Net-Zero America - Nevada data

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		5.62	0.008	0.008	0.005	0.003	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		4.59	2.44	2.09	1.96	1.32	0.543
Premature deaths from air pollution - Mobile - On-Road (deaths)		53.2	52.4	41.8	25.2	11.8	4.54
Premature deaths from air pollution - Gas Stations (deaths)		3.32	3.22	2.53	1.55	0.754	0.332
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		9.21	7.74	5.14	2.82	1.38	0.669
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.281	0.252	0.216	0.176	0.138	0.101
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		0.588	0.536	0.43	0.317	0.218	0.153
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.054	0.055	0.056	0.056	0.056	0.055
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		13.2	12	9.17	5.87	3.37	1.77
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.8	1.53	1.27	1.01	0.762	0.516
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.798	0.704	0.604	0.495	0.379	0.259
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.085	0.012	0.012	0.011	0.011	0.011
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		11.7	11.6	11.1	9.08	7.01	4.53
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		49.8	0.067	0.067	0.044	0.027	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		40.7	21.6	18.5	17.4	11.7	4.81
Monetary damages from air pollution - Mobile - On-Road (million $2019)		473	466	372	224	105	40.3
Monetary damages from air pollution - Gas Stations (million $2019)		29.4	28.5	22.4	13.7	6.68	2.94
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		81.7	68.6	45.5	25	12.2	5.93
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		2.49	2.23	1.91	1.56	1.23	0.893
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		5.21	4.75	3.81	2.81	1.93	1.36
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		0.48	0.491	0.497	0.497	0.494	0.487
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		117	107	81.2	52	29.9	15.7

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)		15.9	13.5	11.2	8.96	6.74	4.57
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		7.06	6.24	5.35	4.38	3.35	2.29
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		0.753	0.107	0.105	0.098	0.096	0.097
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		104	103	98.1	80.6	62.2	40.2

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		4.73	9.61	3.67	2.85	2.09	1.56
By economic sector - Construction (jobs)		5,431	5,765	12,451	12,340	11,938	13,556
By economic sector - Manufacturing (jobs)		1,296	1,567	1,984	2,015	1,868	1,995
By economic sector - Mining (jobs)		1,000	705	460	278	154	81.4
By economic sector - Other (jobs)		696	772	2,333	2,405	2,521	3,274
By economic sector - Pipeline (jobs)		264	236	203	156	109	61.4
By economic sector - Professional (jobs)		2,074	2,273	4,978	5,186	5,272	6,317
By economic sector - Trade (jobs)		1,562	1,600	3,390	3,520	3,642	4,528
By economic sector - Utilities (jobs)		4,265	4,911	7,774	8,993	9,094	9,702
By resource sector - Biomass (jobs)		20.3	26.5	10.5	8.58	7.64	6.65
By resource sector - CO2 (jobs)		0	116	233	232	231	61.2
By resource sector - Coal (jobs)		173	32.1	0	0	0	0
By resource sector - Grid (jobs)		6,122	7,793	13,650	15,992	16,221	18,332
By resource sector - Natural Gas (jobs)		2,984	2,544	2,232	2,373	2,272	1,564
By resource sector - Nuclear (jobs)		0	0.004	0.007	0	0	0
By resource sector - Oil (jobs)		2,072	1,639	1,165	767	485	276
By resource sector - Solar (jobs)		4,789	4,796	15,145	14,321	14,131	17,740
By resource sector - Wind (jobs)		431	892	1,142	1,201	1,251	1,537
By education level - All sectors - High school diploma or less (jobs)		7,081	7,620	14,446	14,926	14,727	16,770
By education level - All sectors - Associates degree or some college (jobs)		5,326	5,770	10,924	11,410	11,340	12,938
By education level - All sectors - Bachelors degree (jobs)		3,272	3,477	6,361	6,630	6,599	7,567
By education level - All sectors - Masters or professional degree (jobs)		800	854	1,604	1,682	1,685	1,950
By education level - All sectors - Doctoral degree (jobs)		113	119	241	247	248	292
Related work experience - All sectors - None (jobs)		2,430	2,619	4,942	5,151	5,116	5,845
Related work experience - All sectors - Up to 1 year (jobs)		3,291	3,544	6,858	7,066	6,986	8,019
Related work experience - All sectors - 1 to 4 years (jobs)		5,970	6,410	11,982	12,479	12,388	14,152
Related work experience - All sectors - 4 to 10 years (jobs)		3,899	4,188	7,817	8,139	8,070	9,183
Related work experience - All sectors - Over 10 years (jobs)		1,002	1,079	1,978	2,061	2,040	2,317
On-the-Job Training - All sectors - None (jobs)		898	954	1,849	1,904	1,889	2,185
On-the-Job Training - All sectors - Up to 1 year (jobs)		10,694	11,495	21,501	22,357	22,182	25,387

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

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - All sectors - 1 to 4 years (jobs)		3,611	3,896	7,333	7,639	7,567	8,588
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,229	1,324	2,566	2,665	2,638	2,989
On-the-Job Training - All sectors - Over 10 years (jobs)		160	170	328	331	324	367
On-Site or In-Plant Training - All sectors - None (jobs)		2,655	2,846	5,436	5,623	5,577	6,401
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		9,763	10,495	19,633	20,420	20,257	23,170
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		2,789	3,008	5,661	5,893	5,837	6,633
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,236	1,327	2,540	2,636	2,607	2,950
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		150	163	307	323	320	363
Wage income - All (million $2019)		932	1,011	1,893	2,001	2,012	2,320

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		44.9	38.5	29.3	20.6	13.8	8.32
Oil consumption - Cumulative (million bbls)							906
Oil production - Annual (million bbls)		0.33	0.332	0.331	0.262	0.213	0.142
Natural gas consumption - Annual (tcf)		232	196	157	118	74.3	51.5
Natural gas consumption - Cumulative (tcf)							4,725
Natural gas production - Annual (tcf)		0.004	0.003	0.003	0.003	0.002	0.002

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	291	274	249	218	190	171	162
Final energy use - Residential (PJ)	94.5	92.3	87.6	79.2	71.6	67.4	65.8
Final energy use - Commercial (PJ)	89.2	89	85.7	80.3	75.1	72.2	71.6
Final energy use - Industry (PJ)	73.7	73.6	72.2	72.9	75.5	77.3	79.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		2.23	2.35	3.09	3.28	3.08	3.22

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	43.2	246	450	1,161	1,873	2,441	3,010
Vehicle stocks - LDV – All others (1000 units)	2,510	2,390	2,270	1,654	1,038	588	137
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		477	1,240	1,983	3,014	3,269	3,123
Public EV charging plugs - DC Fast (1000 units)	0.256		0.746		3.11		4.99
Public EV charging plugs - L2 (1000 units)	0.619		17.9		74.7		120

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 (%)	9.66	27.4	68.8	88.9	91.4	91.5	91.4
Sales of space heating units - Electric Resistance (%)	13.5	20.2	10.8	6.22	5.65	5.68	5.75
Sales of space heating units - Gas (%)	74.6	49	18.5	3.73	1.9	1.81	1.81
Sales of space heating units - Fossil (%)	2.25	3.38	1.94	1.18	1.02	0.999	1.02
Sales of water heating units - Electric Heat Pump (%)	0	8.43	46.6	60.9	62.4	62.5	62.5
Sales of water heating units - Electric Resistance (%)	23.2	37.5	32.8	35.1	35.7	35.8	35.8
Sales of water heating units - Gas Furnace (%)	75.1	52.3	18.8	2.22	0.114	0	0
Sales of water heating units - Other (%)	1.72	1.82	1.81	1.8	1.78	1.78	1.78
Sales of cooking units - Electric Resistance (%)	66.4	73.5	95.5	99.8	100	100	100
Sales of cooking units - Gas (%)	33.6	26.5	4.53	0.228	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		3.41	4.55				

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 (%)	3.34	20.2	63.4	88.9	92.5	92.6	92.7
Sales of space heating units - Electric Resistance (%)	3.3	3.45	4.17	6.37	6.82	6.85	6.84
Sales of space heating units - Gas (%)	92.4	76.1	32.4	4.78	0.723	0.51	0.507
Sales of space heating units - Fossil (%)	0.985	0.209	0.04	0.002	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.03	8.12	45.4	61.3	63.2	63.3	63.3
Sales of water heating units - Electric Resistance (%)	1.46	5.07	23	34.6	36.2	36.3	36.3
Sales of water heating units - Gas (%)	98.1	86.4	31.1	3.68	0.19	0	0
Sales of water heating units - Other (%)	0.365	0.384	0.383	0.384	0.383	0.384	0.383
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)		7,465	8,314				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	809	242	0	0	0	0	0
Installed thermal - Natural gas (MW)	6,545	5,969	6,674	7,057	8,597	6,543	4,690
Installed thermal - Nuclear (MW)	0	0	0.001	0.004	0	0	0
Installed renewables - Rooftop PV (MW)	675	1,040	1,389	1,810	2,310	2,893	3,583
Installed renewables - Solar - Base land use assumptions (MW)	4,971	4,971	4,971	13,631	19,500	24,398	28,779
Installed renewables - Wind - Base land use assumptions (MW)	985	1,335	4,050	7,632	9,418	10,219	12,897
Installed renewables - Solar - Constrained land use assumptions (MW)	4,880	4,965	4,965	6,533	8,473	9,843	13,638
Installed renewables - Wind - Constrained land use assumptions (MW)	222	437	1,128	1,610	2,374	2,417	3,217
Capital invested - Solar PV - Base (billion $2018)		0	0	9.55	6.1	4.81	4.06
Capital invested - Wind - Base (billion $2018)		0.755	3.61	4.44	2.11	0.898	2.84

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Constrained (billion $2018)		3.93	0	4.62	3.7	2.12	1.58
Capital invested - Wind - Constrained (billion $2018)		0.262	1.01	0.429	0.94	0.089	0.787
Capital invested - Biomass power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	13,021	13,021	13,021	34,562	49,077	61,165	71,940
Wind - Base land use assumptions (GWh)	2,421	3,919	11,540	21,442	26,325	28,482	35,708
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	12,657	12,657	12,657	16,469	20,892	24,040	32,842
Wind - Constrained land use assumptions (GWh)	657	1,195	2,853	3,945	5,397	5,474	7,205
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	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	0
Biomass purchases (million $2018/y)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0.01	0.03	0.05	0.04	0.03
Annual - BECCS (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0.01	0.03	0.05	0.04	0.03
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0.01	0.04	0.09	0.13	0.16
Cumulative - BECCS (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0.01	0.04	0.09	0.13	0.16
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	51.1	102	102	102	102
All (km)		0	51.1	102	102	102	102
Cumulative investment - Trunk (million $2018)		0	0	0	0	0	0
Cumulative investment - Spur (million $2018)		0	26.6	53.3	53.4	53.4	53.3
Cumulative investment - All (million $2018)		0	26.6	53.3	53.4	53.4	53.3

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)							-791
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-115
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-1,806
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1.27
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1.52
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-65.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-44.9
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-841
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-3,666
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,185
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-403
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-3,254
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1.86
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-3.05
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-126
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-319
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-1,668
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-6,960
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,579
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-691
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-4,703
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2.49
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-4.57
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-186
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-593
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-10,254
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,495
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							129
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)							919
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0.459
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)							9.3
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							2.92
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							500
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,649
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							194
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							90.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							1,658
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0.69
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)							13.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							21.1
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,008
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							2,986
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							258
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)							2,398
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0.918
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)							17.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							16.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							827
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							3,612

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)							-114

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-0.807
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-115
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-227
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-1.61
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-229
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)							160
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							1.24
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							162
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)							319
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							2.48
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							322

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)		5.62	0.008	0.008	0.005	0.003	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		4.68	1.85	1.21	0.624	0.295	0.151
Premature deaths from air pollution - Mobile - On-Road (deaths)		54.2	57.9	59.3	55.9	46.5	33.1
Premature deaths from air pollution - Gas Stations (deaths)		3.4	3.62	3.68	3.45	2.85	2.04
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		9.33	9.15	8.64	7.44	5.58	3.63
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.292	0.28	0.263	0.241	0.217	0.192
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		0.596	0.618	0.631	0.598	0.507	0.402

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.054	0.055	0.056	0.056	0.056	0.055
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		13.3	13.7	13.7	12.6	10.4	7.72
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.8	1.64	1.49	1.34	1.2	1.05
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.798	0.755	0.709	0.654	0.593	0.527
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.081	0.012	0.013	0.013	0.011	0.008
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		11.7	11.1	10.1	9.14	8.42	6.23
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		49.8	0.067	0.067	0.044	0.027	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		41.5	16.3	10.7	5.53	2.61	1.34
Monetary damages from air pollution - Mobile - On-Road (million $2019)		482	515	527	497	413	295
Monetary damages from air pollution - Gas Stations (million $2019)		30.1	32.1	32.6	30.5	25.3	18
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		82.7	81	76.6	66	49.4	32.2
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		2.59	2.48	2.33	2.14	1.93	1.7
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		5.29	5.48	5.59	5.3	4.49	3.56
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		0.48	0.491	0.497	0.497	0.494	0.487
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		117	122	121	111	91.9	68.4
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		15.9	14.5	13.2	11.9	10.6	9.32
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		7.06	6.69	6.28	5.79	5.25	4.67
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		0.711	0.109	0.112	0.111	0.097	0.07
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		104	98.8	89.3	81.2	74.8	55.4

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		5.76	7.39	2.82	1.81	1.64	1.58
By economic sector - Construction (jobs)		5,474	5,759	10,997	10,938	12,194	13,927

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Manufacturing (jobs)		1,309	1,584	1,818	1,846	2,062	2,218
By economic sector - Mining (jobs)		1,007	724	526	376	257	146
By economic sector - Other (jobs)		707	780	2,027	2,143	2,586	3,307
By economic sector - Pipeline (jobs)		265	240	223	194	166	98.7
By economic sector - Professional (jobs)		2,089	2,258	4,380	4,573	5,372	6,524
By economic sector - Trade (jobs)		1,576	1,617	3,046	3,191	3,777	4,681
By economic sector - Utilities (jobs)		4,232	4,732	6,837	7,480	8,869	9,980
By resource sector - Biomass (jobs)		21.9	19.9	9.36	7.63	6.99	6.51
By resource sector - CO2 (jobs)		0	199	400	398	397	105
By resource sector - Coal (jobs)		173	32.1	0	0	0	0
By resource sector - Grid (jobs)		6,047	7,539	11,870	13,221	15,661	18,712
By resource sector - Natural Gas (jobs)		2,984	2,311	1,905	1,863	2,222	1,728
By resource sector - Nuclear (jobs)		0	0.005	0.009	0	0	0
By resource sector - Oil (jobs)		2,096	1,759	1,481	1,190	905	554
By resource sector - Solar (jobs)		4,894	4,911	13,125	12,893	14,640	17,806
By resource sector - Wind (jobs)		449	931	1,066	1,169	1,453	1,973
By education level - All sectors - High school diploma or less (jobs)		7,114	7,570	12,846	13,164	15,029	17,340
By education level - All sectors - Associates degree or some college (jobs)		5,347	5,714	9,689	10,012	11,533	13,369
By education level - All sectors - Bachelors degree (jobs)		3,286	3,453	5,680	5,863	6,750	7,853
By education level - All sectors - Masters or professional degree (jobs)		803	847	1,428	1,482	1,718	2,020
By education level - All sectors - Doctoral degree (jobs)		114	118	214	220	254	303
Related work experience - All sectors - None (jobs)		2,440	2,597	4,392	4,532	5,212	6,042
Related work experience - All sectors - Up to 1 year (jobs)		3,308	3,525	6,090	6,238	7,135	8,287
Related work experience - All sectors - 1 to 4 years (jobs)		5,995	6,359	10,663	10,995	12,634	14,648
Related work experience - All sectors - 4 to 10 years (jobs)		3,915	4,152	6,951	7,161	8,223	9,505
Related work experience - All sectors - Over 10 years (jobs)		1,006	1,070	1,761	1,814	2,081	2,403
On-the-Job Training - All sectors - None (jobs)		903	950	1,645	1,687	1,934	2,258
On-the-Job Training - All sectors - Up to 1 year (jobs)		10,742	11,415	19,140	19,722	22,649	26,286
On-the-Job Training - All sectors - 1 to 4 years (jobs)		3,624	3,858	6,508	6,704	7,694	8,877
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,233	1,309	2,271	2,334	2,675	3,082
On-the-Job Training - All sectors - Over 10 years (jobs)		161	170	292	294	333	381
On-Site or In-Plant Training - All sectors - None (jobs)		2,669	2,828	4,830	4,963	5,697	6,621
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		9,805	10,420	17,475	18,007	20,676	23,985
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		2,799	2,980	5,027	5,177	5,940	6,857
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,241	1,313	2,252	2,313	2,647	3,045
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		150	161	272	282	325	375
Wage income - All (million $2019)		935	1,002	1,685	1,760	2,049	2,402

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	291	276	258	242	229	214	195
Final energy use - Residential (PJ)	94.5	92.7	91.9	90.1	85.9	79.9	74.4
Final energy use - Commercial (PJ)	89.2	89.2	88.5	87.3	84.9	81.8	79
Final energy use - Industry (PJ)	73.7	73.6	72.4	73.5	76.5	78.3	80

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		2	2.09	2.43	2.55	2.99	3.14

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	33.5	93.1	153	429	705	1,317	1,928
Vehicle stocks - LDV – All others (1000 units)	2,520	2,520	2,520	2,390	2,261	1,742	1,224
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		0	80.1	162	553	1,721	2,514
Public EV charging plugs - DC Fast (1000 units)	0.256		0.253		1.17		3.2
Public EV charging plugs - L2 (1000 units)	0.619		6.09		28.1		76.9

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 (%)	9.66	20.3	25	38.9	62.1	80.4	88.2
Sales of space heating units - Electric Resistance (%)	13.5	21.8	20.6	17.6	12.4	8.21	6.44
Sales of space heating units - Gas (%)	74.6	54.3	50.8	40.6	23.5	10.1	4.22
Sales of space heating units - Fossil (%)	2.25	3.63	3.53	2.94	1.99	1.35	1.13
Sales of water heating units - Electric Heat Pump (%)	0	1.53	5.88	18.5	39	54	60.1
Sales of water heating units - Electric Resistance (%)	23.2	38.6	38.2	36.7	35.1	35	35.4
Sales of water heating units - Gas Furnace (%)	75.1	58	54.2	42.9	24.1	9.21	2.71
Sales of water heating units - Other (%)	1.72	1.82	1.82	1.82	1.8	1.79	1.78
Sales of cooking units - Electric Resistance (%)	66.2	67.1	70.2	78.4	89.7	96.7	99.1
Sales of cooking units - Gas (%)	33.8	32.9	29.8	21.6	10.3	3.33	0.896
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		3.39	4.49				

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 (%)	3.34	13	18	32.6	57.8	78.9	88.5
Sales of space heating units - Electric Resistance (%)	3.3	3.43	3.51	3.82	4.64	5.8	6.5
Sales of space heating units - Gas (%)	92.4	83.3	78.3	63.4	37.5	15.3	4.96
Sales of space heating units - Fossil (%)	0.985	0.242	0.226	0.167	0.082	0.026	0.007
Sales of water heating units - Electric Heat Pump (%)	0.03	1.53	5.79	18.2	38.6	54.2	60.6
Sales of water heating units - Electric Resistance (%)	1.46	2.2	4.25	10.4	21	30.2	34.5
Sales of water heating units - Gas (%)	98.1	95.9	89.6	71	39.9	15.3	4.5
Sales of water heating units - Other (%)	0.365	0.384	0.383	0.384	0.383	0.384	0.383

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

Item	2020	2025	2030	2035	2040	2045	2050
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)		7,460	8,285				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	809	242	0	0	0	0	0
Installed thermal - Natural gas (MW)	6,545	5,969	6,094	6,024	5,473	4,547	3,599
Installed thermal - Nuclear (MW)	0	0	0.002	0.005	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)							-791
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-115
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-1,806
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1.27
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1.52
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-65.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-44.9
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-841
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-3,666
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,185
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-403
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-3,254
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1.86
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-3.05
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-126
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-319
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-1,668
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-6,960
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,579
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-691

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-4,703
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2.49
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-4.57
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-186
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-593
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-10,254
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,495
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							129
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)							919
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0.459
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)							9.3
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							2.92
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							500
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,649
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							194
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							90.7
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							1,658
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0.69
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)							13.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							21.1
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,008
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							2,986
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							258
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)							2,398
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0.918
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)							17.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							16.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							827
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							3,612

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)							-114
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-0.807
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-115
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-227

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-1.61
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-229
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)							160
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							1.24
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							162
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)							319
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							2.48
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							322

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)		5.62	0.008	0.008	0.005	0.003	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		4.21	2.21	1.15	0.775	0.387	0.134
Premature deaths from air pollution - Mobile - On-Road (deaths)		53.2	52.4	41.8	25.2	11.8	4.54
Premature deaths from air pollution - Gas Stations (deaths)		3.32	3.22	2.53	1.55	0.754	0.332
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		9.21	7.74	5.14	2.82	1.38	0.669
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.281	0.252	0.216	0.176	0.138	0.101
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		0.588	0.536	0.43	0.317	0.218	0.153
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.054	0.055	0.056	0.056	0.056	0.055
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		13.2	12	9.17	5.87	3.37	1.77
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.8	1.53	1.27	1.01	0.762	0.516
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.798	0.704	0.604	0.495	0.379	0.259

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.098	0.012	0.012	0.011	0.011	0.004
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		11.5	11.4	10.3	7.78	4.92	0.711
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		49.8	0.067	0.067	0.044	0.027	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		37.3	19.5	10.2	6.87	3.43	1.19
Monetary damages from air pollution - Mobile - On-Road (million $2019)		473	466	372	224	105	40.3
Monetary damages from air pollution - Gas Stations (million $2019)		29.4	28.5	22.4	13.7	6.68	2.94
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		81.7	68.6	45.5	25	12.2	5.93
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		2.49	2.23	1.91	1.56	1.23	0.893
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		5.21	4.75	3.81	2.81	1.93	1.36
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		0.48	0.491	0.497	0.497	0.494	0.487
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		117	107	81.2	52	29.9	15.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		15.9	13.5	11.2	8.96	6.74	4.57
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		7.06	6.24	5.35	4.38	3.35	2.29
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		0.862	0.108	0.104	0.097	0.095	0.037
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		102	101	91.3	69	43.7	6.32

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		4.76	9.88	3.65	2.33	1.88	1.38
By economic sector - Construction (jobs)		5,519	6,825	14,869	14,517	15,952	17,236
By economic sector - Manufacturing (jobs)		1,409	1,692	2,402	2,532	2,587	3,474
By economic sector - Mining (jobs)		988	687	418	224	96.3	18
By economic sector - Other (jobs)		710	1,014	2,871	2,929	3,489	4,088
By economic sector - Pipeline (jobs)		256	213	148	93.9	50.9	23.4
By economic sector - Professional (jobs)		2,120	2,687	6,021	6,217	7,202	8,218
By economic sector - Trade (jobs)		1,585	1,873	4,065	4,192	4,935	5,766
By economic sector - Utilities (jobs)		4,337	5,098	8,895	10,007	11,550	12,637
By resource sector - Biomass (jobs)		18.5	27.9	9.83	7.6	6.97	6.05
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		173	32.1	0	0	0	0
By resource sector - Grid (jobs)		6,325	8,434	16,419	18,848	21,767	24,507

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

Item	2020	2025	2030	2035	2040	2045	2050
By resource sector - Natural Gas (jobs)		2,903	2,341	1,886	1,730	1,908	1,411
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		2,073	1,619	1,120	663	302	5.53
By resource sector - Solar (jobs)		4,917	6,676	18,692	17,589	19,687	22,011
By resource sector - Wind (jobs)		519	969	1,566	1,876	2,194	3,521
By education level - All sectors - High school diploma or less (jobs)		7,226	8,618	17,093	17,427	19,522	21,815
By education level - All sectors - Associates degree or some college (jobs)		5,434	6,494	12,904	13,289	15,011	16,845
By education level - All sectors - Bachelors degree (jobs)		3,337	3,890	7,508	7,737	8,753	9,885
By education level - All sectors - Masters or professional degree (jobs)		815	961	1,899	1,968	2,244	2,539
By education level - All sectors - Doctoral degree (jobs)		115	138	288	293	335	378
Related work experience - All sectors - None (jobs)		2,478	2,947	5,835	5,997	6,768	7,589
Related work experience - All sectors - Up to 1 year (jobs)		3,362	4,039	8,149	8,297	9,313	10,455
Related work experience - All sectors - 1 to 4 years (jobs)		6,089	7,203	14,151	14,545	16,407	18,420
Related work experience - All sectors - 4 to 10 years (jobs)		3,976	4,702	9,223	9,473	10,675	11,958
Related work experience - All sectors - Over 10 years (jobs)		1,024	1,207	2,335	2,403	2,701	3,039
On-the-Job Training - All sectors - None (jobs)		916	1,088	2,196	2,234	2,519	2,834
On-the-Job Training - All sectors - Up to 1 year (jobs)		10,919	12,943	25,436	26,125	29,440	33,143
On-the-Job Training - All sectors - 1 to 4 years (jobs)		3,681	4,378	8,648	8,878	9,997	11,161
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,249	1,496	3,024	3,088	3,479	3,843
On-the-Job Training - All sectors - Over 10 years (jobs)		164	195	389	389	431	481
On-Site or In-Plant Training - All sectors - None (jobs)		2,710	3,226	6,441	6,582	7,418	8,343
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		9,965	11,813	23,218	23,849	26,873	30,228
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		2,843	3,382	6,681	6,856	7,717	8,623
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,257	1,495	2,990	3,052	3,435	3,796
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		152	183	362	374	422	471
Wage income - All (million $2019)		950	1,132	2,230	2,325	2,658	3,016

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	291	274	249	218	190	171	162
Final energy use - Residential (PJ)	94.5	92.3	87.6	79.2	71.6	67.4	65.8
Final energy use - Commercial (PJ)	89.2	89	85.7	80.3	75.1	72.2	71.6
Final energy use - Industry (PJ)	73.7	73.6	72.2	72.9	75.5	77.3	79.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		2.23	2.35	3.09	3.28	3.08	3.22

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	43.2	246	450	1,161	1,873	2,441	3,010
Vehicle stocks - LDV – All others (1000 units)	2,510	2,390	2,270	1,654	1,038	588	137
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		477	1,240	1,983	3,014	3,269	3,123
Public EV charging plugs - DC Fast (1000 units)	0.256		0.746		3.11		4.99
Public EV charging plugs - L2 (1000 units)	0.619		17.9		74.7		120

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 (%)	9.66	27.4	68.8	88.9	91.4	91.5	91.4
Sales of space heating units - Electric Resistance (%)	13.5	20.2	10.8	6.22	5.65	5.68	5.75
Sales of space heating units - Gas (%)	74.6	49	18.5	3.73	1.9	1.81	1.81
Sales of space heating units - Fossil (%)	2.25	3.38	1.94	1.18	1.02	0.999	1.02
Sales of water heating units - Electric Heat Pump (%)	0	8.43	46.6	60.9	62.4	62.5	62.5
Sales of water heating units - Electric Resistance (%)	23.2	37.5	32.8	35.1	35.7	35.8	35.8
Sales of water heating units - Gas Furnace (%)	75.1	52.3	18.8	2.22	0.114	0	0
Sales of water heating units - Other (%)	1.72	1.82	1.81	1.8	1.78	1.78	1.78
Sales of cooking units - Electric Resistance (%)	66.4	73.5	95.5	99.8	100	100	100
Sales of cooking units - Gas (%)	33.6	26.5	4.53	0.228	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		3.41	4.55				

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 (%)	3.34	20.2	63.4	88.9	92.5	92.6	92.7
Sales of space heating units - Electric Resistance (%)	3.3	3.45	4.17	6.37	6.82	6.85	6.84
Sales of space heating units - Gas (%)	92.4	76.1	32.4	4.78	0.723	0.51	0.507
Sales of space heating units - Fossil (%)	0.985	0.209	0.04	0.002	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.03	8.12	45.4	61.3	63.2	63.3	63.3
Sales of water heating units - Electric Resistance (%)	1.46	5.07	23	34.6	36.2	36.3	36.3
Sales of water heating units - Gas (%)	98.1	86.4	31.1	3.68	0.19	0	0
Sales of water heating units - Other (%)	0.365	0.384	0.383	0.384	0.383	0.384	0.383
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)		7,465	8,314				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	809	242	0	0	0	0	0
Installed thermal - Natural gas (MW)	6,545	5,969	6,095	6,516	6,459	5,963	3,581

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Nuclear (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	675	1,040	1,389	1,810	2,310	2,893	3,583
Installed renewables - Solar - Base land use assumptions (MW)	4,971	4,971	6,259	17,580	24,957	32,297	39,397
Installed renewables - Wind - Base land use assumptions (MW)	822	1,738	4,729	9,316	12,802	15,530	22,067
Installed renewables - Solar - Constrained land use assumptions (MW)	4,973	4,973	6,098	8,166	11,339	15,744	21,340
Installed renewables - Wind - Constrained land use assumptions (MW)	244	813	1,272	2,440	2,826	2,928	3,426
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion $2018)		0	1.54	12.5	7.67	7.2	6.58
Capital invested - Wind - Base (billion $2018)		1.35	3.98	5.69	4.12	3.06	6.92

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	13,021	13,021	16,228	44,271	62,484	80,384	97,813
Wind - Base land use assumptions (GWh)	2,421	5,086	13,422	26,074	35,514	42,609	58,960
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	26,042	26,042	31,596	41,365	56,454	77,211	103,659
Wind - Constrained land use assumptions (GWh)	1,314	4,057	6,274	11,021	12,636	13,105	15,221
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)							-791
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-115
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-1,806
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1.27
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1.52
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-65.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-44.9
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-841
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-3,666
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,185
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-403
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-3,254

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1.86
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-3.05
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-126
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-319
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-1,668
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-6,960
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,579
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-691
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-4,703
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2.49
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-4.57
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-186
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-593
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-10,254
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,495
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							129
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)							919
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0.459
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)							9.3
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							2.92
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							500

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,649
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							194
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							90.7
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							1,658
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0.69
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)							13.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							21.1
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,008
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							2,986
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							258
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)							2,398
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0.918
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)							17.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							16.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							827
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							3,612

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-114
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-0.807
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-115
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-227
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-1.61
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-229
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)							160
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							1.24
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							162
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)							319
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							2.48
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							322

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)		5.62	0.008	0.008	0.005	0.003	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		5.27	3.23	3.28	3.87	2.54	0.573
Premature deaths from air pollution - Mobile - On-Road (deaths)		53.2	52.4	41.8	25.2	11.8	4.54
Premature deaths from air pollution - Gas Stations (deaths)		3.32	3.22	2.53	1.55	0.754	0.332

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		9.21	7.74	5.14	2.82	1.38	0.669
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.281	0.252	0.216	0.176	0.138	0.101
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		0.588	0.536	0.43	0.317	0.218	0.153
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.054	0.055	0.056	0.056	0.056	0.055
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		13.2	12	9.17	5.87	3.37	1.77
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.8	1.53	1.27	1.01	0.762	0.516
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.798	0.704	0.604	0.495	0.379	0.259
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.073	0.012	0.012	0.011	0.011	0.004
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		11.9	12.2	12.6	11.3	9.93	7.77
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		49.8	0.067	0.067	0.044	0.027	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		46.7	28.6	29.1	34.3	22.5	5.07
Monetary damages from air pollution - Mobile - On-Road (million $2019)		473	466	372	224	105	40.3
Monetary damages from air pollution - Gas Stations (million $2019)		29.4	28.5	22.4	13.7	6.68	2.94
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		81.7	68.6	45.5	25	12.2	5.93
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		2.49	2.23	1.91	1.56	1.23	0.893
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		5.21	4.75	3.81	2.81	1.93	1.36
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		0.48	0.491	0.497	0.497	0.494	0.487
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		117	107	81.2	52	29.9	15.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		15.9	13.5	11.2	8.96	6.74	4.57
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		7.06	6.24	5.35	4.38	3.35	2.29
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		0.645	0.106	0.105	0.098	0.096	0.036

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		105	108	112	100	88.2	69

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		5.41	7.75	2.59	2.14	1.97	1.71
By economic sector - Construction (jobs)		5,699	6,696	9,480	9,443	8,434	8,797
By economic sector - Manufacturing (jobs)		1,354	1,527	1,764	1,784	1,495	1,485
By economic sector - Mining (jobs)		1,012	725	504	330	209	135
By economic sector - Other (jobs)		753	911	1,540	1,579	1,484	1,919
By economic sector - Pipeline (jobs)		271	264	267	235	197	129
By economic sector - Professional (jobs)		2,151	2,620	3,711	3,813	3,517	4,094
By economic sector - Trade (jobs)		1,618	1,812	2,508	2,556	2,389	2,848
By economic sector - Utilities (jobs)		4,254	5,992	7,663	8,521	8,081	8,502
By resource sector - Biomass (jobs)		18.9	19.9	8.89	7.99	7.71	7.11
By resource sector - CO2 (jobs)		0	225	452	450	448	119
By resource sector - Coal (jobs)		173	32.1	0	0	0	0
By resource sector - Grid (jobs)		6,009	8,892	12,442	14,057	12,905	12,188
By resource sector - Natural Gas (jobs)		3,080	3,563	3,223	3,368	3,514	2,679
By resource sector - Nuclear (jobs)		0	0.006	0.021	0	0	1,704
By resource sector - Oil (jobs)		2,072	1,639	1,165	767	507	348
By resource sector - Solar (jobs)		5,370	5,659	9,429	8,864	7,788	10,241
By resource sector - Wind (jobs)		396	523	720	750	635	623
By education level - All sectors - High school diploma or less (jobs)		7,318	8,760	11,755	12,068	10,972	11,247
By education level - All sectors - Associates degree or some college (jobs)		5,496	6,689	8,974	9,291	8,516	8,741
By education level - All sectors - Bachelors degree (jobs)		3,365	3,985	5,222	5,370	4,910	5,122
By education level - All sectors - Masters or professional degree (jobs)		822	983	1,304	1,347	1,238	1,311
By education level - All sectors - Doctoral degree (jobs)		117	136	185	187	171	192
Related work experience - All sectors - None (jobs)		2,506	3,029	4,053	4,186	3,832	3,939
Related work experience - All sectors - Up to 1 year (jobs)		3,408	4,060	5,493	5,624	5,107	5,328
Related work experience - All sectors - 1 to 4 years (jobs)		6,153	7,387	9,827	10,133	9,263	9,548
Related work experience - All sectors - 4 to 10 years (jobs)		4,019	4,840	6,432	6,634	6,067	6,223
Related work experience - All sectors - Over 10 years (jobs)		1,033	1,238	1,635	1,686	1,538	1,574
On-the-Job Training - All sectors - None (jobs)		929	1,094	1,473	1,503	1,368	1,448
On-the-Job Training - All sectors - Up to 1 year (jobs)		11,028	13,191	17,561	18,084	16,498	17,076
On-the-Job Training - All sectors - 1 to 4 years (jobs)		3,724	4,521	6,044	6,245	5,714	5,821
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,269	1,553	2,102	2,170	1,989	2,022
On-the-Job Training - All sectors - Over 10 years (jobs)		167	194	261	263	236	246
On-Site or In-Plant Training - All sectors - None (jobs)		2,745	3,275	4,388	4,501	4,105	4,287
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		10,066	12,052	16,051	16,536	15,089	15,589

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

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		2,876	3,483	4,657	4,809	4,397	4,487
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,276	1,553	2,087	2,152	1,972	2,001
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		154	190	256	266	244	247
Wage income - All (million $2019)		959	1,169	1,566	1,638	1,519	1,575

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	291	274	249	218	190	171	162
Final energy use - Residential (PJ)	94.5	92.3	87.6	79.2	71.6	67.4	65.8
Final energy use - Commercial (PJ)	89.2	89	85.7	80.3	75.1	72.2	71.6
Final energy use - Industry (PJ)	73.7	73.6	72.2	72.9	75.5	77.3	79.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		2.23	2.35	3.09	3.28	3.08	3.22

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	43.2	246	450	1,161	1,873	2,441	3,010
Vehicle stocks - LDV – All others (1000 units)	2,510	2,390	2,270	1,654	1,038	588	137
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		477	1,240	1,983	3,014	3,269	3,123
Public EV charging plugs - DC Fast (1000 units)	0.256		0.746		3.11		4.99
Public EV charging plugs - L2 (1000 units)	0.619		17.9		74.7		120

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 (%)	9.66	27.4	68.8	88.9	91.4	91.5	91.4
Sales of space heating units - Electric Resistance (%)	13.5	20.2	10.8	6.22	5.65	5.68	5.75
Sales of space heating units - Gas (%)	74.6	49	18.5	3.73	1.9	1.81	1.81
Sales of space heating units - Fossil (%)	2.25	3.38	1.94	1.18	1.02	0.999	1.02
Sales of water heating units - Electric Heat Pump (%)	0	8.43	46.6	60.9	62.4	62.5	62.5
Sales of water heating units - Electric Resistance (%)	23.2	37.5	32.8	35.1	35.7	35.8	35.8
Sales of water heating units - Gas Furnace (%)	75.1	52.3	18.8	2.22	0.114	0	0
Sales of water heating units - Other (%)	1.72	1.82	1.81	1.8	1.78	1.78	1.78
Sales of cooking units - Electric Resistance (%)	66.4	73.5	95.5	99.8	100	100	100
Sales of cooking units - Gas (%)	33.6	26.5	4.53	0.228	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		3.41	4.55				

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 (%)	3.34	20.2	63.4	88.9	92.5	92.6	92.7
Sales of space heating units - Electric Resistance (%)	3.3	3.45	4.17	6.37	6.82	6.85	6.84
Sales of space heating units - Gas (%)	92.4	76.1	32.4	4.78	0.723	0.51	0.507
Sales of space heating units - Fossil (%)	0.985	0.209	0.04	0.002	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.03	8.12	45.4	61.3	63.2	63.3	63.3
Sales of water heating units - Electric Resistance (%)	1.46	5.07	23	34.6	36.2	36.3	36.3
Sales of water heating units - Gas (%)	98.1	86.4	31.1	3.68	0.19	0	0
Sales of water heating units - Other (%)	0.365	0.384	0.383	0.384	0.383	0.384	0.383
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)		7,465	8,314				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	809	242	0	0	0	0	0
Installed thermal - Natural gas (MW)	6,575	6,047	11,087	12,141	12,861	11,853	9,125
Installed thermal - Nuclear (MW)	0	0	0.002	0.011	0	0	750
Installed renewables - Rooftop PV (MW)	675	1,040	1,389	1,810	2,310	2,893	3,583
Installed renewables - Solar - Base land use assumptions (MW)	4,971	5,733	6,780	10,691	13,843	15,034	15,034
Installed renewables - Wind - Base land use assumptions (MW)	672	1,169	1,806	3,801	6,015	7,122	8,751
Installed renewables - Solar - Constrained land use assumptions (MW)	4,973	5,877	6,935	8,598	9,911	10,168	10,168
Installed renewables - Wind - Constrained land use assumptions (MW)	152	259	391	1,091	1,323	1,406	2,307
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion $2018)		1.02	1.25	4.31	3.28	1.17	0
Capital invested - Wind - Base (billion $2018)		0.732	0.847	2.48	2.62	1.24	1.86
Capital invested - Solar PV - Constrained (billion $2018)		1.21	1.27	1.83	1.36	0.252	0
Capital invested - Wind - Constrained (billion $2018)		0.158	0.176	0.868	0.274	0.093	0.954

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	13,021	14,913	17,524	27,219	34,994	37,937	37,937
Wind - Base land use assumptions (GWh)	1,971	3,423	5,281	10,860	16,962	20,030	24,862
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	13,021	15,248	17,820	21,754	24,732	25,315	25,315
Wind - Constrained land use assumptions (GWh)	448	757	1,085	2,768	3,322	3,520	5,281
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)							-791
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-115
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-1,806
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1.27
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1.52
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-65.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-44.9
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-841
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-3,666
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,185
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-403
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-3,254
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1.86
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-3.05
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-126
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-319
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-1,668
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-6,960
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,579
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-691
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-4,703
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2.49
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-4.57
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-186
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-593
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-10,254
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,495

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							129
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)							919
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0.459
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)							9.3
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							2.92
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							500
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,649
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							194
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							90.7
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							1,658
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0.69
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)							13.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							21.1
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,008
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							2,986
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							258
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							93.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							2,398
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0.918
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)							17.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							16.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							827
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							3,612

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)							-114
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-0.807
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-115
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-227
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-1.61
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-229
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)							160
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							1.24
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							162

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							319
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							2.48
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							322

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)		5.62	0.008	0.008	0.005	0.003	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		4.43	1.82	1.3	1.09	0.723	0.365
Premature deaths from air pollution - Mobile - On-Road (deaths)		54.2	57.9	59.3	55.9	46.5	33.1
Premature deaths from air pollution - Gas Stations (deaths)		3.4	3.62	3.68	3.45	2.85	2.04
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		9.33	9.15	8.64	7.44	5.58	3.63
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.292	0.28	0.263	0.241	0.217	0.192
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		0.596	0.618	0.631	0.598	0.507	0.402
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.054	0.055	0.056	0.056	0.056	0.055
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		13.3	13.7	13.7	12.6	10.4	7.72
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.8	1.64	1.49	1.34	1.2	1.05
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.798	0.755	0.709	0.654	0.593	0.527
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.085	0.012	0.013	0.013	0.012	0.012
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		11.7	11.1	10.1	9.14	8.42	6.23
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		49.8	0.067	0.067	0.044	0.027	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		39.2	16.1	11.5	9.69	6.41	3.23
Monetary damages from air pollution - Mobile - On-Road (million $2019)		482	515	527	497	413	295
Monetary damages from air pollution - Gas Stations (million $2019)		30.1	32.1	32.6	30.5	25.3	18

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		82.7	81	76.6	66	49.4	32.2
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		2.59	2.48	2.33	2.14	1.93	1.7
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		5.29	5.48	5.59	5.3	4.49	3.56
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		0.48	0.491	0.497	0.497	0.494	0.487
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		117	122	121	111	91.9	68.4
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		15.9	14.5	13.2	11.9	10.6	9.32
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		7.06	6.69	6.28	5.79	5.25	4.67
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		0.748	0.109	0.112	0.112	0.109	0.105
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		104	98.8	89.3	81.2	74.8	55.4

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		5.28	7.39	2.76	2.04	1.7	1.5
By economic sector - Construction (jobs)		5,446	5,745	10,135	9,358	9,902	12,274
By economic sector - Manufacturing (jobs)		1,311	1,594	1,695	1,546	1,661	1,894
By economic sector - Mining (jobs)		1,003	723	529	390	255	138
By economic sector - Other (jobs)		703	776	1,834	1,769	2,022	2,986
By economic sector - Pipeline (jobs)		262	240	227	199	165	94
By economic sector - Professional (jobs)		2,082	2,256	4,030	3,883	4,319	5,715
By economic sector - Trade (jobs)		1,572	1,615	2,812	2,727	3,040	4,144
By economic sector - Utilities (jobs)		4,210	4,726	6,483	6,752	7,640	8,532
By resource sector - Biomass (jobs)		21	19.9	9.35	8.57	7.84	7.07
By resource sector - CO2 (jobs)		0	204	411	409	407	108
By resource sector - Coal (jobs)		173	32.1	0	0	0	0
By resource sector - Grid (jobs)		6,022	7,523	11,121	11,613	13,048	15,776
By resource sector - Natural Gas (jobs)		2,954	2,305	1,943	1,996	2,320	1,674
By resource sector - Nuclear (jobs)		0	0.004	0.009	0	0	0
By resource sector - Oil (jobs)		2,096	1,759	1,481	1,244	911	521
By resource sector - Solar (jobs)		4,866	4,881	11,800	10,508	11,285	16,315
By resource sector - Wind (jobs)		462	959	982	848	1,027	1,378
By education level - All sectors - High school diploma or less (jobs)		7,083	7,561	11,931	11,393	12,347	15,183
By education level - All sectors - Associates degree or some college (jobs)		5,323	5,707	9,005	8,674	9,490	11,699
By education level - All sectors - Bachelors degree (jobs)		3,274	3,450	5,287	5,088	5,552	6,865
By education level - All sectors - Masters or professional degree (jobs)		800	846	1,327	1,284	1,410	1,765
By education level - All sectors - Doctoral degree (jobs)		113	118	198	188	206	266

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

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - All sectors - None (jobs)		2,429	2,594	4,083	3,930	4,289	5,291
Related work experience - All sectors - Up to 1 year (jobs)		3,294	3,521	5,645	5,376	5,835	7,263
Related work experience - All sectors - 1 to 4 years (jobs)		5,970	6,352	9,916	9,535	10,395	12,815
Related work experience - All sectors - 4 to 10 years (jobs)		3,898	4,147	6,466	6,214	6,773	8,312
Related work experience - All sectors - Over 10 years (jobs)		1,002	1,069	1,639	1,574	1,714	2,098
On-the-Job Training - All sectors - None (jobs)		899	949	1,525	1,454	1,580	1,983
On-the-Job Training - All sectors - Up to 1 year (jobs)		10,698	11,404	17,789	17,077	18,607	22,998
On-the-Job Training - All sectors - 1 to 4 years (jobs)		3,608	3,853	6,052	5,818	6,342	7,764
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,227	1,307	2,110	2,026	2,206	2,699
On-the-Job Training - All sectors - Over 10 years (jobs)		161	170	270	253	272	335
On-Site or In-Plant Training - All sectors - None (jobs)		2,658	2,825	4,483	4,285	4,668	5,803
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		9,764	10,410	16,243	15,597	16,992	20,984
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		2,787	2,976	4,674	4,491	4,893	5,998
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,235	1,311	2,094	2,009	2,185	2,666
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		149	161	253	245	268	327
Wage income - All (million $2019)		931	1,001	1,568	1,530	1,690	2,099

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	291	276	258	242	229	214	195
Final energy use - Residential (PJ)	94.5	92.7	91.9	90.1	85.9	79.9	74.4
Final energy use - Commercial (PJ)	89.2	89.2	88.5	87.3	84.9	81.8	79
Final energy use - Industry (PJ)	73.7	73.6	72.4	73.5	76.5	78.3	80

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		2	2.09	2.43	2.55	2.99	3.14

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	33.5	93.1	153	429	705	1,317	1,928
Vehicle stocks - LDV – All others (1000 units)	2,520	2,520	2,520	2,390	2,261	1,742	1,224
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		0	80.1	162	553	1,721	2,514
Public EV charging plugs - DC Fast (1000 units)	0.256		0.253		1.17		3.2
Public EV charging plugs - L2 (1000 units)	0.619		6.09		28.1		76.9

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 (%)	9.66	20.3	25	38.9	62.1	80.4	88.2
Sales of space heating units - Electric Resistance (%)	13.5	21.8	20.6	17.6	12.4	8.21	6.44
Sales of space heating units - Gas (%)	74.6	54.3	50.8	40.6	23.5	10.1	4.22
Sales of space heating units - Fossil (%)	2.25	3.63	3.53	2.94	1.99	1.35	1.13
Sales of water heating units - Electric Heat Pump (%)	0	1.53	5.88	18.5	39	54	60.1
Sales of water heating units - Electric Resistance (%)	23.2	38.6	38.2	36.7	35.1	35	35.4
Sales of water heating units - Gas Furnace (%)	75.1	58	54.2	42.9	24.1	9.21	2.71
Sales of water heating units - Other (%)	1.72	1.82	1.82	1.82	1.8	1.79	1.78
Sales of cooking units - Electric Resistance (%)	66.2	67.1	70.2	78.4	89.7	96.7	99.1
Sales of cooking units - Gas (%)	33.8	32.9	29.8	21.6	10.3	3.33	0.896
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		3.39	4.49				

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 (%)	3.34	13	18	32.6	57.8	78.9	88.5
Sales of space heating units - Electric Resistance (%)	3.3	3.43	3.51	3.82	4.64	5.8	6.5
Sales of space heating units - Gas (%)	92.4	83.3	78.3	63.4	37.5	15.3	4.96
Sales of space heating units - Fossil (%)	0.985	0.242	0.226	0.167	0.082	0.026	0.007
Sales of water heating units - Electric Heat Pump (%)	0.03	1.53	5.79	18.2	38.6	54.2	60.6
Sales of water heating units - Electric Resistance (%)	1.46	2.2	4.25	10.4	21	30.2	34.5
Sales of water heating units - Gas (%)	98.1	95.9	89.6	71	39.9	15.3	4.5
Sales of water heating units - Other (%)	0.365	0.384	0.383	0.384	0.383	0.384	0.383
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)		7,460	8,285				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	809	242	0	0	0	0	0
Installed thermal - Natural gas (MW)	6,545	5,969	6,092	5,977	6,196	5,545	3,839
Installed thermal - Nuclear (MW)	0	0	0.002	0.005	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

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	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	0
Biomass purchases (million $2018/y)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0.01	0.04	0.06	0.04	0.05
Annual - BECCS (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0.01	0.04	0.06	0.04	0.05
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0.01	0.05	0.11	0.15	0.2
Cumulative - BECCS (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0.01	0.05	0.11	0.15	0.2
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	51.1	102	102	102	102
All (km)		0	51.1	102	102	102	102
Cumulative investment - Trunk (million $2018)		0	0	0	0	0	0
Cumulative investment - Spur (million $2018)		0	26.6	53.4	53.5	53.4	53.4
Cumulative investment - All (million $2018)		0	26.6	53.4	53.5	53.4	53.4

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)							-791
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-115
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-1,806
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1.27
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1.52
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-65.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-44.9
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-841
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-3,666
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,185
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-403
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-3,254
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1.86
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-3.05
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-126
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-319
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-1,668
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-6,960
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,579
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-691
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-4,703
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2.49
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-4.57
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-186
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-593
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-10,254
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,495

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							129
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)							919
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0.459
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)							9.3
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							2.92
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							500
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,649
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							194
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							90.7
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							1,658
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0.69
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)							13.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							21.1
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,008
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							2,986
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							258
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							93.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							2,398
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0.918
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)							17.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							16.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							827
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							3,612

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-114
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-0.807
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)							-115
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-227
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-1.61
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)							-229

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							160
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							1.24
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							162
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)							789
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							2.48
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							791

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)		9.01	5.31	2.87	2.18	2.03	1.91
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		5.4	3.64	3.95	3.71	5.74	5.29
Premature deaths from air pollution - Mobile - On-Road (deaths)		54	58.6	63.1	67.9	72.9	78.1
Premature deaths from air pollution - Gas Stations (deaths)		3.38	3.65	3.91	4.2	4.49	4.77
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		9.27	9.24	9.28	9.57	10	10.6
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.313	0.321	0.323	0.323	0.327	0.334
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		0.588	0.623	0.672	0.733	0.796	0.861
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.057	0.061	0.064	0.068	0.071	0.074

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		13.4	13.8	13.5	13.1	13.3	14.2
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.88	1.93	2.01	2.1	2.2	2.3
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.834	0.896	0.964	1.03	1.1	1.16
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.227	0.156	0.126	0.124	0.123	0.118
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		11.8	13.2	14.4	14.5	15.2	15
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		79.8	47.1	25.4	19.4	18	16.9
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		47.8	32.2	35	32.9	50.9	46.9
Monetary damages from air pollution - Mobile - On-Road (million $2019)		480	521	561	604	648	695
Monetary damages from air pollution - Gas Stations (million $2019)		29.9	32.3	34.6	37.2	39.8	42.2
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		82.1	81.9	82.3	84.8	89	93.5
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		2.78	2.84	2.86	2.87	2.9	2.96
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		5.21	5.52	5.96	6.5	7.05	7.63
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		0.502	0.537	0.57	0.601	0.63	0.657
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		118	122	119	116	117	126
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		16.6	17.1	17.8	18.6	19.5	20.4
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		7.38	7.93	8.53	9.12	9.71	10.3
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		2	1.38	1.11	1.09	1.08	1.04
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		104	117	128	129	135	134

Table 65: *REF scenario - IMPACTS - Jobs*

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		5	4.49	4.43	3.61	3.6	3.91
By economic sector - Construction (jobs)		2,428	4,515	5,047	5,188	5,644	6,837
By economic sector - Manufacturing (jobs)		888	1,082	1,275	1,273	1,228	1,237
By economic sector - Mining (jobs)		1,022	842	694	556	473	398

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		114	565	703	797	902	1,480
By economic sector - Pipeline (jobs)		270	283	287	271	274	271
By economic sector - Professional (jobs)		1,024	1,711	1,935	2,050	2,312	2,966
By economic sector - Trade (jobs)		896	1,324	1,455	1,531	1,710	2,290
By economic sector - Utilities (jobs)		3,530	3,870	4,344	4,476	5,355	4,987
By resource sector - Biomass (jobs)		19.3	18.1	16.8	15	15.3	15.6
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		173	90.5	85.8	31	0	0
By resource sector - Grid (jobs)		4,681	5,389	6,201	6,419	7,269	7,244
By resource sector - Natural Gas (jobs)		3,053	3,051	3,203	3,202	4,123	3,346
By resource sector - Nuclear (jobs)		0	0.002	0.005	0.005	0.012	0
By resource sector - Oil (jobs)		2,118	1,813	1,601	1,486	1,420	1,369
By resource sector - Solar (jobs)			3,499	4,220	4,524	4,707	8,094
By resource sector - Wind (jobs)		135	334	417	468	367	403
By education level - All sectors - High school diploma or less (jobs)		4,242	6,051	6,723	6,886	7,596	8,699
By education level - All sectors - Associates degree or some college (jobs)		3,252	4,571	5,100	5,247	5,858	6,675
By education level - All sectors - Bachelors degree (jobs)		2,114	2,797	3,067	3,133	3,469	3,956
By education level - All sectors - Masters or professional degree (jobs)		508	682	751	771	860	996
By education level - All sectors - Doctoral degree (jobs)		63.2	94.2	104	107	119	146
Related work experience - All sectors - None (jobs)		1,495	2,087	2,321	2,385	2,656	3,036
Related work experience - All sectors - Up to 1 year (jobs)		1,903	2,789	3,106	3,188	3,504	4,091
Related work experience - All sectors - 1 to 4 years (jobs)		3,720	5,118	5,666	5,809	6,449	7,355
Related work experience - All sectors - 4 to 10 years (jobs)		2,427	3,342	3,701	3,793	4,219	4,781
Related work experience - All sectors - Over 10 years (jobs)		633	859	950	970	1,073	1,208
On-the-Job Training - All sectors - None (jobs)		528	760	841	863	950	1,122
On-the-Job Training - All sectors - Up to 1 year (jobs)		6,614	9,143	10,131	10,382	11,481	13,154
On-the-Job Training - All sectors - 1 to 4 years (jobs)		2,218	3,101	3,447	3,537	3,944	4,457
On-the-Job Training - All sectors - 4 to 10 years (jobs)		729	1,056	1,177	1,211	1,361	1,546
On-the-Job Training - All sectors - Over 10 years (jobs)		89.6	135	149	152	166	193
On-Site or In-Plant Training - All sectors - None (jobs)		1,587	2,258	2,505	2,571	2,843	3,298
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		6,042	8,352	9,254	9,483	10,493	12,006
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		1,711	2,393	2,660	2,729	3,037	3,441
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		747	1,064	1,181	1,213	1,360	1,538
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		92.3	129	145	149	168	188
Wage income - All (million $2019)		591	811	906	940	1,060	1,211

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	291	280	269	263	267	277	288

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Residential (PJ)	94.5	93.4	95	97.3	101	105	108
Final energy use - Commercial (PJ)	89.2	90.9	92	92.1	92.8	95.6	100
Final energy use - Industry (PJ)	73.8	76.5	78.3	81.6	85.7	92	98.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		2.15	2.25	2.49	2.61	2.9	3.04

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	8.46	27.8	28.5	29.6	30.6	31.8	33.4
Sales of space heating units - Electric Resistance (%)	13.8	20.2	19.9	19.6	18.9	17.9	16.3
Sales of space heating units - Gas (%)	75.5	49.2	48.8	48.1	47.9	47.8	47.7
Sales of space heating units - Fossil (%)	2.27	2.79	2.82	2.75	2.59	2.52	2.58
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	23.2	38.8	38.9	38.9	39	39	39
Sales of water heating units - Gas Furnace (%)	75.1	59.4	59.3	59.3	59.2	59.2	59.2
Sales of water heating units - Other (%)	1.72	1.82	1.82	1.82	1.81	1.81	1.81
Sales of cooking units - Electric Resistance (%)	65.9	65.9	65.9	65.9	65.9	65.9	65.9
Sales of cooking units - Gas (%)	34.1	34.1	34.1	34.1	34.1	34.1	34.1
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		3.21	3.39				

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 (%)	3.34	23.9	63.4	77.1	78.7	78.8	78.8
Sales of space heating units - Electric Resistance (%)	3.3	5.04	10.6	16	20	20.6	20.7
Sales of space heating units - Gas (%)	92.4	70.9	25.9	6.85	1.34	0.57	0.508
Sales of space heating units - Fossil (%)	0.985	0.211	0.092	0.03	0.004	0	0
Sales of water heating units - Electric Heat Pump (%)	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Sales of water heating units - Electric Resistance (%)	1.46	1.47	1.47	1.48	1.47	1.48	1.47
Sales of water heating units - Gas (%)	98.1	98.1	98.1	98.1	98.1	98.1	98.1
Sales of water heating units - Other (%)	0.365	0.384	0.383	0.384	0.383	0.384	0.383
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)		7,365	7,706				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	809	242	242	242	0	0	0
Installed thermal - Natural gas (MW)	6,564	6,056	6,315	6,808	6,833	7,895	6,118
Installed thermal - Nuclear (MW)	0	0	0.001	0.003	0.005	0.009	0
Installed renewables - Rooftop PV (MW)	675	1,040	1,389	1,810	2,310	2,893	3,583

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed renewables - Solar - Base land use assumptions (MW)	4,809	4,809	4,809	4,809	4,809	4,809	4,809
Installed renewables - Wind - Base land use assumptions (MW)	1,083	1,083	2,113	2,457	2,869	3,437	4,780
Installed renewables - Solar - Constrained land use assumptions (MW)	162	162	162	162	162	162	162

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	13,021	13,021	13,021	13,021	13,021	13,021	13,021
Wind - Base land use assumptions (GWh)	3,183	3,183	6,139	7,102	8,269	9,863	13,558
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)	0.51		1.5				0.43
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.001		-0.003				-0.003
Business-as-usual carbon sink - Total (Mt CO2e/y)	0.509		1.5				0.428

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)							-791
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-115
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-1,806
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1.27
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1.52
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-65.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-44.9
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-841
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-3,666
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,185
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-403
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-3,254
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1.86
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-3.05
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-126

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-319
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-1,668
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-6,960
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,579
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-691
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-4,703
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2.49
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-4.57
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-186
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-593
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-10,254
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,495
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							129
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)							919
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0.459
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)							9.3
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							2.92
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							500
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,649
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							194

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							90.7
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							1,658
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0.69
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)							13.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							21.1
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,008
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							2,986
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							258
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)							2,398
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0.918
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)							17.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							16.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							827
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							3,612