Net-Zero America - Wyoming data

October 29, 2021 (updated November 17, 2023)

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 (%)	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 (%)	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
Capital invested - Biomass w/ccu allam 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 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
All (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
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
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-8,947

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-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
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 (%)	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 (%)	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
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-385
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-2,376

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

Item	2020	2025	2030	2035	2040	2045	2050
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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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
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

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 - 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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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 (%)	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 (%)	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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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
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 36: *E+RE+ 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 36: *E+RE+ scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							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
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 tCO2e/y)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-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
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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		0.099	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
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
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 (%)	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 (%)	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

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

Item	2020	2025	2030	2035	2040	2045	2050
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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
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

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 - 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
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

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 - 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 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
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

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 - 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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - 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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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 (%)	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 (%)	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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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
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

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 - 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
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

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 - 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
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

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 - 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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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
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 (%)	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 (%)	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
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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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
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

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 - 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