	111	2.56
By economic sector - Other (jobs)		159	193	391	572	1,718	3,883
By economic sector - Pipeline (jobs)		97.8	85.9	67	49.2	32.1	3.61
By economic sector - Professional (jobs)		1,519	2,077	2,701	3,881	8,046	16,519
By economic sector - Trade (jobs)		893	1,037	1,469	2,077	4,550	9,637
By economic sector - Utilities (jobs)		1,114	1,381	2,480	3,956	14,071	39,104
By resource sector - Biomass (jobs)		937	1,410	547	433	391	1,041
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Grid (jobs)		1,433	2,221	4,316	6,846	28,205	80,850
By resource sector - Natural Gas (jobs)		688	317	231	496	200	178
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		1,868	1,533	1,152	811	504	0.051
By resource sector - Solar (jobs)		1,049	905	1,386	1,460	5,613	10,959
By resource sector - Wind (jobs)		1,679	3,254	6,135	8,023	11,449	17,145
By education level - All sectors - High school diploma or less (jobs)		3,155	4,039	5,680	7,303	19,246	46,457
By education level - All sectors - Associates degree or some college (jobs)		2,273	2,855	4,315	5,759	15,070	36,057
By education level - All sectors - Bachelors degree (jobs)		1,721	2,112	2,914	3,837	9,288	21,422
By education level - All sectors - Masters or professional degree (jobs)		433	541	739	1,004	2,402	5,491
By education level - All sectors - Doctoral degree (jobs)		71.6	91.8	120	166	354	745
Related work experience - All sectors - None (jobs)		1,081	1,370	1,953	2,571	6,730	16,165
Related work experience - All sectors - Up to 1 year (jobs)		1,546	1,997	2,786	3,577	9,151	21,697
Related work experience - All sectors - 1 to 4 years (jobs)		2,786	3,487	4,953	6,520	16,700	39,671
Related work experience - All sectors - 4 to 10 years (jobs)		1,772	2,202	3,222	4,288	10,952	25,944
Related work experience - All sectors - Over 10 years (jobs)		469	582	854	1,112	2,828	6,696
On-the-Job Training - All sectors - None (jobs)		431	533	750	981	2,444	5,684
On-the-Job Training - All sectors - Up to 1 year (jobs)		5,167	6,544	9,121	11,814	30,005	71,064
On-the-Job Training - All sectors - 1 to 4 years (jobs)		1,519	1,894	2,858	3,833	10,087	24,231
On-the-Job Training - All sectors - 4 to 10 years (jobs)		464	578	903	1,270	3,411	8,245
On-the-Job Training - All sectors - Over 10 years (jobs)		72.8	90.2	135	170	414	949
On-Site or In-Plant Training - All sectors - None (jobs)		1,280	1,622	2,288	2,988	7,433	17,329
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		4,642	5,860	8,228	10,689	27,330	64,941
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		1,187	1,482	2,214	2,949	7,764	18,664
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		485	599	920	1,281	3,403	8,195
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		59.9	75.9	118	161	431	1,043
Wage income - All (million \$2019)		407	513	733	980	2,532	6,095

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	115	106	92.8	76.3	61.2	51.9	48
Final energy use - Residential (PJ)	77.2	68.5	59.5	49.6	40.9	34.8	31.1
Final energy use - Commercial (PJ)	35.3	33	31.4	29.1	26.7	25.2	24.5
Final energy use - Industry (PJ)	90.9	89.1	85.7	82.2	79.8	103	102

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		0.631	0.64	1.22	1.29	1.26	1.32

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	6.7	98.6	190	512	834	1,091	1,347
Vehicle stocks - LDV – All others (1000 units)	1,124	1,070	1,016	741	465	263	61.1
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		216	554	896	1,358	1,478	1,409
Public EV charging plugs - DC Fast (1000 units)	0.118		0.513		2.24		3.63
Public EV charging plugs - L2 (1000 units)	0.3		12.3		53.9		87.1

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 (%)	3	12.5	61.9	80.8	83.2	83.5	83.4
Sales of space heating units - Electric Resistance (%)	1.39	1.41	1.15	0.541	0.387	0.388	0.424
Sales of space heating units - Gas (%)	6.74	3.55	2.57	0.511	0.068	0.03	0.029
Sales of space heating units - Fossil (%)	88.9	82.5	34.4	18.2	16.4	16.1	16.2
Sales of water heating units - Electric Heat Pump (%)	0	2.79	18.7	33.9	36.7	36.9	37
Sales of water heating units - Electric Resistance (%)	25.5	44.1	55.6	61.8	62.9	63	62.9
Sales of water heating units - Gas Furnace (%)	31.8	28.3	20.9	4	0.319	0.011	0
Sales of water heating units - Other (%)	42.8	24.8	4.76	0.282	0.088	0.088	0.088
Sales of cooking units - Electric Resistance (%)	64.2	71.8	95.2	99.8	100	100	100
Sales of cooking units - Gas (%)	35.8	28.2	4.82	0.243	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		1.25	1.28				

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 (%)	2.33	11	39.5	71.3	77.4	77.8	78
Sales of space heating units - Electric Resistance (%)	1.31	4.27	16.7	21.3	22	22.2	22
Sales of space heating units - Gas Furnace (%)	12.2	51.3	37.5	7.1	0.562	0.018	0
Sales of space heating units - Fossil (%)	84.1	33.4	6.38	0.27	0	0	0
Sales of water heating units - Electric Heat Pump (%)	4.05	3.58	15.8	40	45.3	45.8	45.9
Sales of water heating units - Electric Resistance (%)	19.4	12.5	23.7	47.2	52.2	52.5	52.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	58.2	78.7	58.4	11.2	0.896	0.03	0
Sales of water heating units - Other (%)	18.4	5.18	2.06	1.6	1.59	1.59	1.61
Sales of cooking units - Electric Resistance (%)	36.9	49.9	81.2	87.4	87.7	87.7	87.7
Sales of cooking units - Gas (%)	63.1	50.1	18.8	12.6	12.3	12.3	12.3
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		2,622	2,862				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Natural gas (MW)	1,556	568	568	568	1,234	1,234	1,230
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	86.1	150	176	205	239	277	319
Installed renewables - Solar - Base land use assumptions (MW)	85.4	85.4	85.4	479	796	4,351	13,882
Installed renewables - Wind - Base land use assumptions (MW)	1,011	1,011	1,011	1,011	1,011	1,011	1,052
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	0	0	0	208	12,804	46,382
Installed renewables - Solar - Constrained land use assumptions (MW)	85.5	85.5	85.5	85.5	403	4,624	14,230
Installed renewables - Wind - Constrained land use assumptions (MW)	1,145	1,145	1,145	1,145	1,145	1,145	1,145
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	51,104
Capital invested - Solar PV - Base (billion \$2018)		0	0	0.434	0.33	3.49	8.83
Capital invested - Wind - Base (billion \$2018)		0	0	0	0	0	0.077
Capital invested - Offshore Wind - Base (billion \$2018)		0	0	0	0.583	20.6	44.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	176	176	176	888	1,458	7,777	24,453
Wind - Base land use assumptions (GWh)	4,130	4,130	4,130	4,130	4,130	4,130	4,304
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	1,440	64,157	234,209
Solar - Constrained land use assumptions (GWh)	352	352	352	352	1,493	16,521	50,111
Wind - Constrained land use assumptions (GWh)	8,259	8,259	8,259	8,259	8,259	8,259	8,259
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	512,804

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-53.7
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-89.7
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,068
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-157

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,636
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-46.4
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-201
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-28.2
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,195
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-9,475
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-80.5
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-314
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-7,329
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-230
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-7,273
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-89.4
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-301
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-200
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,370
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-18,187
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-107
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-538
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-10,590
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-309
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-10,909
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-133
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-401
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-373
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-26,905
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,545
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							8.77
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							68.4
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,069

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							56.9
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)							6.63
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							13.3
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.84
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							711
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,936
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							13.2
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							70.6
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,734
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							85.7
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)							9.61
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							19.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							13.3
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,432
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,379
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							17.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							72.9
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							5,400
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							114
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							12.6
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							26.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							10.6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,175
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,829

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-164
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-5.04
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-169
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-312
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-10.1
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-322
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							91.1
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							9.16
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							100
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							173
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							18.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							191

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)		14	0.017	0.017	0.016	0.009	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		3.92	2.19	2.37	1.77	0.84	0.197
Premature deaths from air pollution - Mobile - On-Road (deaths)		18.4	16.8	12.5	7.05	3.11	1.14
Premature deaths from air pollution - Gas Stations (deaths)		0.971	0.873	0.642	0.368	0.17	0.073
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		3.95	3.3	2.26	1.26	0.594	0.222
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		9.32	7.1	4.51	2.4	0.972	0.276
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.12	0.997	0.754	0.476	0.249	0.113
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.29	0.272	0.254	0.236	0.218	0.2
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.85	3.5	2.81	1.98	1.28	0.753
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		9.58	7.35	4.71	2.55	1.54	1.09
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.757	0.628	0.503	0.386	0.277	0.178
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.082	0.043	0.042	0.04	0.04	0.036
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		7.28	6.83	6.52	5.55	4.56	3.35
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		124	0.147	0.147	0.14	0.083	0.004
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		34.7	19.4	21	15.7	7.44	1.74
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		163	149	111	62.7	27.6	10.1
Monetary damages from air pollution - Gas Stations (million \$2019)		8.6	7.73	5.69	3.26	1.51	0.648
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		35	29.2	20.1	11.2	5.26	1.97
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		82.6	62.9	40	21.3	8.61	2.44
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		9.91	8.84	6.68	4.22	2.2	1

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		2.57	2.41	2.25	2.09	1.93	1.77
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		34	31	24.9	17.6	11.3	6.66
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		84.8	65	41.7	22.6	13.6	9.64
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		6.7	5.56	4.46	3.41	2.45	1.57
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		0.721	0.377	0.366	0.353	0.35	0.314
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		64.7	60.6	57.9	49.3	40.5	29.8

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		274	491	169	131	113	252
By economic sector - Construction (jobs)		1,653	1,846	1,801	2,330	2,374	2,871
By economic sector - Manufacturing (jobs)		1,378	1,043	1,107	890	714	1,437
By economic sector - Mining (jobs)		650	488	340	228	155	112
By economic sector - Other (jobs)		145	138	164	215	245	339
By economic sector - Pipeline (jobs)		100	155	77.9	91.1	78.9	118
By economic sector - Professional (jobs)		1,411	1,483	1,323	1,926	1,812	2,259
By economic sector - Trade (jobs)		835	807	800	1,008	998	1,197
By economic sector - Utilities (jobs)		1,019	1,254	1,260	3,795	2,351	2,791
By resource sector - Biomass (jobs)		959	1,258	579	491	444	1,048
By resource sector - CO2 (jobs)		0	527	0	216	216	607
By resource sector - Grid (jobs)		1,211	1,456	2,134	3,064	3,355	3,902
By resource sector - Natural Gas (jobs)		749	427	282	273	217	182
By resource sector - Nuclear (jobs)		0	0	0	2,611	528	520
By resource sector - Oil (jobs)		1,866	1,546	1,179	872	663	540
By resource sector - Solar (jobs)		882	395	422	425	424	1,351
By resource sector - Wind (jobs)		1,797	2,095	2,445	2,662	2,995	3,225
By education level - All sectors - High school diploma or less (jobs)		3,103	3,301	2,942	3,492	3,433	4,532
By education level - All sectors - Associates degree or some college (jobs)		2,206	2,269	2,150	2,696	2,661	3,446
By education level - All sectors - Bachelors degree (jobs)		1,673	1,648	1,509	1,878	1,797	2,307
By education level - All sectors - Masters or professional degree (jobs)		416	418	379	493	473	598
By education level - All sectors - Doctoral degree (jobs)		67.7	68.7	61	82.6	77.8	97.2
Related work experience - All sectors - None (jobs)		1,055	1,116	1,007	1,230	1,211	1,583
Related work experience - All sectors - Up to 1 year (jobs)		1,519	1,595	1,428	1,710	1,668	2,218
Related work experience - All sectors - 1 to 4 years (jobs)		2,714	2,789	2,544	3,130	3,054	3,947
Related work experience - All sectors - 4 to 10 years (jobs)		1,717	1,749	1,632	2,042	1,996	2,565
Related work experience - All sectors - Over 10 years (jobs)		459	455	431	529	513	668

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

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - All sectors - None (jobs)		419	422	387	473	459	595
On-the-Job Training - All sectors - Up to 1 year (jobs)		5,068	5,214	4,706	5,697	5,531	7,260
On-the-Job Training - All sectors - 1 to 4 years (jobs)		1,469	1,521	1,432	1,799	1,780	2,280
On-the-Job Training - All sectors - 4 to 10 years (jobs)		437	477	450	592	597	743
On-the-Job Training - All sectors - Over 10 years (jobs)		71.8	70.4	66.7	79.1	76.3	101
On-Site or In-Plant Training - All sectors - None (jobs)		1,250	1,283	1,161	1,428	1,384	1,809
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		4,547	4,676	4,244	5,146	5,007	6,557
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		1,151	1,191	1,116	1,389	1,371	1,764
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		459	494	463	603	604	754
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		57.5	61.1	58.5	75.3	75.2	96.6
Wage income - All (million \$2019)		396	411	379	473	467	609

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	115	106	92.8	76.3	61.2	51.9	48
Final energy use - Residential (PJ)	77.2	68.5	59.5	49.6	40.9	34.8	31.1
Final energy use - Commercial (PJ)	35.3	33	31.4	29.1	26.7	25.2	24.5
Final energy use - Industry (PJ)	90.9	89.1	85.7	82.2	79.8	103	102

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		0.631	0.64	1.22	1.29	1.26	1.32

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	6.7	98.6	190	512	834	1,091	1,347
Vehicle stocks - LDV – All others (1000 units)	1,124	1,070	1,016	741	465	263	61.1
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		216	554	896	1,358	1,478	1,409
Public EV charging plugs - DC Fast (1000 units)	0.118		0.513		2.24		3.63
Public EV charging plugs - L2 (1000 units)	0.3		12.3		53.9		87.1

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 (%)	3	12.5	61.9	80.8	83.2	83.5	83.4
Sales of space heating units - Electric Resistance (%)	1.39	1.41	1.15	0.541	0.387	0.388	0.424
Sales of space heating units - Gas (%)	6.74	3.55	2.57	0.511	0.068	0.03	0.029
Sales of space heating units - Fossil (%)	88.9	82.5	34.4	18.2	16.4	16.1	16.2
Sales of water heating units - Electric Heat Pump (%)	0	2.79	18.7	33.9	36.7	36.9	37

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Electric Resistance (%)	25.5	44.1	55.6	61.8	62.9	63	62.9
Sales of water heating units - Gas Furnace (%)	31.8	28.3	20.9	4	0.319	0.011	0
Sales of water heating units - Other (%)	42.8	24.8	4.76	0.282	0.088	0.088	0.088
Sales of cooking units - Electric Resistance (%)	64.2	71.8	95.2	99.8	100	100	100
Sales of cooking units - Gas (%)	35.8	28.2	4.82	0.243	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		1.25	1.28				

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 (%)	2.33	11	39.5	71.3	77.4	77.8	78
Sales of space heating units - Electric Resistance (%)	1.31	4.27	16.7	21.3	22	22.2	22
Sales of space heating units - Gas Furnace (%)	12.2	51.3	37.5	7.1	0.562	0.018	0
Sales of space heating units - Fossil (%)	84.1	33.4	6.38	0.27	0	0	0
Sales of water heating units - Electric Heat Pump (%)	4.05	3.58	15.8	40	45.3	45.8	45.9
Sales of water heating units - Electric Resistance (%)	19.4	12.5	23.7	47.2	52.2	52.5	52.5
Sales of water heating units - Gas Furnace (%)	58.2	78.7	58.4	11.2	0.896	0.03	0
Sales of water heating units - Other (%)	18.4	5.18	2.06	1.6	1.59	1.59	1.61
Sales of cooking units - Electric Resistance (%)	36.9	49.9	81.2	87.4	87.7	87.7	87.7
Sales of cooking units - Gas (%)	63.1	50.1	18.8	12.6	12.3	12.3	12.3
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		2,622	2,862				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Natural gas (MW)	1,556	384	125	125	246	246	242
Installed thermal - Nuclear (MW)	0	0	0	0	1,114	1,114	1,114
Installed renewables - Rooftop PV (MW)	86.1	150	176	205	239	277	319
Installed renewables - Solar - Base land use assumptions (MW)	85.4	85.4	85.4	85.4	85.4	85.4	85.4
Installed renewables - Wind - Base land use assumptions (MW)	1,011	1,011	1,011	1,011	1,011	1,011	1,011
Installed renewables - Solar - Constrained land use assumptions (MW)	85.5	85.5	85.5	85.5	85.5	85.5	85.5
Installed renewables - Wind - Constrained land use assumptions (MW)	1,011	1,011	1,011	1,011	1,011	1,011	1,011
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion \$2018)		0	0	0	0	0	0
Capital invested - Wind - Base (billion \$2018)		0	0	0	0	0	0
Capital invested - Solar PV - Constrained (billion \$2018)		0	0	0	0	0	0
Capital invested - Wind - Constrained (billion \$2018)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	176	176	176	176	176	176	176
Wind - Base land use assumptions (GWh)	4,130	4,130	4,130	4,130	4,130	4,130	4,130
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	176	176	176	176	176	176	176
Wind - Constrained land use assumptions (GWh)	4,130	4,130	4,130	4,130	4,130	4,130	4,130
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)							-53.7
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-89.7
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,068
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-157
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,636
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-46.4
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-201
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-28.2
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,195
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-9,475
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-80.5
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-314
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-7,329
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-230
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-7,273
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-89.4
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-301
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-200
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,370
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-18,187
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-107
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-538
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-10,590

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-309
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-10,909
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-133
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-401
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-373
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-26,905
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,545
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							8.77
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							68.4
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,069
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							56.9
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)							6.63
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							13.3
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.84
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							711
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,936
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							13.2
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							70.6
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,734
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							85.7
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)							9.61
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							19.9

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 - Reforest pasture (1000 hectares)							13.3
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,432
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,379
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							17.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							72.9
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							5,400
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							114
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)							12.6
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							26.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							10.6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,175
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,829

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO ₂ e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO ₂ e/y)							-164
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-5.04
Carbon sink potential - Moderate deployment - Total (1000 tCO ₂ e/y)							-169
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO ₂ e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO ₂ e/y)							-312
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-10.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-322
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							91.1
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							9.16
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							100
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							173
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							18.3
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							191

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)		14	0.017	0.017	0.016	0.009	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		3.86	1.7	0.816	0.613	0.359	0.142
Premature deaths from air pollution - Mobile - On-Road (deaths)		18.7	18.5	17.6	15.5	12.1	8.08
Premature deaths from air pollution - Gas Stations (deaths)		0.992	0.98	0.925	0.809	0.627	0.421
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		3.97	3.59	3.14	2.57	1.91	1.26
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		9.46	8.43	7.54	6.34	4.81	3.33
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.13	1.08	1.02	0.911	0.733	0.539
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.29	0.272	0.254	0.236	0.218	0.2
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.86	3.8	3.7	3.41	2.92	2.35
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		9.64	8.08	6.56	5.16	4.3	3.66
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.757	0.673	0.59	0.51	0.433	0.362
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.089	0.043	0.042	0.041	0.04	0.039

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)		7.14	6.13	4.91	4	3.33	2.34
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		124	0.147	0.147	0.14	0.083	0.004
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		34.2	15.1	7.22	5.43	3.18	1.26
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		166	164	156	138	107	71.8
Monetary damages from air pollution - Gas Stations (million \$2019)		8.79	8.68	8.19	7.16	5.55	3.73
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		35.2	31.8	27.8	22.8	16.9	11.2
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		83.8	74.7	66.8	56.2	42.6	29.5
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		10	9.59	9.05	8.07	6.49	4.78
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		2.57	2.41	2.25	2.09	1.93	1.77
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		34.1	33.7	32.7	30.2	25.9	20.8
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		85.3	71.5	58	45.7	38	32.4
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		6.7	5.96	5.23	4.51	3.84	3.2
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		0.783	0.378	0.37	0.36	0.356	0.343
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		63.4	54.4	43.6	35.5	29.6	20.8

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		267	544	220	163	136	353
By economic sector - Construction (jobs)		1,767	2,367	2,579	2,890	4,411	19,087
By economic sector - Manufacturing (jobs)		1,162	1,592	1,455	1,156	1,849	5,671
By economic sector - Mining (jobs)		653	509	395	306	216	139
By economic sector - Other (jobs)		156	188	243	287	433	2,065
By economic sector - Pipeline (jobs)		99.1	148	81.1	98	85.9	114
By economic sector - Professional (jobs)		1,549	1,990	2,040	2,298	3,165	9,516
By economic sector - Trade (jobs)		910	1,038	1,172	1,303	1,758	5,482
By economic sector - Utilities (jobs)		1,072	1,539	1,598	1,981	4,144	23,751
By resource sector - Biomass (jobs)		1,062	1,465	743	685	628	1,666
By resource sector - CO2 (jobs)		0	479	0	197	196	551
By resource sector - Grid (jobs)		1,345	1,956	2,697	3,263	7,762	48,613
By resource sector - Natural Gas (jobs)		696	418	186	189	170	275
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		1,884	1,637	1,422	1,235	982	710
By resource sector - Solar (jobs)		998	789	522	565	849	5,777

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

Item	2020	2025	2030	2035	2040	2045	2050
By resource sector - Wind (jobs)		1,649	3,172	4,212	4,349	5,609	8,585
By education level - All sectors - High school diploma or less (jobs)		3,150	4,202	4,035	4,266	6,636	28,086
By education level - All sectors - Associates degree or some college (jobs)		2,251	2,949	2,994	3,254	5,152	21,552
By education level - All sectors - Bachelors degree (jobs)		1,725	2,132	2,121	2,272	3,394	12,841
By education level - All sectors - Masters or professional degree (jobs)		435	542	542	591	878	3,263
By education level - All sectors - Doctoral degree (jobs)		72.6	90	90.7	99.7	138	435
Related work experience - All sectors - None (jobs)		1,080	1,424	1,389	1,493	2,325	9,728
Related work experience - All sectors - Up to 1 year (jobs)		1,549	2,053	1,983	2,093	3,203	13,085
Related work experience - All sectors - 1 to 4 years (jobs)		2,778	3,581	3,533	3,789	5,847	23,810
Related work experience - All sectors - 4 to 10 years (jobs)		1,762	2,263	2,279	2,467	3,826	15,529
Related work experience - All sectors - Over 10 years (jobs)		465	594	599	639	996	4,026
On-the-Job Training - All sectors - None (jobs)		432	544	542	579	867	3,401
On-the-Job Training - All sectors - Up to 1 year (jobs)		5,169	6,705	6,525	6,924	10,615	42,840
On-the-Job Training - All sectors - 1 to 4 years (jobs)		1,502	1,964	1,991	2,169	3,436	14,481
On-the-Job Training - All sectors - 4 to 10 years (jobs)		458	609	631	711	1,132	4,887
On-the-Job Training - All sectors - Over 10 years (jobs)		72.1	92.8	93.4	97.7	147	569
On-Site or In-Plant Training - All sectors - None (jobs)		1,279	1,660	1,628	1,736	2,633	10,378
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		4,640	6,011	5,878	6,252	9,623	39,133
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		1,176	1,535	1,547	1,677	2,650	11,172
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		479	629	649	726	1,145	4,870
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		59.2	79.2	81.5	90.4	145	624
Wage income - All (million \$2019)		406	527	526	572	892	3,663

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	115	107	97.2	89.2	82.9	75.5	66.9
Final energy use - Residential (PJ)	77.2	68.8	62.6	57.4	52.4	47.4	42.8
Final energy use - Commercial (PJ)	35.3	33	32	31	30	29	28.3
Final energy use - Industry (PJ)	90.9	89.2	86.1	83	81.1	104	103

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		0.484	0.475	0.654	0.668	1.11	1.17

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	5.19	32.2	59.2	184	309	586	863
Vehicle stocks - LDV – All others (1000 units)	1,128	1,128	1,128	1,070	1,012	780	548
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	35	73.4	248	780	1,136
Public EV charging plugs - DC Fast (1000 units)	0.118		0.159		0.833		2.32
Public EV charging plugs - L2 (1000 units)	0.3		3.82		20		55.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	3	2.62	5.43	13.6	26.9	36.8	40.8
Sales of space heating units - Electric Resistance (%)	1.39	1.43	1.43	1.44	1.28	1.11	1.03
Sales of space heating units - Gas (%)	6.74	3.62	3.58	3.39	2.96	2.45	2.07
Sales of space heating units - Fossil (%)	88.9	92.3	89.6	81.5	68.9	59.6	56.1
Sales of water heating units - Electric Heat Pump (%)	0	0.324	1.24	4.01	9.3	14.5	17.2
Sales of water heating units - Electric Resistance (%)	25.5	41.9	42.4	44.6	47.8	50.5	51.8
Sales of water heating units - Gas Furnace (%)	31.8	28.7	28.4	26.9	23.4	18.8	16
Sales of water heating units - Other (%)	42.8	29.1	28	24.5	19.5	16.2	15
Sales of cooking units - Electric Resistance (%)	64.1	65	68.3	77	89	96.5	99
Sales of cooking units - Gas (%)	35.9	35	31.7	23	11	3.54	0.953
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		1.25	1.38				

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 (%)	2.33	6.89	8.48	13.3	22.8	32.7	38.1
Sales of space heating units - Electric Resistance (%)	1.31	1.76	2.43	4.48	7.93	10.5	11.3
Sales of space heating units - Gas Furnace (%)	12.2	52.1	51	48.4	42.5	34.6	29.5
Sales of space heating units - Fossil (%)	84.1	39.2	38.1	33.9	26.8	22.3	21
Sales of water heating units - Electric Heat Pump (%)	4.05	2.68	3.38	5.63	11.1	17.9	22
Sales of water heating units - Electric Resistance (%)	19.4	11.6	11.9	14.5	19.6	26	29.9
Sales of water heating units - Gas Furnace (%)	58.2	79.9	79.4	75.1	65.2	52.6	44.8
Sales of water heating units - Other (%)	18.4	5.77	5.34	4.75	4.17	3.55	3.28
Sales of cooking units - Electric Resistance (%)	36.9	40.7	44.7	56.5	72.7	82.9	86.4
Sales of cooking units - Gas (%)	63.1	59.3	55.3	43.5	27.3	17.1	13.6
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		2,622	2,866				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Natural gas (MW)	1,556	568	3.8	3.8	221	393	1,218
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant (billion \$2018)	0	0	0.917	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0	0.019
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	0	0	0.022

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	1,801	1,801	1,801	1,801	1,801
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	24.7
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	18.7

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	2	2	2	2	2
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	1
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	0	0	4
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	1
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	1
Number of facilities - Sng (quantity)	0	1	1	1	1	1	1
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	1
Conversion capital investment - Cumulative 5-yr (million \$2018)		0.047	1,023	0	0	0	3,664
Biomass purchases (million \$2018/y)		0.052	136	136	136	136	457

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	3.32	3.42	8.05
Annual - BECCS (MMT)		0	0	0	0	0	4.52
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	3.32	3.42	3.53
Cumulative - All (MMT)		0	0	0	3.32	6.74	14.8
Cumulative - BECCS (MMT)		0	0	0	0	0	4.52
Cumulative - NGCC (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	3.32	6.74	10.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	151	151	151	151	151
Spur (km)		0	0	0	116	116	650
All (km)		0	151	151	267	267	801
Cumulative investment - Trunk (million \$2018)		0	273	273	273	273	273
Cumulative investment - Spur (million \$2018)		0	0	0	115	116	487
Cumulative investment - All (million \$2018)		0	273	273	388	390	760

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-53.7
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-89.7
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,068
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-157
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,636
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-46.4
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-201
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-28.2
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,195
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-9,475
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-80.5
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-314
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-7,329
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-230
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-7,273
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-89.4
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-301
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-200
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,370
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-18,187
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-107
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-538
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-10,590
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-309

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 ₂ e/y)							-10,909
Carbon sink potential - High - Increase trees outside forests (1000 tCO ₂ e/y)							-133
Carbon sink potential - High - Reforest cropland (1000 tCO ₂ e/y)							-401
Carbon sink potential - High - Reforest pasture (1000 tCO ₂ e/y)							-373
Carbon sink potential - High - All (not counting overlap) (1000 tCO ₂ e/y)							-26,905
Carbon sink potential - High - Restore productivity (1000 tCO ₂ e/y)							-3,545
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							8.77
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							68.4
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,069
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							56.9
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)							6.63
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							13.3
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.84
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							711
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,936
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							13.2
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							70.6
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,734
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							85.7
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)							9.61
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							19.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							13.3

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)							1,432
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,379
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							17.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							72.9
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							5,400
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							114
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)							12.6
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							26.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							10.6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,175
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,829

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)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-164
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-5.04
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)							-169
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-312

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)							-10.1
Carbon sink potential - Aggressive deployment - Cropland to woody energy crops (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Pasture to energy crops (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-322
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							91.1
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							9.16
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							0.742
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							101
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							427
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							18.3
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							0.741
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							446

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)		39.5	24.9	22.9	22.4	22	19.1
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		3.03	2.45	3.05	3.12	2.86	2.67
Premature deaths from air pollution - Mobile - On-Road (deaths)		18.6	18.7	18.7	18.8	18.9	18.9
Premature deaths from air pollution - Gas Stations (deaths)		0.988	0.988	0.983	0.983	0.981	0.975

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)		3.96	3.81	3.82	3.81	3.75	3.61
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		9.16	6.89	4.23	2.41	1.36	0.841
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.11	1.04	0.96	0.904	0.861	0.826
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.303	0.298	0.292	0.285	0.278	0.269
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.91	3.97	3.84	3.64	3.55	3.6
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		9.63	7.86	5.75	3.7	2.61	2.04
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.791	0.798	0.803	0.803	0.801	0.798
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.174	0.123	0.101	0.094	0.09	0.083
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		7.19	7.57	7.67	7.19	7.07	6.63
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		350	220	203	199	195	169
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		26.9	21.7	27	27.6	25.4	23.6
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		166	166	167	167	168	168
Monetary damages from air pollution - Gas Stations (million \$2019)		8.75	8.75	8.7	8.71	8.68	8.64
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		35.1	33.8	33.8	33.8	33.2	32
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		81.1	61	37.5	21.3	12.1	7.45
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		9.82	9.2	8.51	8.01	7.63	7.32
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		2.68	2.64	2.58	2.52	2.46	2.38
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		34.6	35.1	34	32.2	31.4	31.9
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		85.3	69.6	50.9	32.7	23.1	18.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		7	7.07	7.11	7.11	7.09	7.06
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		1.54	1.09	0.887	0.83	0.793	0.735

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)		63.9	67.2	68.1	63.8	62.7	58.9

Table 65: REF scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		253	227	224	183	182	198
By economic sector - Construction (jobs)		1,065	1,191	1,296	1,495	1,684	1,979
By economic sector - Manufacturing (jobs)		659	759	1,155	712	747	1,291
By economic sector - Mining (jobs)		659	533	435	363	309	265
By economic sector - Other (jobs)		59.1	91.8	108	139	165	250
By economic sector - Pipeline (jobs)		101	101	101	99.4	102	104
By economic sector - Professional (jobs)		1,121	1,143	1,179	1,348	1,507	1,711
By economic sector - Trade (jobs)		692	668	658	734	806	935
By economic sector - Utilities (jobs)		821	719	869	1,043	1,252	1,414
By resource sector - Biomass (jobs)		977	914	849	759	777	789
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Grid (jobs)		934	1,024	1,306	1,487	1,975	2,309
By resource sector - Natural Gas (jobs)		709	421	446	561	501	489
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		1,898	1,671	1,502	1,406	1,343	1,301
By resource sector - Solar (jobs)			338	361	372	377	921
By resource sector - Wind (jobs)		912	1,063	1,561	1,531	1,782	2,338
By education level - All sectors - High school diploma or less (jobs)		2,223	2,240	2,505	2,492	2,749	3,345
By education level - All sectors - Associates degree or some college (jobs)		1,553	1,568	1,778	1,832	2,043	2,492
By education level - All sectors - Bachelors degree (jobs)		1,276	1,252	1,350	1,376	1,505	1,778
By education level - All sectors - Masters or professional degree (jobs)		324	318	337	356	392	456
By education level - All sectors - Doctoral degree (jobs)		53.8	53.5	55	60.2	66.1	75.4
Related work experience - All sectors - None (jobs)		769	767	853	868	961	1,161
Related work experience - All sectors - Up to 1 year (jobs)		1,083	1,097	1,223	1,214	1,339	1,635
Related work experience - All sectors - 1 to 4 years (jobs)		1,999	1,990	2,195	2,236	2,467	2,958
Related work experience - All sectors - 4 to 10 years (jobs)		1,251	1,248	1,384	1,426	1,579	1,894
Related work experience - All sectors - Over 10 years (jobs)		329	329	370	371	409	498
On-the-Job Training - All sectors - None (jobs)		309	308	335	340	373	448
On-the-Job Training - All sectors - Up to 1 year (jobs)		3,714	3,704	4,101	4,102	4,514	5,455
On-the-Job Training - All sectors - 1 to 4 years (jobs)		1,045	1,052	1,182	1,228	1,368	1,651
On-the-Job Training - All sectors - 4 to 10 years (jobs)		314	317	350	389	439	517
On-the-Job Training - All sectors - Over 10 years (jobs)		48.1	49.7	56.8	55.6	60.8	75.8
On-Site or In-Plant Training - All sectors - None (jobs)		905	907	1,003	1,014	1,116	1,349
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		3,328	3,321	3,679	3,690	4,066	4,911

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)		821	827	928	957	1,064	1,286
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		334	336	368	404	453	533
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		40.4	41	46.8	49.7	56	67.8
Wage income - All (million \$2019)		295	296	328	339	379	457

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	115	107	98	92.4	92.1	94.8	98.3
Final energy use - Residential (PJ)	77.2	69.1	63.2	58.6	55.2	52.5	50.1
Final energy use - Commercial (PJ)	35.3	33.5	33	32	31	30.8	31.4
Final energy use - Industry (PJ)	90.9	92.9	93.4	94.3	96.6	99.5	102

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		0.574	0.576	0.751	0.773	0.756	0.774

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	2.88	4.65	4.91	5.31	5.38	5.44	5.51
Sales of space heating units - Electric Resistance (%)	1.4	1.38	1.39	1.43	1.39	1.36	1.32
Sales of space heating units - Gas (%)	6.75	12.7	43.8	65.1	66.7	67	66.8
Sales of space heating units - Fossil (%)	89	81.3	49.9	28.1	26.5	26.2	26.4
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	25.5	41.6	41.5	41.7	41.6	41.6	41.5
Sales of water heating units - Gas Furnace (%)	31.8	28.9	29	29	29.1	29.2	29.2
Sales of water heating units - Other (%)	42.8	29.5	29.5	29.3	29.3	29.2	29.2
Sales of cooking units - Electric Resistance (%)	63.8	63.8	63.8	63.8	63.8	63.8	63.8
Sales of cooking units - Gas (%)	36.2	36.2	36.2	36.2	36.2	36.2	36.2
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		1.23	1.26				

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 (%)	2.33	12.7	40.4	63.6	67.5	67.8	68
Sales of space heating units - Electric Resistance (%)	1.31	2.46	7.45	19.9	30.2	32	32
Sales of space heating units - Gas Furnace (%)	12.2	47.5	26.1	6.26	0.817	0.051	0
Sales of space heating units - Fossil (%)	84.1	37.3	26.1	10.2	1.47	0.119	0
Sales of water heating units - Electric Heat Pump (%)	4.05	2.42	2.41	2.36	2.35	2.4	2.4
Sales of water heating units - Electric Resistance (%)	19.4	11.4	11	11.4	11.3	11.2	11.2
Sales of water heating units - Gas Furnace (%)	58.2	80.4	81.1	80.9	80.9	81.3	81.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Other (%)	18.4	5.83	5.56	5.37	5.48	5.14	4.87
Sales of cooking units - Electric Resistance (%)	36.9	39	38.6	38.5	38.3	38.5	38.4
Sales of cooking units - Gas (%)	63.1	61	61.4	61.5	61.7	61.5	61.6
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		2,590	2,664				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Natural gas (MW)	1,556	568	568	676	397	1,119	1,394
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	86.1	150	176	205	239	277	319
Installed renewables - Solar - Base land use assumptions (MW)	85.4	85.4	85.4	85.4	85.4	85.4	85.4
Installed renewables - Wind - Base land use assumptions (MW)	1,011	1,011	1,011	1,011	1,011	1,011	1,011

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	176	176	176	176	176	176	176
Wind - Base land use assumptions (GWh)	4,130	4,130	4,130	4,130	4,130	4,130	4,130
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)	-6.38		-15.3				-13.7
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-2.97		-5.34				-5.55
Business-as-usual carbon sink - Total (Mt CO2e/y)	-9.35		-20.6				-19.2

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)							-53.7
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-89.7
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,068
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-157
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,636
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-46.4
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-201
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-28.2
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,195
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-9,475

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 ₂ e/y)							-80.5
Carbon sink potential - Mid - Avoid deforestation (1000 tCO ₂ e/y)							-314
Carbon sink potential - Mid - Extend rotation length (1000 tCO ₂ e/y)							-7,329
Carbon sink potential - Mid - Improve plantations (1000 tCO ₂ e/y)							-230
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO ₂ e/y)							-7,273
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO ₂ e/y)							-89.4
Carbon sink potential - Mid - Reforest cropland (1000 tCO ₂ e/y)							-301
Carbon sink potential - Mid - Reforest pasture (1000 tCO ₂ e/y)							-200
Carbon sink potential - Mid - Restore productivity (1000 tCO ₂ e/y)							-2,370
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO ₂ e/y)							-18,187
Carbon sink potential - High - Accelerate regeneration (1000 tCO ₂ e/y)							-107
Carbon sink potential - High - Avoid deforestation (1000 tCO ₂ e/y)							-538
Carbon sink potential - High - Extend rotation length (1000 tCO ₂ e/y)							-10,590
Carbon sink potential - High - Improve plantations (1000 tCO ₂ e/y)							-309
Carbon sink potential - High - Increase retention of HWP (1000 tCO ₂ e/y)							-10,909
Carbon sink potential - High - Increase trees outside forests (1000 tCO ₂ e/y)							-133
Carbon sink potential - High - Reforest cropland (1000 tCO ₂ e/y)							-401
Carbon sink potential - High - Reforest pasture (1000 tCO ₂ e/y)							-373
Carbon sink potential - High - All (not counting overlap) (1000 tCO ₂ e/y)							-26,905
Carbon sink potential - High - Restore productivity (1000 tCO ₂ e/y)							-3,545
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							8.77
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							68.4
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,069
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							56.9
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)							6.63
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							13.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.84
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							711
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,936
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							13.2
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							70.6
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,734
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							85.7
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)							9.61
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							19.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							13.3
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,432
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,379
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							17.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							72.9
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							5,400
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							114
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)							12.6
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							26.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							10.6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,175

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)							6,829