



## **Net-Zero America - Connecticut data**

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		40.8	0.066	0.065	0.063	0.038	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		25.2	13.4	9.36	9.27	6.16	2.63
Premature deaths from air pollution - Mobile - On-Road (deaths)		112	104	78.3	44.9	20.2	7.59
Premature deaths from air pollution - Gas Stations (deaths)		5.61	5.1	3.79	2.19	1.02	0.428
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		27.5	23.3	16.2	9.11	4.35	1.65
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		38	29.8	19.6	10.9	4.57	1.32
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		3.63	3.27	2.53	1.69	0.947	0.487
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.835	0.796	0.756	0.712	0.669	0.622
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		22.7	20.5	16.2	11.3	7.18	3.93
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		9.36	7.56	5.23	3.15	2.06	1.49
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.84	1.54	1.25	0.967	0.702	0.456
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.346	0.182	0.18	0.177	0.178	0.176
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		23.3	21.2	18.4	14.2	9.99	5.94
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		361	0.582	0.58	0.562	0.335	0.01
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		224	119	82.9	82.1	54.6	23.3
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		995	923	697	399	179	67.5
Monetary damages from air pollution - Gas Stations (million \$2019)		49.7	45.2	33.6	19.4	8.99	3.79
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		244	206	143	80.7	38.5	14.6
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		337	264	173	96.3	40.5	11.7
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		32.1	29	22.5	14.9	8.39	4.32
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		7.39	7.05	6.69	6.31	5.92	5.51
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		201	181	144	100	63.6	34.8

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)		82.9	66.9	46.3	27.9	18.3	13.2
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		16.3	13.6	11.1	8.56	6.22	4.04
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		3.05	1.61	1.59	1.56	1.57	1.55
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		207	188	163	126	88.7	52.7

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		79.2	161	61.4	47.7	35	141
By economic sector - Construction (jobs)		4,578	5,747	5,704	5,789	5,411	6,203
By economic sector - Manufacturing (jobs)		1,639	2,119	2,512	2,320	2,542	3,336
By economic sector - Mining (jobs)		1,037	732	463	271	142	70.8
By economic sector - Other (jobs)		613	891	870	904	965	1,411
By economic sector - Pipeline (jobs)		262	252	171	124	77.9	50.3
By economic sector - Professional (jobs)		1,969	2,403	2,375	2,482	2,373	3,012
By economic sector - Trade (jobs)		1,459	1,663	1,604	1,622	1,579	2,039
By economic sector - Utilities (jobs)		3,777	4,443	5,593	6,460	5,867	5,514
By resource sector - Biomass (jobs)		340	443	175	143	128	603
By resource sector - CO2 (jobs)		0	258	0.7	1.78	1.77	1.31
By resource sector - Coal (jobs)		54.1	0	0	0	0	0
By resource sector - Grid (jobs)		3,803	5,465	8,497	9,801	9,183	8,943
By resource sector - Natural Gas (jobs)		2,665	2,096	1,726	2,137	1,482	1,175
By resource sector - Nuclear (jobs)		1,092	1,074	1,057	1,041	1,025	834
By resource sector - Oil (jobs)		2,327	1,811	1,242	785	463	240
By resource sector - Solar (jobs)		5,021	6,737	5,567	5,389	6,028	8,628
By resource sector - Wind (jobs)		113	526	1,090	723	681	1,353
By education level - All sectors - High school diploma or less (jobs)		6,508	7,880	8,262	8,504	8,074	9,287
By education level - All sectors - Associates degree or some college (jobs)		4,815	5,811	6,200	6,479	6,149	7,016
By education level - All sectors - Bachelors degree (jobs)		3,195	3,684	3,828	3,935	3,725	4,268
By education level - All sectors - Masters or professional degree (jobs)		780	903	936	971	918	1,057
By education level - All sectors - Doctoral degree (jobs)		115	132	129	131	125	151
Related work experience - All sectors - None (jobs)		2,224	2,674	2,819	2,931	2,776	3,185
Related work experience - All sectors - Up to 1 year (jobs)		3,084	3,744	3,897	3,992	3,819	4,471
Related work experience - All sectors - 1 to 4 years (jobs)		5,556	6,600	6,942	7,189	6,806	7,776
Related work experience - All sectors - 4 to 10 years (jobs)		3,601	4,271	4,506	4,680	4,421	5,018
Related work experience - All sectors - Over 10 years (jobs)		949	1,121	1,191	1,229	1,169	1,327
On-the-Job Training - All sectors - None (jobs)		863	1,020	1,047	1,070	1,021	1,194
On-the-Job Training - All sectors - Up to 1 year (jobs)		10,076	12,011	12,609	12,991	12,360	14,266

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

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - All sectors - 1 to 4 years (jobs)		3,261	3,911	4,157	4,341	4,096	4,619
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,060	1,284	1,354	1,430	1,333	1,487
On-the-Job Training - All sectors - Over 10 years (jobs)		154	184	188	189	181	212
On-Site or In-Plant Training - All sectors - None (jobs)		2,515	3,002	3,117	3,205	3,053	3,549
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		9,161	10,921	11,486	11,847	11,263	12,963
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		2,527	3,032	3,219	3,354	3,169	3,586
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,082	1,297	1,364	1,434	1,336	1,488
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		130	158	171	180	170	191
Wage income - All (million \$2019)		978	1,171	1,252	1,320	1,259	1,439

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		52.3	44.4	33	22.4	14.2	7.82
Oil consumption - Cumulative (million bbls)							1,024
Oil production - Annual (million bbls)		0	0	0	0	0	0
Natural gas consumption - Annual (tcf)		215	181	145	109	68.9	47.8
Natural gas consumption - Cumulative (tcf)							4,381
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)	228	212	186	152	122	104	95.6
Final energy use - Residential (PJ)	155	143	130	112	94.5	81.6	73.9
Final energy use - Commercial (PJ)	120	114	109	101	93.4	88.1	84.9
Final energy use - Industry (PJ)	64.9	63.4	62.5	61.2	61.1	61.8	62.1

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)		1.3	1.34	3.78	4.11	3.37	3.57

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	38.7	272	506	1,323	2,141	2,794	3,448
Vehicle stocks - LDV – All others (1000 units)	2,875	2,737	2,600	1,895	1,189	673	156
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		549	1,419	2,279	3,460	3,757	3,587
Public EV charging plugs - DC Fast (1000 units)	0.229		0.879		3.72		5.99
Public EV charging plugs - L2 (1000 units)	0.794		21.1		89.3		144

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 (%)	7.5	14.9	62.3	88.8	92.4	92.6	92.6
Sales of space heating units - Electric Resistance (%)	4.92	6.44	5.03	2.19	1.67	1.64	1.81
Sales of space heating units - Gas (%)	34.4	19.8	14	2.38	0.3	0.169	0.163
Sales of space heating units - Fossil (%)	53.1	58.8	18.6	6.59	5.61	5.57	5.44
Sales of water heating units - Electric Heat Pump (%)	0	1.56	13.2	30.7	33.7	33.9	33.9
Sales of water heating units - Electric Resistance (%)	35.5	54.6	60.4	65.2	66	66	66
Sales of water heating units - Gas Furnace (%)	46.8	33.5	24.3	3.88	0.229	0	0
Sales of water heating units - Other (%)	17.6	10.3	2.05	0.206	0.126	0.127	0.126
Sales of cooking units - Electric Resistance (%)	71.8	77.8	96.2	99.8	100	100	100
Sales of cooking units - Gas (%)	28.2	22.2	3.79	0.191	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		3.13	3.5				

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 (%)	4.76	11	39.3	72.4	77.8	78.1	78.1
Sales of space heating units - Electric Resistance (%)	2.29	4.46	16.5	21.3	21.9	21.9	21.9
Sales of space heating units - Gas (%)	50.7	53.4	38.2	6.11	0.363	0	0
Sales of space heating units - Fossil (%)	42.2	31.2	5.99	0.253	0	0	0
Sales of water heating units - Electric Heat Pump (%)	2.81	3.52	15.9	41	45.5	45.9	45.9
Sales of water heating units - Electric Resistance (%)	13.8	12.6	24	48.1	52.3	52.5	52.5
Sales of water heating units - Gas (%)	78.2	80	58.2	9.28	0.549	0	0
Sales of water heating units - Other (%)	5.24	3.95	1.94	1.61	1.6	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)		7,080	7,732				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	400	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	4,965	4,265	4,225	4,225	6,216	6,159	5,600
Installed thermal - Nuclear (MW)	2,163	2,163	2,163	2,163	2,163	2,163	1,253
Installed renewables - Rooftop PV (MW)	770	1,341	1,570	1,838	2,141	2,479	2,857
Installed renewables - Solar - Base land use assumptions (MW)	81.5	81.5	3,031	4,770	5,779	6,889	6,889
Installed renewables - Wind - Base land use assumptions (MW)	5.8	5.8	321	472	551	551	590
Installed renewables - Solar - Constrained land use assumptions (MW)	67.9	162	3,583	5,869	7,560	8,281	8,407
Installed renewables - Wind - Constrained land use assumptions (MW)	5.8	5.8	349	388	438	438	438
Capital invested - Solar PV - Base (billion \$2018)		0	3.53	1.92	1.05	1.09	0
Capital invested - Wind - Base (billion \$2018)		0	0.755	0.336	0.169	0	0.073

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Constrained (billion \$2018)		0.09	2.85	0.72	0.909	1.6	0
Capital invested - Wind - Constrained (billion \$2018)		0	0.822	0.087	0.108	0	0
Capital invested - Biomass power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0	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)	169	169	5,420	8,477	10,241	12,184	12,184
Wind - Base land use assumptions (GWh)	24	24	1,153	1,676	1,955	1,955	2,088
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	112	279	6,394	10,430	13,385	14,650	14,870
Wind - Constrained land use assumptions (GWh)	24	24	1,259	1,400	1,572	1,572	1,572
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	0
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	1
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment - Cumulative 5-yr (million \$2018)		0	0	0	0	0	1,600
Biomass purchases (million \$2018/y)		0	0	0	0	0	55

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	0	0	0.01
Annual - BECCS (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0	0	0	0.01
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	0	0	0.01
Cumulative - BECCS (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0	0	0	0.01
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	145	145	145	145	145
Spur (km)		0	1.21	1.21	1.21	1.21	1.21
All (km)		0	146	146	146	146	146
Cumulative investment - Trunk (million \$2018)		0	262	262	262	262	262
Cumulative investment - Spur (million \$2018)		0	0.702	0.702	0.702	0.702	0.703
Cumulative investment - All (million \$2018)		0	262	262	262	262	262

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)							-27.4
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-128
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-445
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-5.3
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-120
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-50.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-17
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-109
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-902
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-41
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-448
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-801
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-7.77
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-240
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-96.7
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-121
Carbon sink potential - Mid - Restore productivity (1000 tCO <sub>2</sub> e/y)							-217
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-1,973
Carbon sink potential - High - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-54.6
Carbon sink potential - High - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-768
Carbon sink potential - High - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-1,158
Carbon sink potential - High - Improve plantations (1000 tCO <sub>2</sub> e/y)							-10.4
Carbon sink potential - High - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-360
Carbon sink potential - High - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-143
Carbon sink potential - High - Reforest cropland (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-224
Carbon sink potential - High - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-3,043
Carbon sink potential - High - Restore productivity (1000 tCO <sub>2</sub> e/y)							-325
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							4.47
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							97.6
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							226
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.92
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)							7.16
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							65.1
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							404
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							6.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							101

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 - Extend rotation length (1000 hectares)							408
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							2.89
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)							10.4
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.98
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							131
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							668
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							8.94
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							104
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							591
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							3.84
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)							13.6
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6.37
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							108
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							835

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO <sub>2</sub> e/y)							-41.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO <sub>2</sub> e/y)							-1.57
Carbon sink potential - Moderate deployment - Total (1000 tCO <sub>2</sub> e/y)							-43.1
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO <sub>2</sub> e/y)							-79
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO <sub>2</sub> e/y)							-3.14
Carbon sink potential - Aggressive deployment - Total (1000 tCO <sub>2</sub> e/y)							-82.1
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)							28.7
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							2.86
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							31.5
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)							54.5
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							5.72
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							60.2

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)		40.8	0.066	0.065	0.063	0.038	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		25	10.8	4.57	1.88	0.543	0.675
Premature deaths from air pollution - Mobile - On-Road (deaths)		114	115	111	99	78.2	53.2
Premature deaths from air pollution - Gas Stations (deaths)		5.74	5.76	5.51	4.89	3.84	2.61
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		27.7	25.5	22.6	18.6	13.9	9.21
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		38.6	35.9	33.4	28.3	20.5	12.5
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		3.67	3.62	3.53	3.21	2.58	1.86

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.835	0.796	0.756	0.712	0.669	0.622
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		22.8	22.4	21.6	19.8	16.9	13.4
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		9.43	8.49	7.51	6.19	5.03	3.92
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.84	1.65	1.46	1.28	1.1	0.929
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.336	0.182	0.182	0.179	0.178	0.171
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		23.2	20	16.1	13.1	11	7.88
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		361	0.582	0.58	0.562	0.335	0.01
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		221	95.2	40.4	16.6	4.81	5.98
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,013	1,020	985	880	695	473
Monetary damages from air pollution - Gas Stations (million \$2019)		50.8	51	48.8	43.3	34	23.1
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		246	226	200	165	124	81.6
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		342	318	296	250	181	111
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		32.5	32.1	31.3	28.4	22.8	16.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		7.39	7.05	6.69	6.31	5.92	5.51
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		202	198	191	175	149	118
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		83.5	75.1	66.4	54.8	44.6	34.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		16.3	14.6	13	11.3	9.73	8.22
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		2.96	1.61	1.6	1.58	1.57	1.51
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		206	178	143	117	97.7	70

Table 18: *E- scenario - IMPACTS - Jobs*

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		96.4	124	47.2	30.4	27.5	141
By economic sector - Construction (jobs)		4,522	5,806	4,819	4,654	5,340	6,155

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Manufacturing (jobs)		1,661	2,156	2,219	2,058	3,064	4,178
By economic sector - Mining (jobs)		1,046	760	551	388	259	140
By economic sector - Other (jobs)		610	912	765	786	962	1,397
By economic sector - Pipeline (jobs)		263	270	175	147	119	83.6
By economic sector - Professional (jobs)		1,951	2,359	2,031	2,001	2,326	2,976
By economic sector - Trade (jobs)		1,452	1,696	1,475	1,433	1,630	2,061
By economic sector - Utilities (jobs)		3,667	4,315	4,323	4,447	5,408	5,273
By resource sector - Biomass (jobs)		366	332	157	128	117	584
By resource sector - CO2 (jobs)		0	443	1.2	3.05	3.04	2.25
By resource sector - Coal (jobs)		54.1	0	0	0	0	0
By resource sector - Grid (jobs)		3,569	4,866	6,066	6,523	8,427	8,516
By resource sector - Natural Gas (jobs)		2,665	2,178	1,458	1,245	1,329	1,149
By resource sector - Nuclear (jobs)		1,092	1,074	1,057	1,041	1,025	834
By resource sector - Oil (jobs)		2,357	1,961	1,635	1,293	959	552
By resource sector - Solar (jobs)		5,046	6,993	5,062	5,009	6,287	8,643
By resource sector - Wind (jobs)		119	551	968	704	991	2,125
By education level - All sectors - High school diploma or less (jobs)		6,453	7,873	6,993	6,786	8,159	9,582
By education level - All sectors - Associates degree or some college (jobs)		4,760	5,815	5,200	5,082	6,153	7,191
By education level - All sectors - Bachelors degree (jobs)		3,168	3,681	3,295	3,186	3,780	4,407
By education level - All sectors - Masters or professional degree (jobs)		773	898	802	781	919	1,074
By education level - All sectors - Doctoral degree (jobs)		114	132	113	109	125	152
Related work experience - All sectors - None (jobs)		2,202	2,672	2,379	2,319	2,787	3,266
Related work experience - All sectors - Up to 1 year (jobs)		3,060	3,740	3,315	3,215	3,871	4,622
Related work experience - All sectors - 1 to 4 years (jobs)		5,503	6,593	5,889	5,725	6,855	7,993
Related work experience - All sectors - 4 to 10 years (jobs)		3,563	4,272	3,810	3,705	4,439	5,149
Related work experience - All sectors - Over 10 years (jobs)		940	1,120	1,011	981	1,184	1,377
On-the-Job Training - All sectors - None (jobs)		856	1,023	903	873	1,035	1,229
On-the-Job Training - All sectors - Up to 1 year (jobs)		9,991	11,991	10,730	10,412	12,522	14,754
On-the-Job Training - All sectors - 1 to 4 years (jobs)		3,222	3,913	3,486	3,401	4,088	4,717
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,045	1,285	1,124	1,102	1,304	1,484
On-the-Job Training - All sectors - Over 10 years (jobs)		153	186	162	155	187	222
On-Site or In-Plant Training - All sectors - None (jobs)		2,494	3,004	2,657	2,575	3,087	3,661
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		9,081	10,904	9,763	9,480	11,396	13,390
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		2,498	3,033	2,705	2,638	3,171	3,670
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,067	1,299	1,138	1,113	1,314	1,492
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		128	158	141	139	168	194
Wage income - All (million \$2019)		968	1,169	1,058	1,044	1,261	1,471

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	228	214	195	179	167	152	134
Final energy use - Residential (PJ)	155	144	135	128	118	105	91.1
Final energy use - Commercial (PJ)	120	114	111	108	105	101	96.5
Final energy use - Industry (PJ)	64.9	63.5	62.9	62.4	62.9	63.5	63.2

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)		0.975	0.97	1.63	1.7	3.09	3.32

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	29.9	98.5	167	485	802	1,505	2,208
Vehicle stocks - LDV – All others (1000 units)	2,886	2,886	2,886	2,738	2,589	1,995	1,401
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	91	186	634	1,979	2,888
Public EV charging plugs - DC Fast (1000 units)	0.229		0.29		1.39		3.84
Public EV charging plugs - L2 (1000 units)	0.794		6.97		33.5		92.2

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 (%)	7.5	7.1	12.5	28.5	55.7	78.2	88.3
Sales of space heating units - Electric Resistance (%)	4.92	6.49	6.23	5.8	4.6	2.99	2.13
Sales of space heating units - Gas (%)	34.4	20.1	19.4	17.2	12.1	5.68	1.98
Sales of space heating units - Fossil (%)	53.1	66.3	61.9	48.5	27.6	13.1	7.61
Sales of water heating units - Electric Heat Pump (%)	0	0.484	1.83	6.09	15.2	25.5	31.2
Sales of water heating units - Electric Resistance (%)	35.5	53.7	54.4	56.4	60.1	63.5	65.2
Sales of water heating units - Gas Furnace (%)	46.8	33.9	32.8	29.2	20.5	9.58	3.12
Sales of water heating units - Other (%)	17.6	11.9	11	8.3	4.13	1.41	0.461
Sales of cooking units - Electric Resistance (%)	71.7	72.5	75.1	81.9	91.4	97.2	99.2
Sales of cooking units - Gas (%)	28.3	27.5	24.9	18.1	8.64	2.79	0.75
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		3.14	3.73				

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 (%)	4.76	7.71	11	20.9	40.9	61.8	73
Sales of space heating units - Electric Resistance (%)	2.29	2.3	3.61	7.63	14.2	19.1	21
Sales of space heating units - Gas (%)	50.7	53.9	51.7	46	32.5	15.2	4.94
Sales of space heating units - Fossil (%)	42.2	36.1	33.8	25.4	12.4	3.94	1.03
Sales of water heating units - Electric Heat Pump (%)	2.81	2.92	4.33	9.01	20.1	33.9	42
Sales of water heating units - Electric Resistance (%)	13.8	12	13	17.7	28.2	41.2	48.8
Sales of water heating units - Gas (%)	78.2	80.8	78.7	69.9	49.2	23	7.51
Sales of water heating units - Other (%)	5.24	4.31	3.95	3.35	2.49	1.86	1.68

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

Item	2020	2025	2030	2035	2040	2045	2050
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)		7,079	7,740				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	400	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	4,965	4,265	3,174	3,176	3,179	3,421	3,503
Installed thermal - Nuclear (MW)	2,163	2,163	2,163	2,163	2,163	2,163	1,253

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-27.4
Carbon sink potential - Low - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-128
Carbon sink potential - Low - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-445
Carbon sink potential - Low - Improve plantations (1000 tCO <sub>2</sub> e/y)							-5.3
Carbon sink potential - Low - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-120
Carbon sink potential - Low - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-50.1
Carbon sink potential - Low - Reforest cropland (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-17
Carbon sink potential - Low - Restore productivity (1000 tCO <sub>2</sub> e/y)							-109
Carbon sink potential - Low - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-902
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-41
Carbon sink potential - Mid - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-448
Carbon sink potential - Mid - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-801
Carbon sink potential - Mid - Improve plantations (1000 tCO <sub>2</sub> e/y)							-7.77
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-240
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-96.7
Carbon sink potential - Mid - Reforest cropland (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-121
Carbon sink potential - Mid - Restore productivity (1000 tCO <sub>2</sub> e/y)							-217
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-1,973
Carbon sink potential - High - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-54.6
Carbon sink potential - High - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-768

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-1,158
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-10.4
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-360
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-224
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-3,043
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-325
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							4.47
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							97.6
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							226
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.92
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)							7.16
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							65.1
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							404
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							6.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							101
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							408
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							2.89
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)							10.4

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 - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.98
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							131
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							668
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							8.94
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							104
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							591
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							3.84
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)							13.6
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6.37
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							108
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							835

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-41.5
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-1.57
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-43.1
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-79

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO <sub>2</sub> e/y)							-3.14
Carbon sink potential - Aggressive deployment - Total (1000 tCO <sub>2</sub> e/y)							-82.1
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)							28.7
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							2.86
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							31.5
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)							54.5
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							5.72
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							60.2

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)		40.8	0.066	0.065	0.063	0.038	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		23.8	12.1	6.86	5.66	2.12	0.685
Premature deaths from air pollution - Mobile - On-Road (deaths)		112	104	78.3	44.9	20.2	7.59
Premature deaths from air pollution - Gas Stations (deaths)		5.61	5.1	3.79	2.19	1.02	0.428
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		27.5	23.3	16.2	9.11	4.35	1.65
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		38	29.8	19.6	10.9	4.57	1.32
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		3.63	3.27	2.53	1.69	0.947	0.487
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.835	0.796	0.756	0.712	0.669	0.622
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		22.7	20.5	16.2	11.3	7.18	3.93
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		9.36	7.56	5.23	3.15	2.06	1.49
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.84	1.54	1.25	0.967	0.702	0.456

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.372	0.182	0.18	0.176	0.178	0.165
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		22.7	20.7	16.8	11.8	6.63	0.644
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		361	0.582	0.58	0.562	0.335	0.01
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		210	108	60.8	50.2	18.8	6.07
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		995	923	697	399	179	67.5
Monetary damages from air pollution - Gas Stations (million \$2019)		49.7	45.2	33.6	19.4	8.99	3.79
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		244	206	143	80.7	38.5	14.6
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		337	264	173	96.3	40.5	11.7
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		32.1	29	22.5	14.9	8.39	4.32
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		7.39	7.05	6.69	6.31	5.92	5.51
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		201	181	144	100	63.6	34.8
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		82.9	66.9	46.3	27.9	18.3	13.2
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		16.3	13.6	11.1	8.56	6.22	4.04
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		3.29	1.61	1.59	1.56	1.57	1.45
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		202	184	149	105	58.9	5.72

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		79.6	165	61.1	38.9	31.4	139
By economic sector - Construction (jobs)		4,554	5,438	4,870	4,681	4,549	6,537
By economic sector - Manufacturing (jobs)		1,700	2,266	3,362	2,601	3,265	4,223
By economic sector - Mining (jobs)		1,025	713	421	213	81.8	15.3
By economic sector - Other (jobs)		613	861	699	734	731	1,348
By economic sector - Pipeline (jobs)		255	211	145	90.4	46.9	21.6
By economic sector - Professional (jobs)		1,949	2,349	2,041	2,006	1,949	3,035
By economic sector - Trade (jobs)		1,447	1,615	1,374	1,318	1,256	2,003
By economic sector - Utilities (jobs)		3,744	4,159	5,103	5,089	5,306	6,258
By resource sector - Biomass (jobs)		310	466	164	127	117	610
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		54.1	0	0	0	0	0
By resource sector - Grid (jobs)		3,790	5,210	7,970	7,954	8,982	11,391

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

Item	2020	2025	2030	2035	2040	2045	2050
By resource sector - Natural Gas (jobs)		2,590	1,998	1,485	1,752	1,194	1,078
By resource sector - Nuclear (jobs)		1,092	1,074	875	603	594	344
By resource sector - Oil (jobs)		2,327	1,785	1,186	655	254	0.017
By resource sector - Solar (jobs)		5,108	6,720	4,811	4,802	4,941	7,943
By resource sector - Wind (jobs)		97.5	522	1,586	879	1,133	2,215
By education level - All sectors - High school diploma or less (jobs)		6,493	7,603	7,737	7,153	7,367	10,125
By education level - All sectors - Associates degree or some college (jobs)		4,801	5,591	5,788	5,435	5,597	7,651
By education level - All sectors - Bachelors degree (jobs)		3,183	3,577	3,581	3,281	3,344	4,545
By education level - All sectors - Masters or professional degree (jobs)		776	876	857	797	804	1,109
By education level - All sectors - Doctoral degree (jobs)		114	129	114	106	103	150
Related work experience - All sectors - None (jobs)		2,216	2,575	2,623	2,452	2,512	3,455
Related work experience - All sectors - Up to 1 year (jobs)		3,078	3,627	3,654	3,366	3,475	4,838
Related work experience - All sectors - 1 to 4 years (jobs)		5,538	6,373	6,474	6,009	6,155	8,407
Related work experience - All sectors - 4 to 10 years (jobs)		3,589	4,116	4,195	3,909	3,998	5,435
Related work experience - All sectors - Over 10 years (jobs)		947	1,086	1,130	1,037	1,075	1,446
On-the-Job Training - All sectors - None (jobs)		860	988	967	891	906	1,264
On-the-Job Training - All sectors - Up to 1 year (jobs)		10,051	11,636	11,868	10,932	11,269	15,457
On-the-Job Training - All sectors - 1 to 4 years (jobs)		3,250	3,755	3,854	3,619	3,705	5,029
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,054	1,219	1,209	1,168	1,169	1,603
On-the-Job Training - All sectors - Over 10 years (jobs)		154	179	179	161	166	228
On-Site or In-Plant Training - All sectors - None (jobs)		2,508	2,906	2,912	2,690	2,757	3,810
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		9,137	10,570	10,792	9,957	10,258	14,052
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		2,519	2,915	2,992	2,801	2,872	3,905
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,075	1,234	1,223	1,174	1,174	1,603
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		129	151	158	151	154	211
Wage income - All (million \$2019)		975	1,128	1,160	1,095	1,132	1,554

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	228	212	186	152	122	104	95.6
Final energy use - Residential (PJ)	155	143	130	112	94.5	81.6	73.9
Final energy use - Commercial (PJ)	120	114	109	101	93.4	88.1	84.9
Final energy use - Industry (PJ)	64.9	63.4	62.5	61.2	61.1	61.8	62.1

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)		1.3	1.34	3.78	4.11	3.37	3.57

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	38.7	272	506	1,323	2,141	2,794	3,448
Vehicle stocks - LDV – All others (1000 units)	2,875	2,737	2,600	1,895	1,189	673	156
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		549	1,419	2,279	3,460	3,757	3,587
Public EV charging plugs - DC Fast (1000 units)	0.229		0.879		3.72		5.99
Public EV charging plugs - L2 (1000 units)	0.794		21.1		89.3		144

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 (%)	7.5	14.9	62.3	88.8	92.4	92.6	92.6
Sales of space heating units - Electric Resistance (%)	4.92	6.44	5.03	2.19	1.67	1.64	1.81
Sales of space heating units - Gas (%)	34.4	19.8	14	2.38	0.3	0.169	0.163
Sales of space heating units - Fossil (%)	53.1	58.8	18.6	6.59	5.61	5.57	5.44
Sales of water heating units - Electric Heat Pump (%)	0	1.56	13.2	30.7	33.7	33.9	33.9
Sales of water heating units - Electric Resistance (%)	35.5	54.6	60.4	65.2	66	66	66
Sales of water heating units - Gas Furnace (%)	46.8	33.5	24.3	3.88	0.229	0	0
Sales of water heating units - Other (%)	17.6	10.3	2.05	0.206	0.126	0.127	0.126
Sales of cooking units - Electric Resistance (%)	71.8	77.8	96.2	99.8	100	100	100
Sales of cooking units - Gas (%)	28.2	22.2	3.79	0.191	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		3.13	3.5				

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 (%)	4.76	11	39.3	72.4	77.8	78.1	78.1
Sales of space heating units - Electric Resistance (%)	2.29	4.46	16.5	21.3	21.9	21.9	21.9
Sales of space heating units - Gas (%)	50.7	53.4	38.2	6.11	0.363	0	0
Sales of space heating units - Fossil (%)	42.2	31.2	5.99	0.253	0	0	0
Sales of water heating units - Electric Heat Pump (%)	2.81	3.52	15.9	41	45.5	45.9	45.9
Sales of water heating units - Electric Resistance (%)	13.8	12.6	24	48.1	52.3	52.5	52.5
Sales of water heating units - Gas (%)	78.2	80	58.2	9.28	0.549	0	0
Sales of water heating units - Other (%)	5.24	3.95	1.94	1.61	1.6	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)		7,080	7,732				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	400	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	4,965	4,265	4,270	4,271	5,593	6,146	5,255

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Nuclear (MW)	2,163	2,163	2,163	1,253	1,253	1,253	0
Installed renewables - Rooftop PV (MW)	770	1,341	1,570	1,838	2,141	2,479	2,857
Installed renewables - Solar - Base land use assumptions (MW)	81.5	81.5	2,839	3,588	4,030	4,030	4,030
Installed renewables - Wind - Base land use assumptions (MW)	5.8	5.8	321	472	551	551	590
Installed renewables - Solar - Constrained land use assumptions (MW)	81.6	81.6	4,290	6,050	6,944	6,944	6,944
Installed renewables - Wind - Constrained land use assumptions (MW)	6.64	6.64	350	389	439	439	472
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion \$2018)		0	3.3	0.826	0.459	0	0
Capital invested - Wind - Base (billion \$2018)		0	0.755	0.336	0.169	0	0.073

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	169	169	5,099	6,409	7,180	7,180	7,180
Wind - Base land use assumptions (GWh)	24	24	1,153	1,676	1,955	1,955	2,088
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	337	337	15,298	21,470	24,597	24,597	24,597
Wind - Constrained land use assumptions (GWh)	48	48	2,519	2,800	3,144	3,144	3,371
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-27.4
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-128
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-445
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-5.3
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-120
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-50.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-17
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-109
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-902
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-41
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-448
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-801

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Improve plantations (1000 tCO <sub>2</sub> e/y)							-7.77
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-240
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-96.7
Carbon sink potential - Mid - Reforest cropland (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-121
Carbon sink potential - Mid - Restore productivity (1000 tCO <sub>2</sub> e/y)							-217
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-1,973
Carbon sink potential - High - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-54.6
Carbon sink potential - High - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-768
Carbon sink potential - High - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-1,158
Carbon sink potential - High - Improve plantations (1000 tCO <sub>2</sub> e/y)							-10.4
Carbon sink potential - High - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-360
Carbon sink potential - High - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-143
Carbon sink potential - High - Reforest cropland (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-224
Carbon sink potential - High - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-3,043
Carbon sink potential - High - Restore productivity (1000 tCO <sub>2</sub> e/y)							-325
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							4.47
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							97.6
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							226
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.92
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)							7.16
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							65.1

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 - Total impacted (over 30 years) (1000 hectares)							404
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							6.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							101
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							408
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							2.89
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)							10.4
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.98
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							131
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							668
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							8.94
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							104
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							591
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							3.84
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)							13.6
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6.37
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							108
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							835

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 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO <sub>2</sub> e/y)							-41.5
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO <sub>2</sub> e/y)							-1.57
Carbon sink potential - Moderate deployment - Total (1000 tCO <sub>2</sub> e/y)							-43.1
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO <sub>2</sub> e/y)							-79
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO <sub>2</sub> e/y)							-3.14
Carbon sink potential - Aggressive deployment - Total (1000 tCO <sub>2</sub> e/y)							-82.1
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)							28.7
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							2.86
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							31.5
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)							54.5
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							5.72
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							60.2

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)		40.8	0.066	0.065	0.063	0.038	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		24.6	13.2	15.2	11.9	6.42	1.31
Premature deaths from air pollution - Mobile - On-Road (deaths)		112	104	78.3	44.9	20.2	7.59
Premature deaths from air pollution - Gas Stations (deaths)		5.61	5.1	3.79	2.19	1.02	0.428

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		27.5	23.3	16.2	9.11	4.35	1.65
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		38	29.8	19.6	10.9	4.57	1.32
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		3.63	3.27	2.53	1.69	0.947	0.487
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.835	0.796	0.756	0.712	0.669	0.622
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		22.7	20.5	16.2	11.3	7.18	3.93
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		9.36	7.56	5.23	3.15	2.06	1.49
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.84	1.54	1.25	0.967	0.702	0.456
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.32	0.182	0.18	0.176	0.178	0.165
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		23.7	22.5	21.8	18.9	15.8	11.8
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		361	0.582	0.58	0.562	0.335	0.01
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		218	117	135	105	56.9	11.6
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		995	923	697	399	179	67.5
Monetary damages from air pollution - Gas Stations (million \$2019)		49.7	45.2	33.6	19.4	8.99	3.79
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		244	206	143	80.7	38.5	14.6
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		337	264	173	96.3	40.5	11.7
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		32.1	29	22.5	14.9	8.39	4.32
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		7.39	7.05	6.69	6.31	5.92	5.51
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		201	181	144	100	63.6	34.8
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		82.9	66.9	46.3	27.9	18.3	13.2
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		16.3	13.6	11.1	8.56	6.22	4.04
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		2.82	1.6	1.59	1.56	1.57	1.45

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		210	200	193	168	141	105

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		90.5	130	43.4	35.7	32.9	143
By economic sector - Construction (jobs)		6,534	4,095	4,853	5,082	4,349	5,601
By economic sector - Manufacturing (jobs)		2,062	1,517	1,947	1,452	1,134	1,997
By economic sector - Mining (jobs)		1,048	750	504	320	195	122
By economic sector - Other (jobs)		986	485	591	710	663	1,241
By economic sector - Pipeline (jobs)		269	294	206	173	135	107
By economic sector - Professional (jobs)		2,614	1,724	2,504	2,438	1,983	2,987
By economic sector - Trade (jobs)		1,876	1,224	1,473	1,474	1,255	1,920
By economic sector - Utilities (jobs)		4,331	4,420	8,655	7,913	6,083	6,774
By resource sector - Biomass (jobs)		317	332	149	134	129	596
By resource sector - CO2 (jobs)		0	501	1.36	3.45	3.44	2.54
By resource sector - Coal (jobs)		54.1	0	0	0	0	0
By resource sector - Grid (jobs)		4,822	4,759	8,203	8,676	7,542	7,092
By resource sector - Natural Gas (jobs)		2,742	2,597	2,076	2,064	1,816	1,766
By resource sector - Nuclear (jobs)		1,092	1,074	5,183	3,843	2,243	3,347
By resource sector - Oil (jobs)		2,326	1,811	1,242	785	491	318
By resource sector - Solar (jobs)		7,863	3,121	3,285	3,841	3,455	7,524
By resource sector - Wind (jobs)		594	441	637	252	151	249
By education level - All sectors - High school diploma or less (jobs)		8,463	6,195	8,474	8,081	6,598	8,668
By education level - All sectors - Associates degree or some college (jobs)		6,238	4,628	6,468	6,195	5,065	6,606
By education level - All sectors - Bachelors degree (jobs)		3,986	2,985	4,533	4,131	3,236	4,348
By education level - All sectors - Masters or professional degree (jobs)		975	729	1,141	1,045	817	1,107
By education level - All sectors - Doctoral degree (jobs)		146	101	161	147	113	164
Related work experience - All sectors - None (jobs)		2,865	2,133	2,953	2,819	2,301	3,019
Related work experience - All sectors - Up to 1 year (jobs)		4,031	2,890	4,051	3,834	3,109	4,206
Related work experience - All sectors - 1 to 4 years (jobs)		7,100	5,283	7,536	7,091	5,714	7,516
Related work experience - All sectors - 4 to 10 years (jobs)		4,608	3,430	4,900	4,618	3,723	4,861
Related work experience - All sectors - Over 10 years (jobs)		1,205	901	1,337	1,236	983	1,293
On-the-Job Training - All sectors - None (jobs)		1,112	794	1,165	1,084	863	1,183
On-the-Job Training - All sectors - Up to 1 year (jobs)		12,885	9,541	13,632	12,759	10,262	13,677
On-the-Job Training - All sectors - 1 to 4 years (jobs)		4,215	3,136	4,405	4,210	3,428	4,413
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,395	1,026	1,375	1,361	1,130	1,421
On-the-Job Training - All sectors - Over 10 years (jobs)		202	141	200	185	147	202
On-Site or In-Plant Training - All sectors - None (jobs)		3,244	2,357	3,389	3,171	2,543	3,440
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		11,721	8,685	12,408	11,635	9,367	12,431

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

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		3,266	2,424	3,396	3,242	2,641	3,411
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,411	1,043	1,414	1,383	1,140	1,437
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		169	127	169	167	139	175
Wage income - All (million \$2019)		1,245	948	1,393	1,328	1,081	1,424

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	228	212	186	152	122	104	95.6
Final energy use - Residential (PJ)	155	143	130	112	94.5	81.6	73.9
Final energy use - Commercial (PJ)	120	114	109	101	93.4	88.1	84.9
Final energy use - Industry (PJ)	64.9	63.4	62.5	61.2	61.1	61.8	62.1

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)		1.3	1.34	3.78	4.11	3.37	3.57

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	38.7	272	506	1,323	2,141	2,794	3,448
Vehicle stocks - LDV – All others (1000 units)	2,875	2,737	2,600	1,895	1,189	673	156
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		549	1,419	2,279	3,460	3,757	3,587
Public EV charging plugs - DC Fast (1000 units)	0.229		0.879		3.72		5.99
Public EV charging plugs - L2 (1000 units)	0.794		21.1		89.3		144

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 (%)	7.5	14.9	62.3	88.8	92.4	92.6	92.6
Sales of space heating units - Electric Resistance (%)	4.92	6.44	5.03	2.19	1.67	1.64	1.81
Sales of space heating units - Gas (%)	34.4	19.8	14	2.38	0.3	0.169	0.163
Sales of space heating units - Fossil (%)	53.1	58.8	18.6	6.59	5.61	5.57	5.44
Sales of water heating units - Electric Heat Pump (%)	0	1.56	13.2	30.7	33.7	33.9	33.9
Sales of water heating units - Electric Resistance (%)	35.5	54.6	60.4	65.2	66	66	66
Sales of water heating units - Gas Furnace (%)	46.8	33.5	24.3	3.88	0.229	0	0
Sales of water heating units - Other (%)	17.6	10.3	2.05	0.206	0.126	0.127	0.126
Sales of cooking units - Electric Resistance (%)	71.8	77.8	96.2	99.8	100	100	100
Sales of cooking units - Gas (%)	28.2	22.2	3.79	0.191	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		3.13	3.5				

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 (%)	4.76	11	39.3	72.4	77.8	78.1	78.1
Sales of space heating units - Electric Resistance (%)	2.29	4.46	16.5	21.3	21.9	21.9	21.9
Sales of space heating units - Gas (%)	50.7	53.4	38.2	6.11	0.363	0	0
Sales of space heating units - Fossil (%)	42.2	31.2	5.99	0.253	0	0	0
Sales of water heating units - Electric Heat Pump (%)	2.81	3.52	15.9	41	45.5	45.9	45.9
Sales of water heating units - Electric Resistance (%)	13.8	12.6	24	48.1	52.3	52.5	52.5
Sales of water heating units - Gas (%)	78.2	80	58.2	9.28	0.549	0	0
Sales of water heating units - Other (%)	5.24	3.95	1.94	1.61	1.6	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)		7,080	7,732				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	400	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	4,965	4,265	4,060	4,063	5,038	4,460	2,552
Installed thermal - Nuclear (MW)	2,163	2,163	2,163	3,896	4,736	4,736	4,404
Installed renewables - Rooftop PV (MW)	770	1,341	1,570	1,838	2,141	2,479	2,857
Installed renewables - Solar - Base land use assumptions (MW)	1,273	3,656	3,656	3,656	4,251	4,251	4,251
Installed renewables - Wind - Base land use assumptions (MW)	5.8	5.8	82.8	82.8	82.8	135	245
Installed renewables - Solar - Constrained land use assumptions (MW)	2,024	3,248	4,132	4,132	5,632	5,632	6,007
Installed renewables - Wind - Constrained land use assumptions (MW)	5.8	5.8	171	171	171	171	349
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion \$2018)		3.19	0	0	0.619	0	0
Capital invested - Wind - Base (billion \$2018)		0	0.273	0	0	0.106	0.283
Capital invested - Solar PV - Constrained (billion \$2018)		1.64	1.06	0	1.56	0	0.347
Capital invested - Wind - Constrained (billion \$2018)		0	0.396	0	0	0	0.338

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	2,320	6,549	6,549	6,549	7,589	7,589	7,589
Wind - Base land use assumptions (GWh)	24	24	433	433	433	625	1,153
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	3,653	5,825	7,405	7,405	10,045	10,045	10,707
Wind - Constrained land use assumptions (GWh)	24	24	628	628	628	628	1,259
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)							-27.4
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-128
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-445
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-5.3
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-120
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-50.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-17
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-109
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-902
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-41
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-448
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-801
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-7.77
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-240
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-96.7
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-121
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-217
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-1,973
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-54.6
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-768
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-1,158
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-10.4
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-360
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-224
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-3,043
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-325

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							4.47
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							97.6
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							226
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.92
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)							7.16
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							65.1
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							404
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							6.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							101
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							408
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							2.89
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)							10.4
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.98
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							131
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							668
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							8.94
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							104

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							591
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							3.84
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)							13.6
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6.37
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							108
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							835

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO <sub>2</sub> e/y)							-41.5
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO <sub>2</sub> e/y)							-1.57
Carbon sink potential - Moderate deployment - Total (1000 tCO <sub>2</sub> e/y)							-43.1
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO <sub>2</sub> e/y)							-79
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO <sub>2</sub> e/y)							-3.14
Carbon sink potential - Aggressive deployment - Total (1000 tCO <sub>2</sub> e/y)							-82.1
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)							28.7
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							2.86
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							31.5

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

Item	2020	2025	2030	2035	2040	2045	2050
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)							54.5
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							5.72
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							60.2

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)		40.8	0.066	0.065	0.063	0.038	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		25.1	10.3	5.33	4.18	2.6	0.918
Premature deaths from air pollution - Mobile - On-Road (deaths)		114	115	111	99	78.2	53.2
Premature deaths from air pollution - Gas Stations (deaths)		5.74	5.76	5.51	4.89	3.84	2.61
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		27.7	25.5	22.6	18.6	13.9	9.21
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		38.6	35.9	33.4	28.3	20.5	12.5
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		3.67	3.62	3.53	3.21	2.58	1.86
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.835	0.796	0.756	0.712	0.669	0.622
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		22.8	22.4	21.6	19.8	16.9	13.4
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		9.43	8.49	7.51	6.19	5.03	3.92
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.84	1.65	1.46	1.28	1.1	0.929
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.345	0.182	0.182	0.179	0.181	0.177
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		23.2	20	16.1	13.1	11	7.88
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		361	0.582	0.58	0.562	0.335	0.01
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		222	90.9	47.2	37.1	23	8.13
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,013	1,020	985	880	695	473
Monetary damages from air pollution - Gas Stations (million \$2019)		50.8	51	48.8	43.3	34	23.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		246	226	200	165	124	81.6
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		342	318	296	250	181	111
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		32.5	32.1	31.3	28.4	22.8	16.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		7.39	7.05	6.69	6.31	5.92	5.51
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		202	198	191	175	149	118
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		83.5	75.1	66.4	54.8	44.6	34.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		16.3	14.6	13	11.3	9.73	8.22
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		3.04	1.61	1.6	1.58	1.59	1.56
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		206	178	143	117	97.7	70

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		88.3	124	46.2	34.2	28.4	186
By economic sector - Construction (jobs)		4,513	5,775	4,611	4,308	4,784	5,839
By economic sector - Manufacturing (jobs)		1,656	2,164	2,035	1,578	2,202	3,422
By economic sector - Mining (jobs)		1,042	760	554	406	258	130
By economic sector - Other (jobs)		609	904	720	707	826	1,336
By economic sector - Pipeline (jobs)		260	271	178	151	116	78.3
By economic sector - Professional (jobs)		1,946	2,347	1,947	1,868	2,100	2,961
By economic sector - Trade (jobs)		1,451	1,687	1,419	1,348	1,466	1,997
By economic sector - Utilities (jobs)		3,657	4,313	4,216	4,241	5,107	4,959
By resource sector - Biomass (jobs)		351	333	156	143	131	876
By resource sector - CO2 (jobs)		0	455	1.23	3.13	3.12	2.31
By resource sector - Coal (jobs)		54.1	0	0	0	0	0
By resource sector - Grid (jobs)		3,569	4,856	5,829	6,014	7,725	7,915
By resource sector - Natural Gas (jobs)		2,637	2,172	1,484	1,328	1,393	1,074
By resource sector - Nuclear (jobs)		1,092	1,074	1,057	1,041	1,025	834
By resource sector - Oil (jobs)		2,357	1,961	1,635	1,363	967	510
By resource sector - Solar (jobs)		5,039	6,925	4,723	4,376	5,055	8,298
By resource sector - Wind (jobs)		123	570	840	374	589	1,398
By education level - All sectors - High school diploma or less (jobs)		6,431	7,850	6,697	6,214	7,175	8,924
By education level - All sectors - Associates degree or some college (jobs)		4,747	5,798	4,981	4,657	5,427	6,682
By education level - All sectors - Bachelors degree (jobs)		3,160	3,671	3,167	2,943	3,350	4,134
By education level - All sectors - Masters or professional degree (jobs)		771	895	772	726	823	1,021
By education level - All sectors - Doctoral degree (jobs)		114	131	109	103	113	148

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

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - All sectors - None (jobs)		2,195	2,664	2,281	2,132	2,465	3,052
Related work experience - All sectors - Up to 1 year (jobs)		3,050	3,728	3,170	2,935	3,389	4,317
Related work experience - All sectors - 1 to 4 years (jobs)		5,487	6,574	5,650	5,268	6,064	7,462
Related work experience - All sectors - 4 to 10 years (jobs)		3,554	4,260	3,655	3,410	3,930	4,802
Related work experience - All sectors - Over 10 years (jobs)		937	1,118	969	897	1,040	1,275
On-the-Job Training - All sectors - None (jobs)		854	1,020	865	803	914	1,155
On-the-Job Training - All sectors - Up to 1 year (jobs)		9,961	11,957	10,282	9,545	11,014	13,761
On-the-Job Training - All sectors - 1 to 4 years (jobs)		3,214	3,902	3,344	3,129	3,623	4,390
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,042	1,281	1,080	1,024	1,175	1,398
On-the-Job Training - All sectors - Over 10 years (jobs)		153	185	155	141	161	204
On-Site or In-Plant Training - All sectors - None (jobs)		2,487	2,995	2,545	2,360	2,714	3,419
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		9,053	10,874	9,357	8,696	10,035	12,489
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		2,491	3,024	2,594	2,424	2,807	3,414
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,064	1,295	1,094	1,035	1,183	1,405
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		127	157	135	128	149	181
Wage income - All (million \$2019)		965	1,165	1,017	965	1,123	1,378

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	228	214	195	179	167	152	134
Final energy use - Residential (PJ)	155	144	135	128	118	105	91.1
Final energy use - Commercial (PJ)	120	114	111	108	105	101	96.5
Final energy use - Industry (PJ)	64.9	63.5	62.9	62.4	62.9	63.5	63.2

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)		0.975	0.97	1.63	1.7	3.09	3.32

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	29.9	98.5	167	485	802	1,505	2,208
Vehicle stocks - LDV – All others (1000 units)	2,886	2,886	2,886	2,738	2,589	1,995	1,401
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	91	186	634	1,979	2,888
Public EV charging plugs - DC Fast (1000 units)	0.229		0.29		1.39		3.84
Public EV charging plugs - L2 (1000 units)	0.794		6.97		33.5		92.2

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 (%)	7.5	7.1	12.5	28.5	55.7	78.2	88.3
Sales of space heating units - Electric Resistance (%)	4.92	6.49	6.23	5.8	4.6	2.99	2.13
Sales of space heating units - Gas (%)	34.4	20.1	19.4	17.2	12.1	5.68	1.98
Sales of space heating units - Fossil (%)	53.1	66.3	61.9	48.5	27.6	13.1	7.61
Sales of water heating units - Electric Heat Pump (%)	0	0.484	1.83	6.09	15.2	25.5	31.2
Sales of water heating units - Electric Resistance (%)	35.5	53.7	54.4	56.4	60.1	63.5	65.2
Sales of water heating units - Gas Furnace (%)	46.8	33.9	32.8	29.2	20.5	9.58	3.12
Sales of water heating units - Other (%)	17.6	11.9	11	8.3	4.13	1.41	0.461
Sales of cooking units - Electric Resistance (%)	71.7	72.5	75.1	81.9	91.4	97.2	99.2
Sales of cooking units - Gas (%)	28.3	27.5	24.9	18.1	8.64	2.79	0.75
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		3.14	3.73				

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 (%)	4.76	7.71	11	20.9	40.9	61.8	73
Sales of space heating units - Electric Resistance (%)	2.29	2.3	3.61	7.63	14.2	19.1	21
Sales of space heating units - Gas (%)	50.7	53.9	51.7	46	32.5	15.2	4.94
Sales of space heating units - Fossil (%)	42.2	36.1	33.8	25.4	12.4	3.94	1.03
Sales of water heating units - Electric Heat Pump (%)	2.81	2.92	4.33	9.01	20.1	33.9	42
Sales of water heating units - Electric Resistance (%)	13.8	12	13	17.7	28.2	41.2	48.8
Sales of water heating units - Gas (%)	78.2	80.8	78.7	69.9	49.2	23	7.51
Sales of water heating units - Other (%)	5.24	4.31	3.95	3.35	2.49	1.86	1.68
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)		7,079	7,740				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	400	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	4,965	4,265	3,173	3,176	3,547	4,079	3,502
Installed thermal - Nuclear (MW)	2,163	2,163	2,163	2,163	2,163	2,163	1,253
Capital invested - Biomass power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	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	0
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	2
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment - Cumulative 5-yr (million \$2018)		0	0	0	0	0	2,269
Biomass purchases (million \$2018/y)		0	0	0	0	0	142

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	0	0	0.01
Annual - BECCS (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0	0	0	0.01
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	0	0	0.01
Cumulative - BECCS (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0	0	0	0.01
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	145	145	145	145	145
Spur (km)		0	1.21	1.21	1.21	1.21	1.21
All (km)		0	146	146	146	146	146
Cumulative investment - Trunk (million \$2018)		0	262	262	262	262	262
Cumulative investment - Spur (million \$2018)		0	0.702	0.702	0.702	0.702	0.703
Cumulative investment - All (million \$2018)		0	262	262	262	262	262

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)							-27.4
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-128
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-445
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-5.3
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-120
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-50.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-17
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-109
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-902
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-41
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-448
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-801
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-7.77
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-240
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-96.7
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-121
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-217
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-1,973
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-54.6
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-768
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-1,158
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-10.4
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-360
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-224
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-3,043
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-325

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							4.47
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							97.6
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							226
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.92
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)							7.16
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							65.1
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							404
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							6.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							101
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							408
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							2.89
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)							10.4
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.98
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							131
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							668
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							8.94
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							104

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							591
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							3.84
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)							13.6
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6.37
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							108
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							835

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 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO <sub>2</sub> e/y)							-41.5
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO <sub>2</sub> e/y)							-1.57
Carbon sink potential - Moderate deployment - Cropland to woody energy crops (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Moderate deployment - Pasture to energy crops (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Moderate deployment - Total (1000 tCO <sub>2</sub> e/y)							-43.1
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO <sub>2</sub> e/y)							-79
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO <sub>2</sub> e/y)							-3.14
Carbon sink potential - Aggressive deployment - Cropland to woody energy crops (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Aggressive deployment - Pasture to energy crops (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Aggressive deployment - Total (1000 tCO <sub>2</sub> e/y)							-82.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							28.7
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							2.86
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)							0.313
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							31.8
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)							134
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							5.72
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)							0.313
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							141

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)		112	73.4	68.8	67	65.8	58.8
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		16.8	13.7	17.9	19.5	20.6	19.5
Premature deaths from air pollution - Mobile - On-Road (deaths)		114	116	118	120	122	125
Premature deaths from air pollution - Gas Stations (deaths)		5.71	5.8	5.86	5.96	6.04	6.1
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		27.5	26.6	26.7	26.9	26.9	26.5
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		37.4	29.8	19.7	12.1	7.26	4.72
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		3.6	3.52	3.43	3.39	3.34	3.31
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.872	0.871	0.868	0.86	0.852	0.839

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		23.2	23.6	23.2	22.6	22.8	23.9
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		9.45	8.31	6.75	4.9	3.79	3.11
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.92	1.96	1.99	2.01	2.03	2.05
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.65	0.474	0.398	0.379	0.369	0.349
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		23.4	25.1	25.9	24.6	24.6	23.5
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		997	650	610	594	583	521
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		149	122	158	173	182	172
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,011	1,031	1,048	1,068	1,088	1,109
Monetary damages from air pollution - Gas Stations (million \$2019)		50.6	51.4	51.9	52.8	53.5	54
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		244	236	237	239	239	234
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		332	264	175	107	64.3	41.8
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		31.9	31.2	30.4	30	29.6	29.3
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		7.72	7.71	7.68	7.62	7.54	7.43
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		205	209	205	200	202	211
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		83.6	73.6	59.8	43.4	33.5	27.6
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		17	17.3	17.6	17.8	18	18.1
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		5.74	4.18	3.51	3.35	3.26	3.08
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		207	223	230	218	218	209

Table 65: REF scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		83.7	75	74.1	60.4	60.3	65.4
By economic sector - Construction (jobs)		2,085	3,197	3,676	3,796	3,878	5,366
By economic sector - Manufacturing (jobs)		1,034	1,168	1,780	1,193	1,206	1,911
By economic sector - Mining (jobs)		1,058	858	699	568	483	409

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		86.9	347	414	463	501	1,087
By economic sector - Pipeline (jobs)		268	278	280	265	268	266
By economic sector - Professional (jobs)		1,137	1,435	1,598	1,670	1,694	2,424
By economic sector - Trade (jobs)		904	1,073	1,134	1,171	1,194	1,804
By economic sector - Utilities (jobs)		3,616	3,552	4,291	4,542	4,613	4,605
By resource sector - Biomass (jobs)		323	302	281	251	257	261
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		54.1	0	0	0	0	0
By resource sector - Grid (jobs)		3,569	3,570	5,085	5,280	5,495	5,844
By resource sector - Natural Gas (jobs)		2,716	2,623	2,675	2,921	2,869	2,709
By resource sector - Nuclear (jobs)		1,092	1,074	1,057	1,041	1,025	834
By resource sector - Oil (jobs)		2,371	2,004	1,752	1,621	1,547	1,496
By resource sector - Solar (jobs)			2,207	2,365	2,483	2,570	6,185
By resource sector - Wind (jobs)		148	201	731	132	136	607
By education level - All sectors - High school diploma or less (jobs)		4,206	5,014	5,882	5,766	5,852	7,605
By education level - All sectors - Associates degree or some college (jobs)		3,164	3,738	4,408	4,370	4,434	5,751
By education level - All sectors - Bachelors degree (jobs)		2,274	2,524	2,866	2,805	2,819	3,569
By education level - All sectors - Masters or professional degree (jobs)		554	617	695	692	696	884
By education level - All sectors - Doctoral degree (jobs)		74.4	87.1	94.6	95.3	95.6	128
Related work experience - All sectors - None (jobs)		1,479	1,733	2,025	2,005	2,035	2,631
Related work experience - All sectors - Up to 1 year (jobs)		1,939	2,342	2,741	2,673	2,711	3,596
Related work experience - All sectors - 1 to 4 years (jobs)		3,767	4,347	5,041	4,971	5,029	6,452
Related work experience - All sectors - 4 to 10 years (jobs)		2,434	2,816	3,270	3,233	3,268	4,172
Related work experience - All sectors - Over 10 years (jobs)		652	745	870	846	854	1,085
On-the-Job Training - All sectors - None (jobs)		558	659	752	738	746	987
On-the-Job Training - All sectors - Up to 1 year (jobs)		6,785	7,842	9,125	8,918	9,023	11,668
On-the-Job Training - All sectors - 1 to 4 years (jobs)		2,162	2,544	2,980	2,964	3,004	3,838
On-the-Job Training - All sectors - 4 to 10 years (jobs)		674	822	955	980	996	1,271
On-the-Job Training - All sectors - Over 10 years (jobs)		93.1	115	134	128	129	173
On-Site or In-Plant Training - All sectors - None (jobs)		1,641	1,932	2,237	2,192	2,215	2,904
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		6,169	7,136	8,306	8,132	8,230	10,622
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		1,673	1,969	2,306	2,288	2,319	2,972
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		704	843	976	995	1,009	1,279
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		85.2	101	121	121	124	158
Wage income - All (million \$2019)		675	782	916	921	944	1,205

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	228	214	197	187	187	193	200

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Residential (PJ)	155	145	139	135	132	130	128
Final energy use - Commercial (PJ)	120	116	117	116	115	117	121
Final energy use - Industry (PJ)	64.9	65.9	67.9	70.3	74.3	78.9	82.7

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)		1.02	1.02	2.7	2.9	2.76	2.92

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 (%)	7.29	8.79	9.1	9.58	9.77	9.98	10.3
Sales of space heating units - Electric Resistance (%)	4.95	6.28	6.15	6.11	6.12	5.85	5.64
Sales of space heating units - Gas (%)	34.5	27.1	53.6	72	73	73.2	73.1
Sales of space heating units - Fossil (%)	53.3	57.9	31.1	12.3	11.1	11	11
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	35.5	53.5	53.4	53.5	53.4	53.4	53.4
Sales of water heating units - Gas Furnace (%)	46.8	34.3	34.3	34.2	34.2	34.2	34.2
Sales of water heating units - Other (%)	17.6	12.3	12.3	12.3	12.3	12.3	12.3
Sales of cooking units - Electric Resistance (%)	71.5	71.5	71.5	71.5	71.5	71.5	71.5
Sales of cooking units - Gas (%)	28.5	28.5	28.5	28.5	28.5	28.5	28.5
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		3.06	3.2				

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 (%)	4.76	13	41.2	64.2	67.9	68.3	68.4
Sales of space heating units - Electric Resistance (%)	2.29	2.72	7.48	19.8	29.9	31.6	31.6
Sales of space heating units - Gas (%)	50.7	49.5	26.9	6.44	0.813	0.044	0
Sales of space heating units - Fossil (%)	42.2	34.8	24.4	9.58	1.37	0.108	0
Sales of water heating units - Electric Heat Pump (%)	2.81	2.41	2.38	2.38	2.36	2.39	2.38
Sales of water heating units - Electric Resistance (%)	13.8	11.5	11.2	11.4	11.4	11.2	11.3
Sales of water heating units - Gas (%)	78.2	81.7	82.2	82	82	82.3	82.2
Sales of water heating units - Other (%)	5.24	4.38	4.24	4.21	4.3	4.08	4.12
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)		6,993	7,196				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	400	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	4,965	4,265	4,265	4,388	4,709	5,612	5,616
Installed thermal - Nuclear (MW)	2,163	2,163	2,163	2,163	2,163	2,163	1,253
Installed renewables - Rooftop PV (MW)	770	1,341	1,570	1,838	2,141	2,479	2,857

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed renewables - Solar - Base land use assumptions (MW)	81.5	81.5	81.5	81.5	81.5	81.5	81.5
Installed renewables - Wind - Base land use assumptions (MW)	5.8	5.8	5.8	5.8	5.8	5.8	46.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	169	169	169	169	169	169	169
Wind - Base land use assumptions (GWh)	24	24	24	24	24	24	171
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)	-10.2		-1.57				-1.41
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.098		-0.176				-0.183
Business-as-usual carbon sink - Total (Mt CO2e/y)	-10.3		-1.75				-1.59

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)							-27.4
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-128
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-445
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-5.3
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-120
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-50.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-17
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-109
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-902
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-41
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-448
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-801
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-7.77
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-240
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-96.7
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-121
Carbon sink potential - Mid - Restore productivity (1000 tCO <sub>2</sub> e/y)							-217
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-1,973
Carbon sink potential - High - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-54.6
Carbon sink potential - High - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-768
Carbon sink potential - High - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-1,158
Carbon sink potential - High - Improve plantations (1000 tCO <sub>2</sub> e/y)							-10.4
Carbon sink potential - High - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-360
Carbon sink potential - High - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-143
Carbon sink potential - High - Reforest cropland (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-224
Carbon sink potential - High - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-3,043
Carbon sink potential - High - Restore productivity (1000 tCO <sub>2</sub> e/y)							-325
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							4.47
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							97.6
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							226
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.92
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)							7.16
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							65.1
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							404
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							6.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							101

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							408
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							2.89
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)							10.4
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.98
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							131
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							668
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							8.94
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							104
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							591
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							3.84
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)							13.6
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6.37
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							108
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							835