



Net-Zero America - Wyoming 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)		3.21	0.002	0.002	0.002	0.001	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		0.695	0.447	0.323	0.305	0.202	0.096
Premature deaths from air pollution - Mobile - On-Road (deaths)		2.67	2.42	1.78	0.984	0.427	0.156
Premature deaths from air pollution - Gas Stations (deaths)		0.185	0.166	0.122	0.07	0.034	0.016
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		0.531	0.452	0.316	0.177	0.084	0.033
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.01	0.009	0.006	0.004	0.002	0.001
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		0.099	0.091	0.071	0.047	0.025	0.012
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.046	0.043	0.04	0.036	0.033	0.03
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		0.287	0.247	0.18	0.109	0.058	0.028
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.074	0.058	0.044	0.032	0.022	0.014
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.039	0.031	0.025	0.019	0.013	0.008
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.2	0.121	0.106	0.088	0.075	0.069
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		13.3	12	10.4	7.87	5.53	3.27
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		28.4	0.02	0.02	0.015	0.009	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		6.16	3.96	2.86	2.71	1.79	0.854
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		23.8	21.5	15.8	8.75	3.79	1.38
Monetary damages from air pollution - Gas Stations (million \$2019)		1.64	1.47	1.08	0.624	0.3	0.143
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		4.7	4.01	2.8	1.57	0.741	0.29
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		0.091	0.077	0.054	0.032	0.018	0.009
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		0.876	0.805	0.631	0.415	0.224	0.103
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		0.41	0.38	0.351	0.322	0.293	0.263
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		2.54	2.19	1.59	0.964	0.513	0.246

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)		0.656	0.513	0.392	0.287	0.198	0.124
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		0.342	0.278	0.22	0.167	0.118	0.075
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		10.6	1.07	0.939	0.774	0.664	0.61
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		118	107	92.5	69.9	49.1	29

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		0	0	0	0	0	10.3
By economic sector - Construction (jobs)		4,630	5,588	6,764	7,897	8,273	8,669
By economic sector - Manufacturing (jobs)		6,701	8,204	8,915	7,930	6,668	6,586
By economic sector - Mining (jobs)		9,381	6,651	5,046	3,291	2,068	1,102
By economic sector - Other (jobs)		187	294	437	611	735	891
By economic sector - Pipeline (jobs)		730	663	582	452	328	218
By economic sector - Professional (jobs)		3,606	3,960	4,741	5,584	6,108	6,818
By economic sector - Trade (jobs)		5,083	3,670	3,822	3,881	3,925	4,114
By economic sector - Utilities (jobs)		3,716	4,042	5,156	6,770	7,221	7,565
By resource sector - Biomass (jobs)		0	0	0	0	0	44
By resource sector - CO2 (jobs)		0	0	14.6	17.8	18.1	99.9
By resource sector - Coal (jobs)		3,817	364	193	142	110	92.3
By resource sector - Grid (jobs)		2,698	4,512	7,351	10,463	11,807	12,933
By resource sector - Natural Gas (jobs)		10,721	8,701	6,672	5,462	3,800	2,339
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		11,814	10,701	9,641	7,043	5,296	3,313
By resource sector - Solar (jobs)		1,342	1,542	2,339	2,355	2,394	3,096
By resource sector - Wind (jobs)		3,643	7,253	9,253	10,931	11,901	14,057
By education level - All sectors - High school diploma or less (jobs)		13,868	13,404	14,471	14,839	14,318	14,483
By education level - All sectors - Associates degree or some college (jobs)		9,917	9,889	10,787	11,324	11,112	11,439
By education level - All sectors - Bachelors degree (jobs)		8,111	7,707	8,027	8,016	7,692	7,767
By education level - All sectors - Masters or professional degree (jobs)		1,875	1,812	1,902	1,947	1,912	1,963
By education level - All sectors - Doctoral degree (jobs)		264	261	277	289	292	307
Related work experience - All sectors - None (jobs)		4,681	4,591	4,952	5,129	4,993	5,084
Related work experience - All sectors - Up to 1 year (jobs)		6,475	6,295	6,828	7,030	6,831	7,000
Related work experience - All sectors - 1 to 4 years (jobs)		12,703	12,195	13,003	13,290	12,866	13,046
Related work experience - All sectors - 4 to 10 years (jobs)		7,950	7,790	8,348	8,610	8,380	8,545
Related work experience - All sectors - Over 10 years (jobs)		2,226	2,202	2,334	2,355	2,256	2,283
On-the-Job Training - All sectors - None (jobs)		1,919	1,823	1,926	1,951	1,887	1,921
On-the-Job Training - All sectors - Up to 1 year (jobs)		23,293	22,394	23,892	24,269	23,392	23,734

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)		6,683	6,674	7,232	7,569	7,412	7,581
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,817	1,848	2,058	2,269	2,296	2,378
On-the-Job Training - All sectors - Over 10 years (jobs)		323	333	356	356	339	343
On-Site or In-Plant Training - All sectors - None (jobs)		5,447	5,363	5,748	5,900	5,738	5,885
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		21,067	20,221	21,579	21,949	21,167	21,465
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		5,274	5,227	5,653	5,884	5,742	5,856
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		2,005	2,008	2,200	2,375	2,374	2,436
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		241	252	282	306	305	316
Wage income - All (million \$2019)		2,005	1,960	2,110	2,185	2,140	2,190

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		28.7	25.8	21.1	16.3	12.6	8.98
Oil consumption - Cumulative (million bbls)							638
Oil production - Annual (million bbls)		114	114	114	90.5	73.5	48.9
Natural gas consumption - Annual (tcf)		127	107	86	64.7	40.7	28.3
Natural gas consumption - Cumulative (tcf)							2,590
Natural gas production - Annual (tcf)		1,923	1,818	1,583	1,339	1,062	825

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	100	93.7	82.5	69.4	57.8	50.9	48.2
Final energy use - Residential (PJ)	12.4	11.7	11.2	10	8.47	7.35	6.61
Final energy use - Commercial (PJ)	23.9	23.9	23.4	22.2	20.6	19.5	18.9
Final energy use - Industry (PJ)	91.2	95.3	94.6	94.5	96.9	97.8	98.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		0.475	0.492	0.982	1.06	0.888	0.932

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	1.43	70	139	379	619	810	1,002
Vehicle stocks - LDV – All others (1000 units)	836	796	756	551	346	196	45.5
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		161	411	669	1,013	1,103	1,051
Public EV charging plugs - DC Fast (1000 units)	0.067		0.335		1.49		2.42
Public EV charging plugs - L2 (1000 units)	0.087		8.09		36.1		58.5

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 (%)	5.11	12.5	35.2	82	92.9	94	93.9
Sales of space heating units - Electric Resistance (%)	9.04	15.7	12.6	5.87	4.27	4.11	4.16
Sales of space heating units - Gas (%)	70.6	54.6	39.6	9.78	2.61	1.91	1.89
Sales of space heating units - Fossil (%)	15.2	17.3	12.6	2.36	0.19	0.008	0
Sales of water heating units - Electric Heat Pump (%)	0	0.824	11.4	35.5	41	41.4	41.4
Sales of water heating units - Electric Resistance (%)	12.2	25.1	33.5	52.4	57.1	57.6	57.7
Sales of water heating units - Gas Furnace (%)	87.1	73.3	54.2	11.3	0.997	0.043	0
Sales of water heating units - Other (%)	0.718	0.834	0.853	0.869	0.883	0.888	0.894
Sales of cooking units - Electric Resistance (%)	38	51.2	91.7	99.6	100	100	100
Sales of cooking units - Gas (%)	62	48.8	8.35	0.42	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		0.195	0.209				

Table 8: E+ scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	1.45	7.71	29.2	77.9	89.7	90.8	90.8
Sales of space heating units - Electric Resistance (%)	1.46	3.43	4.85	8.06	8.66	8.7	8.7
Sales of space heating units - Gas Furnace (%)	97.1	88.6	66	14	1.67	0.543	0.493
Sales of space heating units - Fossil (%)	0	0.209	0.04	0.002	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.014	0.99	13.4	41.7	48.6	49.2	49.2
Sales of water heating units - Electric Resistance (%)	0.674	2.42	14.8	42.9	49.7	50.4	50.4
Sales of water heating units - Gas Furnace (%)	99.2	96.2	71.5	15	1.33	0.057	0
Sales of water heating units - Other (%)	0.16	0.382	0.381	0.382	0.381	0.382	0.382
Sales of cooking units - Electric Resistance (%)	41.9	54.6	83	88.6	88.9	88.9	88.9
Sales of cooking units - Gas (%)	58.1	45.4	17	11.4	11.1	11.1	11.1
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		1,754	1,951				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	5,768	875	0	0	0	0	0
Installed thermal - Natural gas (MW)	299	299	389	390	3,873	6,057	5,881
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	9.15	13.9	18.7	24.6	32	41.1	52.3
Installed renewables - Wind - Base land use assumptions (MW)	1,692	6,828	14,320	20,451	29,540	35,993	39,239
Installed renewables - Wind - Constrained land use assumptions (MW)	5,748	6,713	11,111	14,230	17,473	20,770	22,188
Capital invested - Wind - Base (billion \$2018)		1.38	9.97	7.61	10.7	7.23	3.44
Capital invested - Wind - Constrained (billion \$2018)		6.49	5.04	2.64	3.93	3.26	2.02
Capital invested - Biomass power plant (billion \$2018)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	0	0	0.302

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Base land use assumptions (GWh)	24,571	28,214	53,844	74,557	104,330	125,593	136,765
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Constrained land use assumptions (GWh)	24,034	27,387	42,077	52,246	62,677	72,932	77,334
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	339
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	1
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	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment - Cumulative 5-yr (million \$2018)		0	0	0	0	0	277
Biomass purchases (million \$2018/y)		0	0	0	0	0	16.5

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	0.32
Annual - BECCS (MMT)		0	0	0	0	0	0.32
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	0	0	0.32
Cumulative - BECCS (MMT)		0	0	0	0	0	0.32
Cumulative - NGCC (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	0	0	0	0	0
Spur (km)		0	25.7	25.7	95.7	25.7	192

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	25.7	25.7	95.7	25.7	192
Cumulative investment - Trunk (million \$2018)		0	0	0	0	0	0
Cumulative investment - Spur (million \$2018)		0	13.7	14.8	52.6	14.8	117
Cumulative investment - All (million \$2018)		0	13.7	14.8	52.6	14.8	117

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)							-976
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-115
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-924
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-14.7
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-80
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-135
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-1,188
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-145
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,092
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-4,670
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,462
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-403
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-1,665
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-21.5
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-160
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-260
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,782
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,027
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,167

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO ₂ e/y)							-8,947
Carbon sink potential - High - Accelerate regeneration (1000 tCO ₂ e/y)							-1,948
Carbon sink potential - High - Avoid deforestation (1000 tCO ₂ e/y)							-691
Carbon sink potential - High - Extend rotation length (1000 tCO ₂ e/y)							-2,406
Carbon sink potential - High - Improve plantations (1000 tCO ₂ e/y)							-28.8
Carbon sink potential - High - Increase retention of HWP (1000 tCO ₂ e/y)							-240
Carbon sink potential - High - Increase trees outside forests (1000 tCO ₂ e/y)							-385
Carbon sink potential - High - Reforest cropland (1000 tCO ₂ e/y)							-2,376
Carbon sink potential - High - Reforest pasture (1000 tCO ₂ e/y)							-1,909
Carbon sink potential - High - All (not counting overlap) (1000 tCO ₂ e/y)							-13,225
Carbon sink potential - High - Restore productivity (1000 tCO ₂ e/y)							-3,241
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							159
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							87.9
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							470
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							5.31
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)							19.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							78.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							9.4
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							650
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,480
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							239
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							90.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							848
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							7.99

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							27.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							118
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							68
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,309
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							2,709
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							319
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							93.6
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,227
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							10.6
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)							36.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							157
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							54.2
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,074
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							2,972

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-378
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.5
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-393

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-742
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-29
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-771
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)							513
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							22.3
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							535
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)							1,003
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							44.6
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,048

Table 17: E- scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		3.21	0.002	0.002	0.002	0.001	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		0.706	0.393	0.258	0.157	0.086	0.064
Premature deaths from air pollution - Mobile - On-Road (deaths)		2.71	2.64	2.49	2.17	1.67	1.1
Premature deaths from air pollution - Gas Stations (deaths)		0.189	0.184	0.171	0.149	0.114	0.077
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		0.533	0.489	0.44	0.375	0.29	0.202
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.011	0.01	0.009	0.008	0.006	0.005
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		0.099	0.098	0.096	0.089	0.072	0.054
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.046	0.043	0.04	0.036	0.033	0.03
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		0.288	0.274	0.254	0.22	0.174	0.125

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.074	0.062	0.052	0.044	0.036	0.029
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.039	0.034	0.029	0.025	0.021	0.017
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.13	0.124	0.116	0.104	0.077	0.039
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		13.2	11.5	9.4	7.77	6.52	4.47
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		28.4	0.02	0.02	0.015	0.009	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		6.25	3.48	2.29	1.39	0.762	0.566
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		24.1	23.5	22.2	19.3	14.8	9.75
Monetary damages from air pollution - Gas Stations (million \$2019)		1.67	1.63	1.52	1.32	1.01	0.681
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		4.73	4.33	3.9	3.32	2.57	1.79
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		0.093	0.089	0.08	0.067	0.054	0.041
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		0.882	0.867	0.851	0.785	0.641	0.478
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		0.41	0.38	0.351	0.322	0.293	0.263
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		2.55	2.43	2.25	1.95	1.54	1.11
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		0.656	0.551	0.464	0.385	0.315	0.254
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		0.342	0.299	0.259	0.22	0.185	0.152
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		9.96	1.1	1.02	0.914	0.677	0.348
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		118	102	83.5	69	57.9	39.7

Table 18: E- scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		0	0	0	0	0	10.3
By economic sector - Construction (jobs)		4,657	5,603	6,285	7,173	8,768	10,927
By economic sector - Manufacturing (jobs)		6,793	8,327	8,038	7,722	8,288	8,287
By economic sector - Mining (jobs)		9,318	6,461	4,755	3,524	2,623	1,547
By economic sector - Other (jobs)		190	303	411	551	773	1,098
By economic sector - Pipeline (jobs)		729	637	540	466	407	313
By economic sector - Professional (jobs)		3,618	3,979	4,471	5,259	6,630	8,500

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Trade (jobs)		5,003	3,668	3,675	3,869	4,423	5,178
By economic sector - Utilities (jobs)		3,715	3,990	4,478	5,184	6,818	9,598
By resource sector - Biomass (jobs)		0	0	0	0	0	42.5
By resource sector - CO2 (jobs)		0	0	25	30.5	31	171
By resource sector - Coal (jobs)		3,654	369	211	169	113	51.2
By resource sector - Grid (jobs)		2,696	4,613	6,376	8,178	11,399	16,020
By resource sector - Natural Gas (jobs)		10,686	8,064	5,524	3,885	3,130	3,305
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		11,824	10,765	9,815	8,776	7,700	5,001
By resource sector - Solar (jobs)		1,384	1,595	1,963	2,076	2,696	3,168
By resource sector - Wind (jobs)		3,778	7,560	8,739	10,631	13,661	17,699
By education level - All sectors - High school diploma or less (jobs)		13,850	13,377	13,308	13,736	15,721	18,317
By education level - All sectors - Associates degree or some college (jobs)		9,923	9,857	9,875	10,331	12,042	14,429
By education level - All sectors - Bachelors degree (jobs)		8,109	7,672	7,444	7,573	8,544	9,834
By education level - All sectors - Masters or professional degree (jobs)		1,876	1,801	1,766	1,829	2,101	2,479
By education level - All sectors - Doctoral degree (jobs)		265	259	260	276	323	386
Related work experience - All sectors - None (jobs)		4,681	4,574	4,550	4,721	5,443	6,430
Related work experience - All sectors - Up to 1 year (jobs)		6,469	6,294	6,286	6,527	7,519	8,823
Related work experience - All sectors - 1 to 4 years (jobs)		12,692	12,148	11,990	12,354	14,125	16,504
Related work experience - All sectors - 4 to 10 years (jobs)		7,952	7,758	7,682	7,955	9,154	10,800
Related work experience - All sectors - Over 10 years (jobs)		2,229	2,193	2,144	2,188	2,488	2,886
On-the-Job Training - All sectors - None (jobs)		1,917	1,818	1,783	1,831	2,085	2,427
On-the-Job Training - All sectors - Up to 1 year (jobs)		23,274	22,337	22,027	22,636	25,820	30,001
On-the-Job Training - All sectors - 1 to 4 years (jobs)		6,689	6,644	6,629	6,914	8,023	9,579
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,818	1,835	1,886	2,032	2,424	3,004
On-the-Job Training - All sectors - Over 10 years (jobs)		324	333	327	334	378	434
On-Site or In-Plant Training - All sectors - None (jobs)		5,451	5,350	5,296	5,482	6,307	7,424
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		21,048	20,166	19,889	20,445	23,330	27,137
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		5,277	5,206	5,188	5,395	6,238	7,402
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		2,005	1,993	2,021	2,148	2,528	3,083
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		242	251	258	275	326	398
Wage income - All (million \$2019)		2,004	1,950	1,942	2,022	2,340	2,773

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	100	94.2	85.5	79.2	74.7	69.4	62.9
Final energy use - Residential (PJ)	12.4	11.7	11.3	11.1	10.7	10.3	9.8
Final energy use - Commercial (PJ)	23.9	23.9	23.7	23.6	23.4	23.1	22.9
Final energy use - Industry (PJ)	91.2	95.4	95	95.9	99	99.6	100

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)		0.375	0.38	0.515	0.536	0.847	0.903

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	1.1	21.3	41.4	135	228	435	642
Vehicle stocks - LDV – All others (1000 units)	839	839	839	796	753	580	407
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	25.8	54.8	184	582	848
Public EV charging plugs - DC Fast (1000 units)	0.067		0.1		0.552		1.55
Public EV charging plugs - L2 (1000 units)	0.087		2.42		13.3		37.5

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 (%)	5.11	10.8	12.2	17	27.9	41.4	49.7
Sales of space heating units - Electric Resistance (%)	9.04	15.9	15.6	15.1	13.8	11.8	10.6
Sales of space heating units - Gas (%)	70.6	55.7	54.6	52.6	46.3	37	31.4
Sales of space heating units - Fossil (%)	15.2	17.6	17.7	15.3	12	9.78	8.25
Sales of water heating units - Electric Heat Pump (%)	0	0.23	0.889	3.05	8.31	15.1	19.3
Sales of water heating units - Electric Resistance (%)	12.2	24.6	25.4	27.4	31.8	37.2	40.6
Sales of water heating units - Gas Furnace (%)	87.1	74.3	72.8	68.7	59	46.8	39.1
Sales of water heating units - Other (%)	0.718	0.834	0.853	0.868	0.881	0.89	0.897
Sales of cooking units - Electric Resistance (%)	37.8	39.4	45.1	60.1	81	93.9	98.3
Sales of cooking units - Gas (%)	62.2	60.6	54.9	39.9	19	6.14	1.65
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		0.194	0.206				

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	1.45	6.48	7.77	12	22.4	35.8	44.2
Sales of space heating units - Electric Resistance (%)	1.46	3.35	3.43	3.71	4.42	5.32	5.86
Sales of space heating units - Gas Furnace (%)	97.1	89.9	88.6	84.1	73	58.7	49.8
Sales of space heating units - Fossil (%)	0	0.246	0.238	0.208	0.166	0.139	0.129
Sales of water heating units - Electric Heat Pump (%)	0.014	0.298	1.07	3.62	9.83	17.9	23
Sales of water heating units - Electric Resistance (%)	0.674	1.73	2.5	5.04	11.2	19.3	24.3
Sales of water heating units - Gas Furnace (%)	99.2	97.6	96	91	78.6	62.4	52.4
Sales of water heating units - Other (%)	0.16	0.382	0.381	0.382	0.381	0.382	0.382
Sales of cooking units - Electric Resistance (%)	41.9	46.2	50.2	60.8	75.4	84.6	87.8
Sales of cooking units - Gas (%)	58.1	53.8	49.8	39.2	24.6	15.4	12.2
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		1,753	1,948				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	5,768	875	0	0	0	0	0
Installed thermal - Natural gas (MW)	299	299	383	303	315	1,956	7,574
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-976
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-115
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-924
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-14.7
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-80
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-135
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-1,188
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-145
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,092
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-4,670
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,462
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-403
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-1,665
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-21.5
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-160
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-260
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,782
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,027
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,167
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-8,947
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,948
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-691
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-2,406
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-28.8
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-240

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-385
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-2,376
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-1,909
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-13,225
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,241
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							159
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							87.9
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							470
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							5.31
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)							19.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							78.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							9.4
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							650
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,480
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							239
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							90.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							848
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							7.99
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)							27.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							118
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							68

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,309
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							2,709
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							319
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							93.6
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,227
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							10.6
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)							36.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							157
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							54.2
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,074
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							2,972

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)							-378
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.5
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-393
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-742
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-29
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-771

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							513
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							22.3
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							535
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)							1,003
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							44.6
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,048

Table 27: E+RE+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		3.21	0.002	0.002	0.002	0.001	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		0.63	0.371	0.187	0.153	0.084	0.052
Premature deaths from air pollution - Mobile - On-Road (deaths)		2.67	2.42	1.78	0.984	0.427	0.156
Premature deaths from air pollution - Gas Stations (deaths)		0.185	0.166	0.122	0.07	0.034	0.016
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		0.531	0.452	0.316	0.177	0.084	0.033
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.01	0.009	0.006	0.004	0.002	0.001
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		0.099	0.091	0.071	0.047	0.025	0.012
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.046	0.043	0.04	0.036	0.033	0.03
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		0.287	0.247	0.18	0.109	0.058	0.028
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.074	0.058	0.044	0.032	0.022	0.014
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.039	0.031	0.025	0.019	0.013	0.008
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.38	0.122	0.105	0.086	0.074	0.003

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		13	11.8	9.65	6.7	3.83	0.476
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		28.4	0.02	0.02	0.015	0.009	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		5.58	3.29	1.66	1.36	0.746	0.458
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		23.8	21.5	15.8	8.75	3.79	1.38
Monetary damages from air pollution - Gas Stations (million \$2019)		1.64	1.47	1.08	0.624	0.3	0.143
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		4.7	4.01	2.8	1.57	0.741	0.29
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		0.091	0.077	0.054	0.032	0.018	0.009
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		0.876	0.805	0.631	0.415	0.224	0.103
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		0.41	0.38	0.351	0.322	0.293	0.263
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		2.54	2.19	1.59	0.964	0.513	0.246
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		0.656	0.513	0.392	0.287	0.198	0.124
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		0.342	0.278	0.22	0.167	0.118	0.075
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		12.2	1.07	0.929	0.758	0.651	0.022
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		116	105	85.7	59.5	34	4.23

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		0	0	0	0	0	10.3
By economic sector - Construction (jobs)		4,572	5,864	8,326	10,316	11,834	22,634
By economic sector - Manufacturing (jobs)		7,449	8,926	10,940	10,862	9,659	15,826
By economic sector - Mining (jobs)		9,392	6,561	4,741	2,869	1,497	194
By economic sector - Other (jobs)		188	322	587	865	1,153	3,527
By economic sector - Pipeline (jobs)		715	649	532	378	227	39.6
By economic sector - Professional (jobs)		3,627	4,159	5,760	7,341	8,997	15,450
By economic sector - Trade (jobs)		5,302	3,753	4,266	4,671	5,266	9,055
By economic sector - Utilities (jobs)		3,496	4,250	6,849	9,165	10,400	19,269
By resource sector - Biomass (jobs)		0	0	0	0	0	45.5
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		4,240	364	191	139	108	0.296
By resource sector - Grid (jobs)		2,326	4,978	10,856	15,259	18,209	36,607
By resource sector - Natural Gas (jobs)		10,370	8,434	6,002	4,643	2,636	1,093
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		11,814	10,695	9,405	6,493	4,157	794

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

Item	2020	2025	2030	2035	2040	2045	2050
By resource sector - Solar (jobs)		1,781	2,109	2,656	3,259	3,615	15,824
By resource sector - Wind (jobs)		4,209	7,905	12,892	16,672	20,308	31,642
By education level - All sectors - High school diploma or less (jobs)		14,224	14,005	17,212	18,991	19,847	35,276
By education level - All sectors - Associates degree or some college (jobs)		10,113	10,346	12,929	14,616	15,608	27,838
By education level - All sectors - Bachelors degree (jobs)		8,249	7,991	9,326	10,050	10,528	17,717
By education level - All sectors - Masters or professional degree (jobs)		1,889	1,875	2,214	2,446	2,642	4,478
By education level - All sectors - Doctoral degree (jobs)		265	269	320	362	408	681
Related work experience - All sectors - None (jobs)		4,767	4,787	5,880	6,549	6,925	12,288
Related work experience - All sectors - Up to 1 year (jobs)		6,666	6,598	8,173	9,090	9,607	17,202
Related work experience - All sectors - 1 to 4 years (jobs)		12,952	12,690	15,320	16,857	17,748	30,875
Related work experience - All sectors - 4 to 10 years (jobs)		8,085	8,114	9,874	10,968	11,628	20,240
Related work experience - All sectors - Over 10 years (jobs)		2,271	2,297	2,755	3,001	3,124	5,385
On-the-Job Training - All sectors - None (jobs)		1,959	1,897	2,264	2,477	2,617	4,616
On-the-Job Training - All sectors - Up to 1 year (jobs)		23,857	23,357	28,227	30,923	32,391	56,445
On-the-Job Training - All sectors - 1 to 4 years (jobs)		6,779	6,961	8,619	9,699	10,335	18,290
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,813	1,921	2,470	2,908	3,215	5,807
On-the-Job Training - All sectors - Over 10 years (jobs)		332	350	423	459	474	833
On-Site or In-Plant Training - All sectors - None (jobs)		5,566	5,602	6,823	7,569	8,033	14,131
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		21,565	21,085	25,496	27,955	29,291	51,122
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		5,361	5,452	6,728	7,530	7,988	14,124
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		2,005	2,083	2,614	3,016	3,291	5,847
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		244	264	341	396	429	767
Wage income - All (million \$2019)		2,037	2,036	2,480	2,760	2,938	5,139

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	100	93.7	82.5	69.4	57.8	50.9	48.2
Final energy use - Residential (PJ)	12.4	11.7	11.2	10	8.47	7.35	6.61
Final energy use - Commercial (PJ)	23.9	23.9	23.4	22.2	20.6	19.5	18.9
Final energy use - Industry (PJ)	91.2	95.3	94.6	94.5	96.9	97.8	98.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		0.475	0.492	0.982	1.06	0.888	0.932

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	1.43	70	139	379	619	810	1,002
Vehicle stocks - LDV – All others (1000 units)	836	796	756	551	346	196	45.5
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		161	411	669	1,013	1,103	1,051
Public EV charging plugs - DC Fast (1000 units)	0.067		0.335		1.49		2.42
Public EV charging plugs - L2 (1000 units)	0.087		8.09		36.1		58.5

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 (%)	5.11	12.5	35.2	82	92.9	94	93.9
Sales of space heating units - Electric Resistance (%)	9.04	15.7	12.6	5.87	4.27	4.11	4.16
Sales of space heating units - Gas (%)	70.6	54.6	39.6	9.78	2.61	1.91	1.89
Sales of space heating units - Fossil (%)	15.2	17.3	12.6	2.36	0.19	0.008	0
Sales of water heating units - Electric Heat Pump (%)	0	0.824	11.4	35.5	41	41.4	41.4
Sales of water heating units - Electric Resistance (%)	12.2	25.1	33.5	52.4	57.1	57.6	57.7
Sales of water heating units - Gas Furnace (%)	87.1	73.3	54.2	11.3	0.997	0.043	0
Sales of water heating units - Other (%)	0.718	0.834	0.853	0.869	0.883	0.888	0.894
Sales of cooking units - Electric Resistance (%)	38	51.2	91.7	99.6	100	100	100
Sales of cooking units - Gas (%)	62	48.8	8.35	0.42	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		0.195	0.209				

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	1.45	7.71	29.2	77.9	89.7	90.8	90.8
Sales of space heating units - Electric Resistance (%)	1.46	3.43	4.85	8.06	8.66	8.7	8.7
Sales of space heating units - Gas Furnace (%)	97.1	88.6	66	14	1.67	0.543	0.493
Sales of space heating units - Fossil (%)	0	0.209	0.04	0.002	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.014	0.99	13.4	41.7	48.6	49.2	49.2
Sales of water heating units - Electric Resistance (%)	0.674	2.42	14.8	42.9	49.7	50.4	50.4
Sales of water heating units - Gas Furnace (%)	99.2	96.2	71.5	15	1.33	0.057	0
Sales of water heating units - Other (%)	0.16	0.382	0.381	0.382	0.381	0.382	0.382
Sales of cooking units - Electric Resistance (%)	41.9	54.6	83	88.6	88.9	88.9	88.9
Sales of cooking units - Gas (%)	58.1	45.4	17	11.4	11.1	11.1	11.1
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		1,754	1,951				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	5,768	875	0	0	0	0	0
Installed thermal - Natural gas (MW)	299	299	463	1,215	5,432	6,849	7,574
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed renewables - Rooftop PV (MW)	9.15	13.9	18.7	24.6	32	41.1	52.3
Installed renewables - Solar - Base land use assumptions (MW)	0	0	0	0	0	0	11,289
Installed renewables - Wind - Base land use assumptions (MW)	6,123	7,512	15,720	27,314	41,989	54,506	86,025
Installed renewables - Solar - Constrained land use assumptions (MW)	0	0	0	0	0	0	5,385
Installed renewables - Wind - Constrained land use assumptions (MW)	5,950	7,626	12,202	16,770	23,303	28,418	59,803
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion \$2018)		0	0	0	0	0	10.5
Capital invested - Wind - Base (billion \$2018)		2.04	10.9	14.4	17.3	14	33.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	0	0	0	0	0	0	24,112
Wind - Base land use assumptions (GWh)	25,403	30,769	58,728	97,027	145,256	185,499	287,770
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	0	0	0	0	0	0	22,821
Wind - Constrained land use assumptions (GWh)	48,069	59,739	89,897	119,591	160,431	191,129	383,395
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)							-976
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-115
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-924
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-14.7
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-80
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-135
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-1,188
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-145
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,092
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-4,670
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,462
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-403
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-1,665

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 tCO2e/y)							-21.5
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-160
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-260
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,782
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,027
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,167
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-8,947
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,948
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-691
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-2,406
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-28.8
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-240
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-385
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-2,376
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-1,909
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-13,225
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,241
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							159
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							87.9
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							470
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							5.31
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)							19.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							78.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							9.4
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							650

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)							1,480
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							239
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							90.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							848
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							799
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)							279
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							118
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							68
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,309
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							2,709
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							319
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							93.6
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,227
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							10.6
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)							36.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							157
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							54.2
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,074
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							2,972

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 ₂ e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO ₂ e/y)							-378
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-14.5
Carbon sink potential - Moderate deployment - Total (1000 tCO ₂ e/y)							-393
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO ₂ e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO ₂ e/y)							-742
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-29
Carbon sink potential - Aggressive deployment - Total (1000 tCO ₂ e/y)							-771
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)							513
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							22.3
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							535
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)							1,003
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							44.6
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,048

Table 38: *E+RE- scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		3.21	0.002	0.002	0.002	0.001	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		0.691	0.437	0.408	0.519	0.244	0.071
Premature deaths from air pollution - Mobile - On-Road (deaths)		2.67	2.42	1.78	0.984	0.427	0.156
Premature deaths from air pollution - Gas Stations (deaths)		0.185	0.166	0.122	0.07	0.034	0.016

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)		0.531	0.452	0.316	0.177	0.084	0.033
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.01	0.009	0.006	0.004	0.002	0.001
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		0.099	0.091	0.071	0.047	0.025	0.012
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.046	0.043	0.04	0.036	0.033	0.03
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		0.287	0.247	0.18	0.109	0.058	0.028
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.074	0.058	0.044	0.032	0.022	0.014
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.039	0.031	0.025	0.019	0.013	0.008
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.02	0.12	0.106	0.087	0.075	0.002
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		13.5	12.6	12	9.96	8.06	5.83
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		28.4	0.02	0.02	0.015	0.009	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		6.12	3.87	3.62	4.6	2.16	0.626
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		23.8	21.5	15.8	8.75	3.79	1.38
Monetary damages from air pollution - Gas Stations (million \$2019)		1.64	1.47	1.08	0.624	0.3	0.143
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		4.7	4.01	2.8	1.57	0.741	0.29
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		0.091	0.077	0.054	0.032	0.018	0.009
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		0.876	0.805	0.631	0.415	0.224	0.103
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		0.41	0.38	0.351	0.322	0.293	0.263
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		2.54	2.19	1.59	0.964	0.513	0.246
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		0.656	0.513	0.392	0.287	0.198	0.124
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		0.342	0.278	0.22	0.167	0.118	0.075
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		9.01	1.06	0.934	0.765	0.665	0.021

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)		120	112	106	88.5	71.6	51.8

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		0	0	0	0	0	10.3
By economic sector - Construction (jobs)		4,874	4,849	5,280	6,268	6,064	5,288
By economic sector - Manufacturing (jobs)		7,150	6,897	7,537	6,977	5,157	4,966
By economic sector - Mining (jobs)		9,365	6,914	5,596	3,923	2,735	1,697
By economic sector - Other (jobs)		256	232	284	401	497	514
By economic sector - Pipeline (jobs)		745	698	673	576	479	385
By economic sector - Professional (jobs)		3,628	3,414	3,593	4,017	3,978	3,621
By economic sector - Trade (jobs)		4,913	3,447	3,343	3,206	2,987	2,547
By economic sector - Utilities (jobs)		3,565	3,464	4,106	5,961	5,406	4,494
By resource sector - Biomass (jobs)		0	0	0	0	0	42.7
By resource sector - CO2 (jobs)		0	0	28.3	34.5	35	194
By resource sector - Coal (jobs)		3,399	361	192	141	111	0
By resource sector - Grid (jobs)		2,246	3,143	4,490	8,299	7,752	6,332
By resource sector - Natural Gas (jobs)		11,069	9,545	8,813	7,893	6,285	4,681
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		11,813	10,701	9,641	7,043	5,413	3,748
By resource sector - Solar (jobs)		2,662	1,575	1,622	1,658	1,879	3,011
By resource sector - Wind (jobs)		3,309	4,590	5,627	6,262	5,829	5,514
By education level - All sectors - High school diploma or less (jobs)		14,053	12,076	12,386	12,848	11,166	9,609
By education level - All sectors - Associates degree or some college (jobs)		10,083	8,866	9,149	9,683	8,504	7,391
By education level - All sectors - Bachelors degree (jobs)		8,197	7,071	7,002	6,918	5,969	5,085
By education level - All sectors - Masters or professional degree (jobs)		1,896	1,663	1,641	1,648	1,451	1,239
By education level - All sectors - Doctoral degree (jobs)		268	239	234	234	213	185
Related work experience - All sectors - None (jobs)		4,751	4,152	4,249	4,433	3,880	3,342
Related work experience - All sectors - Up to 1 year (jobs)		6,574	5,623	5,759	5,962	5,195	4,516
Related work experience - All sectors - 1 to 4 years (jobs)		12,845	11,084	11,219	11,487	10,003	8,573
Related work experience - All sectors - 4 to 10 years (jobs)		8,063	7,059	7,168	7,404	6,470	5,566
Related work experience - All sectors - Over 10 years (jobs)		2,266	1,996	2,017	2,044	1,755	1,511
On-the-Job Training - All sectors - None (jobs)		1,946	1,657	1,654	1,664	1,450	1,246
On-the-Job Training - All sectors - Up to 1 year (jobs)		23,575	20,268	20,544	20,923	18,115	15,591
On-the-Job Training - All sectors - 1 to 4 years (jobs)		6,797	6,022	6,176	6,512	5,721	4,932
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,846	1,668	1,734	1,927	1,756	1,510
On-the-Job Training - All sectors - Over 10 years (jobs)		334	298	304	305	261	228
On-Site or In-Plant Training - All sectors - None (jobs)		5,543	4,831	4,895	5,013	4,371	3,793
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		21,315	18,312	18,564	18,946	16,416	14,112

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)		5,358	4,719	4,836	5,072	4,444	3,828
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		2,034	1,826	1,879	2,038	1,839	1,572
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		246	225	238	261	233	203
Wage income - All (million \$2019)		2,028	1,788	1,831	1,903	1,677	1,449

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	100	93.7	82.5	69.4	57.8	50.9	48.2
Final energy use - Residential (PJ)	12.4	11.7	11.2	10	8.47	7.35	6.61
Final energy use - Commercial (PJ)	23.9	23.9	23.4	22.2	20.6	19.5	18.9
Final energy use - Industry (PJ)	91.2	95.3	94.6	94.5	96.9	97.8	98.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		0.475	0.492	0.982	1.06	0.888	0.932

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	1.43	70	139	379	619	810	1,002
Vehicle stocks - LDV – All others (1000 units)	836	796	756	551	346	196	45.5
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		161	411	669	1,013	1,103	1,051
Public EV charging plugs - DC Fast (1000 units)	0.067		0.335		1.49		2.42
Public EV charging plugs - L2 (1000 units)	0.087		8.09		36.1		58.5

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 (%)	5.11	12.5	35.2	82	92.9	94	93.9
Sales of space heating units - Electric Resistance (%)	9.04	15.7	12.6	5.87	4.27	4.11	4.16
Sales of space heating units - Gas (%)	70.6	54.6	39.6	9.78	2.61	1.91	1.89
Sales of space heating units - Fossil (%)	15.2	17.3	12.6	2.36	0.19	0.008	0
Sales of water heating units - Electric Heat Pump (%)	0	0.824	11.4	35.5	41	41.4	41.4
Sales of water heating units - Electric Resistance (%)	12.2	25.1	33.5	52.4	57.1	57.6	57.7
Sales of water heating units - Gas Furnace (%)	87.1	73.3	54.2	11.3	0.997	0.043	0
Sales of water heating units - Other (%)	0.718	0.834	0.853	0.869	0.883	0.888	0.894
Sales of cooking units - Electric Resistance (%)	38	51.2	91.7	99.6	100	100	100
Sales of cooking units - Gas (%)	62	48.8	8.35	0.42	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		0.195	0.209				

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	1.45	7.71	29.2	77.9	89.7	90.8	90.8
Sales of space heating units - Electric Resistance (%)	1.46	3.43	4.85	8.06	8.66	8.7	8.7
Sales of space heating units - Gas Furnace (%)	97.1	88.6	66	14	1.67	0.543	0.493
Sales of space heating units - Fossil (%)	0	0.209	0.04	0.002	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.014	0.99	13.4	41.7	48.6	49.2	49.2
Sales of water heating units - Electric Resistance (%)	0.674	2.42	14.8	42.9	49.7	50.4	50.4
Sales of water heating units - Gas Furnace (%)	99.2	96.2	71.5	15	1.33	0.057	0
Sales of water heating units - Other (%)	0.16	0.382	0.381	0.382	0.381	0.382	0.382
Sales of cooking units - Electric Resistance (%)	41.9	54.6	83	88.6	88.9	88.9	88.9
Sales of cooking units - Gas (%)	58.1	45.4	17	11.4	11.1	11.1	11.1
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		1,754	1,951				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	5,768	875	0	0	0	0	0
Installed thermal - Natural gas (MW)	299	223	632	2,108	4,461	4,631	3,723
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	9.15	13.9	18.7	24.6	32	41.1	52.3
Installed renewables - Solar - Base land use assumptions (MW)	0	624	624	624	624	1,239	1,758
Installed renewables - Wind - Base land use assumptions (MW)	6,123	7,162	10,647	14,879	21,867	27,260	28,141
Installed renewables - Solar - Constrained land use assumptions (MW)	0	0	0	0	481	481	808
Installed renewables - Wind - Constrained land use assumptions (MW)	5,748	6,597	9,541	11,449	14,857	16,777	17,258
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion \$2018)		0.836	0	0	0	0.603	0.481
Capital invested - Wind - Base (billion \$2018)		1.53	4.64	5.2	8.26	6	0.933
Capital invested - Solar PV - Constrained (billion \$2018)		0	0	0	0.499	0	0.303
Capital invested - Wind - Constrained (billion \$2018)		1.25	3.92	2.37	4.03	2.15	0.51

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	0	1,350	1,350	1,350	1,350	2,677	3,799
Wind - Base land use assumptions (GWh)	25,403	29,333	41,691	55,645	79,358	97,055	100,139
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	0	0	0	0	1,031	1,031	1,732
Wind - Constrained land use assumptions (GWh)	24,034	26,992	36,886	43,210	54,319	60,449	61,985
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)							-976
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-115
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-924
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-14.7
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-80
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-135
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-1,188
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-145
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,092
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-4,670
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,462
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-403
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-1,665
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-21.5
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-160
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-260
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,782
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,027
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,167
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-8,947
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,948
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-691
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-2,406
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-28.8
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-240
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-385
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-2,376
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-1,909
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-13,225
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,241

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)							159
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							87.9
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							470
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							5.31
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)							19.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							78.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							9.4
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							650
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,480
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							239
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							90.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							848
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							7.99
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)							27.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							118
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							68
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,309
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							2,709
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							319
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							93.6

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)							1,227
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							10.6
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)							36.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							157
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							54.2
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,074
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							2,972

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO ₂ e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO ₂ e/y)							-378
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-14.5
Carbon sink potential - Moderate deployment - Total (1000 tCO ₂ e/y)							-393
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO ₂ e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO ₂ e/y)							-742
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-29
Carbon sink potential - Aggressive deployment - Total (1000 tCO ₂ e/y)							-771
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)							513
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							22.3
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							535

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)							1,003
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							44.6
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,048

Table 49: E-B+ scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		3.21	0.002	0.002	0.002	0.001	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		0.669	0.377	0.273	0.206	0.132	0.06
Premature deaths from air pollution - Mobile - On-Road (deaths)		2.71	2.64	2.49	2.17	1.67	1.1
Premature deaths from air pollution - Gas Stations (deaths)		0.189	0.184	0.171	0.149	0.114	0.077
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		0.533	0.489	0.44	0.375	0.29	0.202
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.011	0.01	0.009	0.008	0.006	0.005
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		0.099	0.098	0.096	0.089	0.072	0.054
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.046	0.043	0.04	0.036	0.033	0.03
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		0.288	0.274	0.254	0.22	0.174	0.125
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.074	0.062	0.052	0.044	0.036	0.029
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.039	0.034	0.029	0.025	0.021	0.017
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.19	0.124	0.116	0.105	0.091	0.078
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		13.2	11.5	9.4	7.77	6.52	4.47
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		28.4	0.02	0.02	0.015	0.009	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		5.93	3.34	2.42	1.82	1.17	0.533
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		24.1	23.5	22.2	19.3	14.8	9.75
Monetary damages from air pollution - Gas Stations (million \$2019)		1.67	1.63	1.52	1.32	1.01	0.681

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)		4.73	4.33	3.9	3.32	2.57	1.79
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		0.093	0.089	0.08	0.067	0.054	0.041
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		0.882	0.867	0.851	0.785	0.641	0.478
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		0.41	0.38	0.351	0.322	0.293	0.263
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		2.55	2.43	2.25	1.95	1.54	1.11
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		0.656	0.551	0.464	0.385	0.315	0.254
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		0.342	0.299	0.259	0.22	0.185	0.152
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		10.5	1.09	1.02	0.924	0.805	0.689
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		118	102	83.5	69	57.9	39.7

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		0	0	0	0	0	18.8
By economic sector - Construction (jobs)		4,672	5,672	6,077	6,049	6,828	7,400
By economic sector - Manufacturing (jobs)		6,831	8,412	7,465	6,025	6,333	6,873
By economic sector - Mining (jobs)		9,322	6,447	4,795	3,576	2,646	1,500
By economic sector - Other (jobs)		192	310	391	440	571	741
By economic sector - Pipeline (jobs)		724	635	546	475	408	301
By economic sector - Professional (jobs)		3,637	4,030	4,340	4,457	5,153	5,970
By economic sector - Trade (jobs)		5,083	3,689	3,616	3,472	3,665	3,802
By economic sector - Utilities (jobs)		3,716	4,034	4,254	4,129	5,000	5,632
By resource sector - Biomass (jobs)		0	0	0	0	0	88.8
By resource sector - CO2 (jobs)		0	0	25.7	31.3	31.8	176
By resource sector - Coal (jobs)		3,797	368	211	171	135	105
By resource sector - Grid (jobs)		2,733	4,701	5,881	6,090	8,074	9,496
By resource sector - Natural Gas (jobs)		10,569	8,023	5,660	4,060	3,005	2,012
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		11,825	10,765	9,815	8,793	7,736	4,830
By resource sector - Solar (jobs)		1,373	1,581	1,737	1,565	1,881	3,092
By resource sector - Wind (jobs)		3,882	7,788	8,155	7,913	9,740	12,438
By education level - All sectors - High school diploma or less (jobs)		13,930	13,484	12,807	11,610	12,415	12,996
By education level - All sectors - Associates degree or some college (jobs)		9,965	9,941	9,497	8,676	9,410	10,104
By education level - All sectors - Bachelors degree (jobs)		8,137	7,726	7,212	6,520	6,844	7,073
By education level - All sectors - Masters or professional degree (jobs)		1,880	1,814	1,715	1,577	1,676	1,761
By education level - All sectors - Doctoral degree (jobs)		265	261	253	240	258	277

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

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - All sectors - None (jobs)		4,701	4,610	4,387	4,000	4,295	4,527
Related work experience - All sectors - Up to 1 year (jobs)		6,510	6,348	6,039	5,480	5,897	6,277
Related work experience - All sectors - 1 to 4 years (jobs)		12,750	12,240	11,579	10,531	11,212	11,717
Related work experience - All sectors - 4 to 10 years (jobs)		7,982	7,819	7,415	6,758	7,232	7,626
Related work experience - All sectors - Over 10 years (jobs)		2,236	2,210	2,065	1,854	1,967	2,063
On-the-Job Training - All sectors - None (jobs)		1,926	1,832	1,723	1,562	1,656	1,734
On-the-Job Training - All sectors - Up to 1 year (jobs)		23,393	22,510	21,233	19,215	20,454	21,429
On-the-Job Training - All sectors - 1 to 4 years (jobs)		6,712	6,698	6,390	5,842	6,300	6,693
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,822	1,851	1,825	1,723	1,896	2,040
On-the-Job Training - All sectors - Over 10 years (jobs)		325	336	314	280	297	314
On-Site or In-Plant Training - All sectors - None (jobs)		5,474	5,394	5,103	4,634	4,964	5,279
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		21,155	20,322	19,175	17,361	18,482	19,350
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		5,297	5,248	5,000	4,563	4,909	5,192
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		2,010	2,009	1,958	1,834	1,994	2,115
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		242	254	248	231	254	275
Wage income - All (million \$2019)		2,012	1,964	1,877	1,728	1,860	1,961

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	100	94.2	85.5	79.2	74.7	69.4	62.9
Final energy use - Residential (PJ)	12.4	11.7	11.3	11.1	10.7	10.3	9.8
Final energy use - Commercial (PJ)	23.9	23.9	23.7	23.6	23.4	23.1	22.9
Final energy use - Industry (PJ)	91.2	95.4	95	95.9	99	99.6	100

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)		0.375	0.38	0.515	0.536	0.847	0.903

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	1.1	21.3	41.4	135	228	435	642
Vehicle stocks - LDV – All others (1000 units)	839	839	839	796	753	580	407
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	25.8	54.8	184	582	848
Public EV charging plugs - DC Fast (1000 units)	0.067		0.1		0.552		1.55
Public EV charging plugs - L2 (1000 units)	0.087		2.42		13.3		37.5

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 (%)	5.11	10.8	12.2	17	27.9	41.4	49.7
Sales of space heating units - Electric Resistance (%)	9.04	15.9	15.6	15.1	13.8	11.8	10.6
Sales of space heating units - Gas (%)	70.6	55.7	54.6	52.6	46.3	37	31.4
Sales of space heating units - Fossil (%)	15.2	17.6	17.7	15.3	12	9.78	8.25
Sales of water heating units - Electric Heat Pump (%)	0	0.23	0.889	3.05	8.31	15.1	19.3
Sales of water heating units - Electric Resistance (%)	12.2	24.6	25.4	27.4	31.8	37.2	40.6
Sales of water heating units - Gas Furnace (%)	87.1	74.3	72.8	68.7	59	46.8	39.1
Sales of water heating units - Other (%)	0.718	0.834	0.853	0.868	0.881	0.89	0.897
Sales of cooking units - Electric Resistance (%)	37.8	39.4	45.1	60.1	81	93.9	98.3
Sales of cooking units - Gas (%)	62.2	60.6	54.9	39.9	19	6.14	1.65
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		0.194	0.206				

Table 55: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	1.45	6.48	7.77	12	22.4	35.8	44.2
Sales of space heating units - Electric Resistance (%)	1.46	3.35	3.43	3.71	4.42	5.32	5.86
Sales of space heating units - Gas Furnace (%)	97.1	89.9	88.6	84.1	73	58.7	49.8
Sales of space heating units - Fossil (%)	0	0.246	0.238	0.208	0.166	0.139	0.129
Sales of water heating units - Electric Heat Pump (%)	0.014	0.298	1.07	3.62	9.83	17.9	23
Sales of water heating units - Electric Resistance (%)	0.674	1.73	2.5	5.04	11.2	19.3	24.3
Sales of water heating units - Gas Furnace (%)	99.2	97.6	96	91	78.6	62.4	52.4
Sales of water heating units - Other (%)	0.16	0.382	0.381	0.382	0.381	0.382	0.382
Sales of cooking units - Electric Resistance (%)	41.9	46.2	50.2	60.8	75.4	84.6	87.8
Sales of cooking units - Gas (%)	58.1	53.8	49.8	39.2	24.6	15.4	12.2
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		1,753	1,948				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	5,768	875	0	0	0	0	0
Installed thermal - Natural gas (MW)	299	299	382	303	315	1,172	366
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0
Capital invested - Biomass power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	0	0	0.68

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	763

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

Item	2020	2025	2030	2035	2040	2045	2050
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	1
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	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment - Cumulative 5-yr (million \$2018)		0	0	0	0	0	624
Biomass purchases (million \$2018/y)		0	0	0	0	0	47

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	0.75
Annual - BECCS (MMT)		0	0	0	0	0	0.75
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	0	0	0.75
Cumulative - BECCS (MMT)		0	0	0	0	0	0.75
Cumulative - NGCC (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	0	0	0	0	0
Spur (km)		0	60.7	25.7	25.7	311	279
All (km)		0	60.7	25.7	25.7	311	279
Cumulative investment - Trunk (million \$2018)		0	0	0	0	0	0
Cumulative investment - Spur (million \$2018)		0	32.2	16.6	16.6	179	179
Cumulative investment - All (million \$2018)		0	32.2	16.6	16.6	179	179

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)							-976
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-115
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-924
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-14.7
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-80
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-135
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-1,188
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-145
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,092
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-4,670
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,462
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-403
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-1,665
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-21.5
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-160
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-260
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,782
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,027
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,167
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-8,947
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,948
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-691
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-2,406
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-28.8
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-240
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-385
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-2,376
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-1,909
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-13,225
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,241

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)							159
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							87.9
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							470
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							5.31
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)							19.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							78.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							9.4
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							650
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,480
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							239
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							90.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							848
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							7.99
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)							27.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							118
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							68
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,309
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							2,709
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							319
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							93.6

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)							1,227
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							10.6
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)							36.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							157
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							54.2
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,074
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							2,972

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-5.6
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-375
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.1
Carbon sink potential - Moderate deployment - Cropland to woody energy crops (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Pasture to energy crops (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-394
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-5.6
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-735
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-28.3
Carbon sink potential - Aggressive deployment - Cropland to woody energy crops (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Pasture to energy crops (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-769

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)							8.46
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							507
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							21.7
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							2.77
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							540
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							8.46
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							2,452
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							43.5
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							2.77
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							2,507

Table 64: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		6.41	3.7	2.01	1.58	1.35	1.3
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		0.764	0.731	0.718	0.504	0.476	0.351
Premature deaths from air pollution - Mobile - On-Road (deaths)		2.71	2.68	2.66	2.64	2.61	2.59
Premature deaths from air pollution - Gas Stations (deaths)		0.188	0.185	0.182	0.179	0.176	0.172
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		0.53	0.491	0.457	0.434	0.419	0.406
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.011	0.01	0.008	0.006	0.004	0.003
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		0.097	0.096	0.097	0.097	0.095	0.092
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.048	0.047	0.046	0.044	0.042	0.04

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)		0.291	0.276	0.248	0.219	0.202	0.198
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.077	0.073	0.07	0.067	0.064	0.062
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.04	0.04	0.04	0.039	0.039	0.038
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		3.26	2.05	1.52	1.37	1.25	1.11
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		13.3	13.8	13.8	12.8	12.4	11.4
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		56.8	32.8	17.8	14	12	11.6
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		6.77	6.48	6.36	4.47	4.22	3.11
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		24.1	23.9	23.6	23.5	23.2	23
Monetary damages from air pollution - Gas Stations (million \$2019)		1.67	1.64	1.61	1.59	1.55	1.52
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		4.7	4.35	4.05	3.84	3.71	3.59
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		0.094	0.086	0.068	0.05	0.037	0.03
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		0.864	0.852	0.857	0.861	0.841	0.817
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		0.428	0.416	0.403	0.389	0.373	0.354
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		2.57	2.45	2.19	1.94	1.79	1.75
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		0.685	0.65	0.622	0.595	0.57	0.549
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		0.357	0.354	0.352	0.347	0.341	0.336
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		28.8	18.1	13.4	12.1	11.1	9.82
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		118	122	123	114	110	101

Table 65: REF scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		0	0	0	0	0	0
By economic sector - Construction (jobs)		4,171	4,164	4,159	4,732	4,858	4,611
By economic sector - Manufacturing (jobs)		4,687	5,813	6,806	6,629	5,345	5,378
By economic sector - Mining (jobs)		11,225	8,814	7,145	5,707	4,704	3,690

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		141	138	139	207	231	244
By economic sector - Pipeline (jobs)		742	779	795	757	757	724
By economic sector - Professional (jobs)		3,600	3,280	3,077	3,344	3,372	3,221
By economic sector - Trade (jobs)		7,808	5,631	4,588	4,281	3,966	3,553
By economic sector - Utilities (jobs)		3,844	3,408	3,114	3,638	3,690	3,358
By resource sector - Biomass (jobs)		0	0	0	0	0	0
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		9,456	5,271	3,250	2,532	1,985	1,534
By resource sector - Grid (jobs)		2,601	1,953	1,643	3,117	3,279	2,739
By resource sector - Natural Gas (jobs)		10,994	11,111	10,853	9,700	9,363	8,857
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		11,837	10,792	9,874	8,919	8,140	6,833
By resource sector - Solar (jobs)			605	1,024	872	728	1,403
By resource sector - Wind (jobs)		1,331	2,296	3,179	4,155	3,429	3,414
By education level - All sectors - High school diploma or less (jobs)		15,192	13,244	12,314	12,119	11,106	10,233
By education level - All sectors - Associates degree or some college (jobs)		10,304	9,270	8,742	8,713	8,060	7,487
By education level - All sectors - Bachelors degree (jobs)		8,546	7,559	6,967	6,709	6,126	5,573
By education level - All sectors - Masters or professional degree (jobs)		1,914	1,715	1,579	1,536	1,424	1,296
By education level - All sectors - Doctoral degree (jobs)		264	240	221	218	208	191
Related work experience - All sectors - None (jobs)		4,943	4,408	4,128	4,085	3,779	3,490
Related work experience - All sectors - Up to 1 year (jobs)		7,042	6,117	5,674	5,577	5,071	4,675
Related work experience - All sectors - 1 to 4 years (jobs)		13,692	12,021	11,130	10,889	10,018	9,192
Related work experience - All sectors - 4 to 10 years (jobs)		8,294	7,429	6,948	6,846	6,325	5,828
Related work experience - All sectors - Over 10 years (jobs)		2,248	2,053	1,944	1,899	1,731	1,595
On-the-Job Training - All sectors - None (jobs)		2,067	1,797	1,647	1,595	1,453	1,325
On-the-Job Training - All sectors - Up to 1 year (jobs)		25,132	22,033	20,443	19,948	18,208	16,726
On-the-Job Training - All sectors - 1 to 4 years (jobs)		6,848	6,210	5,857	5,835	5,425	5,020
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,865	1,696	1,593	1,639	1,585	1,473
On-the-Job Training - All sectors - Over 10 years (jobs)		307	292	284	279	252	235
On-Site or In-Plant Training - All sectors - None (jobs)		5,635	5,047	4,725	4,638	4,244	3,915
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		22,797	19,949	18,485	18,044	16,486	15,135
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		5,480	4,929	4,634	4,602	4,266	3,941
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		2,069	1,878	1,762	1,788	1,716	1,589
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		239	224	217	223	212	199
Wage income - All (million \$2019)		2,130	1,915	1,803	1,789	1,675	1,556

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	100	94.3	86.2	81.7	81.7	84.2	87.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Residential (PJ)	12.4	11.8	11.6	11.6	11.6	11.8	12
Final energy use - Commercial (PJ)	23.8	24.3	24.8	24.8	24.8	25.4	26.5
Final energy use - Industry (PJ)	91.2	98	100	103	106	111	116

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		0.451	0.465	0.504	0.521	0.589	0.612

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 (%)	4.61	14.6	14.9	15.5	16.1	16.6	17.2
Sales of space heating units - Electric Resistance (%)	9.12	15.3	15.1	15.1	15.1	14.6	14
Sales of space heating units - Gas (%)	70.9	53.8	53.4	54	54.8	54.6	54.5
Sales of space heating units - Fossil (%)	15.3	16.2	16.5	15.3	14	14.2	14.2
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	12.2	24.4	24.7	25	25.4	25.6	25.8
Sales of water heating units - Gas Furnace (%)	87.1	74.7	74.4	74.1	73.7	73.6	73.3
Sales of water heating units - Other (%)	0.718	0.834	0.853	0.868	0.881	0.89	0.897
Sales of cooking units - Electric Resistance (%)	37.2	37.2	37.2	37.2	37.2	37.2	37.2
Sales of cooking units - Gas (%)	62.8	62.8	62.8	62.8	62.8	62.8	62.8
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		0.191	0.192				

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	1.45	13.4	45.3	72.5	77.4	78.1	78.1
Sales of space heating units - Electric Resistance (%)	1.46	4.34	9.12	16.3	20.7	21.4	21.4
Sales of space heating units - Gas Furnace (%)	97.1	82	45.5	11.2	1.88	0.584	0.494
Sales of space heating units - Fossil (%)	0	0.228	0.136	0.039	0.005	0	0
Sales of water heating units - Electric Heat Pump (%)	0.014	0.03	0.03	0.03	0.03	0.03	0.03
Sales of water heating units - Electric Resistance (%)	0.674	1.46	1.46	1.47	1.46	1.47	1.46
Sales of water heating units - Gas Furnace (%)	99.2	98.1	98.1	98.1	98.1	98.1	98.1
Sales of water heating units - Other (%)	0.16	0.382	0.381	0.382	0.381	0.382	0.382
Sales of cooking units - Electric Resistance (%)	41.9	44.7	44.7	44.6	44.4	44.5	44.6
Sales of cooking units - Gas (%)	58.1	55.3	55.3	55.4	55.6	55.5	55.4
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		1,732	1,819				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	5,768	3,909	2,015	785	695	0	0
Installed thermal - Natural gas (MW)	299	174	256	350	407	579	429

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	9.15	13.9	18.7	24.6	32	41.1	52.3
Installed renewables - Wind - Base land use assumptions (MW)	3,288	3,288	3,288	3,288	7,399	11,853	12,367
Installed renewables - Wind - Constrained land use assumptions (MW)	2,602	2,602	2,602	2,602	2,698	2,698	2,698

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Base land use assumptions (GWh)	24,571	24,571	24,571	24,571	39,853	54,997	56,832
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)	29		1.96				0.561
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.065		-0.136				-0.143
Business-as-usual carbon sink - Total (Mt CO2e/y)	28.9		1.82				0.418

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)							-976
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-115
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-924
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-14.7
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-80
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-135
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-1,188
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-145
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,092
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-4,670
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,462
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-403
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-1,665
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-21.5
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-160
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-260

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,782
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,027
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,167
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-8,947
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,948
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-691
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-2,406
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-28.8
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-240
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-385
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-2,376
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-1,909
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-13,225
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,241
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							159
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							87.9
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							470
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							5.31
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)							19.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							78.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							9.4
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							650
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,480
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							239

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							90.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							848
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							799
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)							279
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							118
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							68
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,309
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							2,709
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							319
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							93.6
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,227
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							10.6
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)							36.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							157
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							54.2
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,074
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							2,972