



Net-Zero America - Arizona data

October 29, 2021 (updated November 17, 2023)

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		17.4	0.023	0.023	0.014	0.009	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		23.1	16.1	13	11.6	7.02	1.32
Premature deaths from air pollution - Mobile - On-Road (deaths)		163	154	118	68.6	30.9	11.4
Premature deaths from air pollution - Gas Stations (deaths)		6.93	6.45	4.92	2.94	1.43	0.673
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		13.3	10.4	6.5	3.64	2.11	1.4
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.213	0.184	0.152	0.119	0.09	0.063
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.25	1.08	0.829	0.595	0.405	0.281
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.112	0.109	0.106	0.102	0.098	0.093
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		12.6	11	7.96	4.88	2.81	1.64
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.34	1.08	0.869	0.672	0.489	0.321
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.98	1.68	1.39	1.1	0.813	0.539
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.262	0.034	0.032	0.028	0.027	0.026
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		35.9	34.1	31.3	24.8	18.5	11.6
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		154	0.207	0.207	0.126	0.076	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		204	143	115	103	62.2	11.7
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,446	1,367	1,051	610	275	101
Monetary damages from air pollution - Gas Stations (million \$2019)		61.4	57.1	43.5	26	12.7	5.96
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		118	91.8	57.6	32.3	18.7	12.4
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		1.89	1.63	1.35	1.06	0.794	0.558
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		11.1	9.55	7.34	5.27	3.59	2.49
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		0.987	0.963	0.935	0.901	0.864	0.822
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		111	97.3	70.4	43.2	24.9	14.5

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)		11.8	9.59	7.69	5.95	4.33	2.85
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		17.5	14.9	12.3	9.72	7.2	4.77
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		2.31	0.3	0.28	0.251	0.234	0.228
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		319	303	278	220	164	103

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		96.6	125	111	67.4	24.3	43.3
By economic sector - Construction (jobs)		12,010	11,794	12,344	12,901	12,510	16,985
By economic sector - Manufacturing (jobs)		2,583	2,524	2,496	2,309	1,938	1,900
By economic sector - Mining (jobs)		1,940	1,239	774	443	226	106
By economic sector - Other (jobs)		1,521	1,600	1,884	2,201	2,486	4,405
By economic sector - Pipeline (jobs)		400	390	260	197	119	104
By economic sector - Professional (jobs)		5,183	5,026	5,316	5,690	5,794	8,291
By economic sector - Trade (jobs)		3,741	3,380	3,520	3,761	3,915	5,967
By economic sector - Utilities (jobs)		12,215	11,876	11,873	11,820	10,503	10,460
By resource sector - Biomass (jobs)		248	304	264	173	92.6	199
By resource sector - CO2 (jobs)		0	442	9.81	95.9	39	273
By resource sector - Coal (jobs)		1,309	391	4.06	3	2.32	1.94
By resource sector - Grid (jobs)		17,056	16,990	18,720	18,965	17,139	18,812
By resource sector - Natural Gas (jobs)		4,563	3,873	3,719	4,692	4,265	2,149
By resource sector - Nuclear (jobs)		2,125	2,091	1,494	398	0.093	0.136
By resource sector - Oil (jobs)		4,241	3,276	2,218	1,371	776	371
By resource sector - Solar (jobs)		9,616	9,599	10,783	11,999	13,240	24,074
By resource sector - Wind (jobs)		531	988	1,366	1,694	1,962	2,381
By education level - All sectors - High school diploma or less (jobs)		16,778	16,064	16,384	16,705	15,847	20,386
By education level - All sectors - Associates degree or some college (jobs)		12,625	12,148	12,446	12,869	12,311	15,765
By education level - All sectors - Bachelors degree (jobs)		8,014	7,580	7,572	7,612	7,235	9,309
By education level - All sectors - Masters or professional degree (jobs)		1,990	1,894	1,905	1,928	1,851	2,422
By education level - All sectors - Doctoral degree (jobs)		282	268	271	275	271	379
Related work experience - All sectors - None (jobs)		5,779	5,548	5,660	5,815	5,547	7,134
Related work experience - All sectors - Up to 1 year (jobs)		7,862	7,533	7,700	7,842	7,489	9,839
Related work experience - All sectors - 1 to 4 years (jobs)		14,321	13,661	13,857	14,138	13,462	17,277
Related work experience - All sectors - 4 to 10 years (jobs)		9,315	8,908	9,036	9,244	8,797	11,206
Related work experience - All sectors - Over 10 years (jobs)		2,412	2,305	2,325	2,350	2,221	2,806
On-the-Job Training - All sectors - None (jobs)		2,163	2,060	2,085	2,114	2,032	2,714
On-the-Job Training - All sectors - Up to 1 year (jobs)		25,721	24,525	24,870	25,276	24,041	30,992

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)		8,558	8,229	8,397	8,642	8,226	10,439
On-the-Job Training - All sectors - 4 to 10 years (jobs)		2,876	2,784	2,866	2,993	2,869	3,662
On-the-Job Training - All sectors - Over 10 years (jobs)		372	357	360	364	347	454
On-Site or In-Plant Training - All sectors - None (jobs)		6,350	6,081	6,174	6,303	6,038	7,894
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		23,474	22,385	22,709	23,088	21,951	28,256
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		6,611	6,350	6,478	6,657	6,335	8,061
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		2,903	2,799	2,866	2,975	2,842	3,611
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		351	340	351	367	350	440
Wage income - All (million \$2019)		2,178	2,106	2,157	2,222	2,134	2,738

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		95.3	80.2	58.8	39.2	23.7	12.1
Oil consumption - Cumulative (million bbls)							1,832
Oil production - Annual (million bbls)		0.014	0.014	0.014	0.011	0.009	0.006
Natural gas consumption - Annual (tcf)		298	251	201	152	95.4	66.1
Natural gas consumption - Cumulative (tcf)							6,065
Natural gas production - Annual (tcf)		0.056	0.053	0.046	0.039	0.031	0.024

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	577	543	484	411	345	303	285
Final energy use - Residential (PJ)	190	187	180	168	158	153	152
Final energy use - Commercial (PJ)	154	154	150	142	136	133	134
Final energy use - Industry (PJ)	138	138	137	143	157	161	165

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)		5.56	5.85	7.13	7.54	7.14	7.45

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	140	607	1,073	2,707	4,340	5,646	6,951
Vehicle stocks - LDV – All others (1000 units)	5,796	5,519	5,242	3,820	2,398	1,357	315
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		1,096	2,868	4,551	6,933	7,503	7,177
Public EV charging plugs - DC Fast (1000 units)	0.323		1.88		7.6		12.2
Public EV charging plugs - L2 (1000 units)	1.11		45.2		183		293

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 (%)	20.5	39.8	77.9	87.9	88.7	88.6	88.5
Sales of space heating units - Electric Resistance (%)	25.1	29.4	12.9	8.67	8.4	8.53	8.6
Sales of space heating units - Gas (%)	50.6	26.1	6.34	1.28	0.966	0.96	0.955
Sales of space heating units - Fossil (%)	3.8	4.75	2.83	2.2	1.94	1.88	1.97
Sales of water heating units - Electric Heat Pump (%)	0	11.1	59.1	70.5	71.1	71.1	71.1
Sales of water heating units - Electric Resistance (%)	46.7	56.4	31.4	25.8	25.6	25.6	25.6
Sales of water heating units - Gas Furnace (%)	49.7	29.2	6.29	0.391	0.01	0	0
Sales of water heating units - Other (%)	3.58	3.23	3.22	3.24	3.23	3.24	3.24
Sales of cooking units - Electric Resistance (%)	82.8	86.5	97.7	99.9	100	100	100
Sales of cooking units - Gas (%)	17.2	13.5	2.31	0.116	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		9.03	12.9				

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 (%)	9.42	24.7	74.5	91.3	93	93.1	93.1
Sales of space heating units - Electric Resistance (%)	8.85	3.72	4.18	5.96	6.38	6.41	6.34
Sales of space heating units - Gas (%)	81.7	71.4	21.3	2.75	0.604	0.53	0.531
Sales of space heating units - Fossil (%)	0	0.191	0.037	0.002	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.083	10.5	56.1	67.4	68.1	68.1	68.1
Sales of water heating units - Electric Resistance (%)	4.09	5.98	25.6	31.1	31.5	31.5	31.5
Sales of water heating units - Gas (%)	94.7	83.1	18	1.12	0.029	0	0
Sales of water heating units - Other (%)	1.09	0.39	0.388	0.391	0.39	0.389	0.388
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)		15,691	17,430				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	3,632	2,903	0	0	0	0	0
Installed thermal - Natural gas (MW)	13,236	11,808	12,708	14,776	17,383	14,213	12,968
Installed thermal - Nuclear (MW)	4,210	4,210	4,210	1,403	0.018	0.054	0.103
Installed renewables - Rooftop PV (MW)	1,845	2,808	3,773	4,985	6,485	8,313	10,586
Installed renewables - Solar - Base land use assumptions (MW)	5,833	5,833	5,833	5,833	5,833	5,833	7,101
Installed renewables - Wind - Base land use assumptions (MW)	268	618	691	1,093	1,212	1,328	1,640
Installed renewables - Solar - Constrained land use assumptions (MW)	5,831	5,831	5,831	5,831	6,330	10,394	12,652
Installed renewables - Wind - Constrained land use assumptions (MW)	689	916	1,356	7,774	18,780	31,372	41,951
Capital invested - Solar PV - Base (billion \$2018)		0	0	0	0	0	1.17
Capital invested - Wind - Base (billion \$2018)		0	0.096	0.499	0.141	0.13	0.33

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)		1.03	0	0	1.13	0.159	6.01
Capital invested - Wind - Constrained (billion \$2018)		0.159	0.739	5.99	10.7	12.7	9.9
Capital invested - Biomass power plant (billion \$2018)	0	0.005	0.135	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0	0.057
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	0	0	0.315

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	14,540	14,540	14,540	14,540	14,540	14,540	17,635
Wind - Base land use assumptions (GWh)	1,920	1,920	2,147	3,330	3,664	3,983	4,846
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	13,756	13,756	13,756	13,756	14,961	24,743	30,194
Wind - Constrained land use assumptions (GWh)	2,143	2,756	3,817	17,632	38,894	60,398	78,262
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Biomass power plant (GWh)	0	10.1	276	276	276	276	276
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	354
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	57.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	2	2	2	2	2	2
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	2
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	2
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	1
Number of facilities - Diesel (quantity)	0	0	0	2	2	2	2
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	2
Number of facilities - Pyrolysis (quantity)	0	0	0	2	2	2	2
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	1
Number of facilities - Sng (quantity)	0	2	2	2	2	2	2
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment - Cumulative 5-yr (million \$2018)		5.8	151	30.3	3.23	4.74	665
Biomass purchases (million \$2018/y)		0.64	13.2	14.8	14.9	15.2	44.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0.01	0.01	3.33	3.5	4.27
Annual - BECCS (MMT)		0	0	0	0	0	0.67
Annual - NGCC (MMT)		0	0.01	0.01	0.01	0.08	0.07
Annual - Cement and lime (MMT)		0	0	0	3.32	3.42	3.53
Cumulative - All (MMT)		0	0.01	0.02	3.35	6.85	11.1
Cumulative - BECCS (MMT)		0	0	0	0	0	0.67
Cumulative - NGCC (MMT)		0	0.01	0.02	0.03	0.11	0.18
Cumulative - Cement and lime (MMT)		0	0	0	3.32	6.74	10.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	406	406	406	406	406
Spur (km)		0	9.36	9.36	98.6	108	479
All (km)		0	415	415	504	514	885
Cumulative investment - Trunk (million \$2018)		0	440	440	440	440	440
Cumulative investment - Spur (million \$2018)		0	5.14	5.13	90.9	97.6	300
Cumulative investment - All (million \$2018)		0	445	445	531	537	740

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)							-903
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-310
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,696
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-48.1
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-7.32
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,682
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-5,789
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,352
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,083
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,858
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-96.2
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-277
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest pasture (1000 tCO ₂ e/y)							-52
Carbon sink potential - Mid - Restore productivity (1000 tCO ₂ e/y)							-3,335
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO ₂ e/y)							-11,053
Carbon sink potential - High - Accelerate regeneration (1000 tCO ₂ e/y)							-1,802
Carbon sink potential - High - Avoid deforestation (1000 tCO ₂ e/y)							-1,857
Carbon sink potential - High - Extend rotation length (1000 tCO ₂ e/y)							-7,019
Carbon sink potential - High - Improve plantations (1000 tCO ₂ e/y)							0
Carbon sink potential - High - Increase retention of HWP (1000 tCO ₂ e/y)							-144
Carbon sink potential - High - Increase trees outside forests (1000 tCO ₂ e/y)							-410
Carbon sink potential - High - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO ₂ e/y)							-96.6
Carbon sink potential - High - All (not counting overlap) (1000 tCO ₂ e/y)							-16,318
Carbon sink potential - High - Restore productivity (1000 tCO ₂ e/y)							-4,989
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							147
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							236
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,371
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0
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)							20.5
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.476
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,001
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,776
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							221
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							244

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)							2,475
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0
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)							29.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							3.44
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,015
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,988
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							295
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							251
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,579
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0
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)							38.9
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							2.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,654
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							5,821

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO ₂ e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO ₂ e/y)							-227

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-4.96
Carbon sink potential - Moderate deployment - Total (1000 tCO ₂ e/y)							-232
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO ₂ e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO ₂ e/y)							-450
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-9.92
Carbon sink potential - Aggressive deployment - Total (1000 tCO ₂ e/y)							-460
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)							257
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							7.61
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							264
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)							506
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							15.2
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							521

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)		17.4	0.023	0.023	0.014	0.009	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		23.5	14.9	10.1	5.09	2.2	0.346
Premature deaths from air pollution - Mobile - On-Road (deaths)		165	169	167	152	122	84.4
Premature deaths from air pollution - Gas Stations (deaths)		7.08	7.23	7.07	6.4	5.14	3.59
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		13.5	12.3	11.1	9.21	6.8	4.53
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.222	0.205	0.187	0.167	0.146	0.126
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.27	1.23	1.19	1.08	0.893	0.697

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)		0.112	0.109	0.106	0.102	0.098	0.093
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		12.7	12.8	12.4	10.9	8.61	6.12
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.34	1.16	1.02	0.891	0.768	0.653
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.98	1.8	1.63	1.45	1.27	1.1
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.247	0.035	0.034	0.032	0.027	0.018
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		35.8	32.7	28.5	25	22.3	16
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		154	0.207	0.207	0.126	0.076	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		208	132	89.2	45.1	19.5	3.06
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,471	1,506	1,485	1,353	1,087	750
Monetary damages from air pollution - Gas Stations (million \$2019)		62.7	64	62.6	56.7	45.5	31.8
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		120	109	98	81.6	60.3	40.1
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		1.97	1.82	1.66	1.48	1.3	1.11
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		11.3	10.9	10.6	9.58	7.91	6.17
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		0.987	0.963	0.935	0.901	0.864	0.822
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		113	113	110	96.9	76.2	54.2
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		11.8	10.3	9.04	7.89	6.8	5.78
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		17.5	16	14.4	12.9	11.3	9.72
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		2.18	0.305	0.3	0.284	0.237	0.159
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		318	291	253	222	198	142

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		99	173	126	78	28.3	43.4
By economic sector - Construction (jobs)		12,019	11,911	11,364	11,285	11,975	17,554

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Manufacturing (jobs)		2,583	2,580	2,340	2,063	2,042	2,155
By economic sector - Mining (jobs)		1,940	1,300	945	662	436	225
By economic sector - Other (jobs)		1,529	1,610	1,798	2,056	2,430	4,442
By economic sector - Pipeline (jobs)		402	426	275	247	191	180
By economic sector - Professional (jobs)		5,173	5,074	4,940	5,019	5,598	8,595
By economic sector - Trade (jobs)		3,732	3,439	3,429	3,529	3,927	6,206
By economic sector - Utilities (jobs)		12,089	11,790	10,023	8,663	9,028	10,886
By resource sector - Biomass (jobs)		252	431	327	245	120	193
By resource sector - CO2 (jobs)		0	759	16.8	164	66.8	469
By resource sector - Coal (jobs)		1,224	349	4.44	3.56	2.37	1.08
By resource sector - Grid (jobs)		16,829	16,738	15,498	13,744	14,723	19,192
By resource sector - Natural Gas (jobs)		4,563	3,631	3,028	3,302	3,640	2,456
By resource sector - Nuclear (jobs)		2,125	2,091	1,494	398	0.122	0.176
By resource sector - Oil (jobs)		4,298	3,556	2,950	2,310	1,690	926
By resource sector - Solar (jobs)		9,728	9,721	10,614	11,788	13,217	24,098
By resource sector - Wind (jobs)		548	1,028	1,307	1,647	2,194	2,951
By education level - All sectors - High school diploma or less (jobs)		16,728	16,237	14,981	14,287	15,078	21,228
By education level - All sectors - Associates degree or some college (jobs)		12,581	12,231	11,271	10,856	11,612	16,401
By education level - All sectors - Bachelors degree (jobs)		7,991	7,654	6,980	6,558	6,932	9,737
By education level - All sectors - Masters or professional degree (jobs)		1,984	1,910	1,753	1,657	1,767	2,526
By education level - All sectors - Doctoral degree (jobs)		282	272	255	246	264	394
Related work experience - All sectors - None (jobs)		5,760	5,599	5,157	4,944	5,258	7,427
Related work experience - All sectors - Up to 1 year (jobs)		7,841	7,617	7,072	6,758	7,152	10,227
Related work experience - All sectors - 1 to 4 years (jobs)		14,274	13,786	12,661	12,057	12,798	18,014
Related work experience - All sectors - 4 to 10 years (jobs)		9,285	8,980	8,229	7,847	8,337	11,686
Related work experience - All sectors - Over 10 years (jobs)		2,405	2,323	2,120	1,996	2,109	2,931
On-the-Job Training - All sectors - None (jobs)		2,158	2,082	1,930	1,841	1,953	2,822
On-the-Job Training - All sectors - Up to 1 year (jobs)		25,641	24,774	22,789	21,647	22,921	32,317
On-the-Job Training - All sectors - 1 to 4 years (jobs)		8,529	8,286	7,604	7,284	7,755	10,870
On-the-Job Training - All sectors - 4 to 10 years (jobs)		2,867	2,800	2,583	2,512	2,691	3,804
On-the-Job Training - All sectors - Over 10 years (jobs)		371	361	333	318	334	474
On-Site or In-Plant Training - All sectors - None (jobs)		6,335	6,141	5,665	5,418	5,760	8,218
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		23,399	22,605	20,791	19,748	20,910	29,459
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		6,589	6,397	5,877	5,625	5,983	8,395
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		2,894	2,818	2,591	2,505	2,673	3,757
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		349	342	315	305	328	457
Wage income - All (million \$2019)		2,170	2,123	1,964	1,881	2,019	2,857

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	578	547	504	469	441	408	369
Final energy use - Residential (PJ)	190	188	187	184	176	167	161
Final energy use - Commercial (PJ)	154	154	154	153	150	146	143
Final energy use - Industry (PJ)	138	139	137	144	160	164	168

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)		5.08	5.31	5.56	5.79	6.91	7.24

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	108	245	382	1,015	1,649	3,050	4,452
Vehicle stocks - LDV – All others (1000 units)	5,820	5,820	5,820	5,520	5,221	4,023	2,826
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	188	371	1,276	3,945	5,771
Public EV charging plugs - DC Fast (1000 units)	0.323		0.669		2.89		7.8
Public EV charging plugs - L2 (1000 units)	1.11		16.1		69.5		188

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 (%)	20.5	32.5	36.8	49.4	69.2	82.3	86.9
Sales of space heating units - Electric Resistance (%)	25.1	32.5	30.6	25.2	16.8	11.2	9.24
Sales of space heating units - Gas (%)	50.6	29.9	27.6	21.1	11.1	4.33	1.85
Sales of space heating units - Fossil (%)	3.8	5.13	5.09	4.25	2.87	2.13	2.05
Sales of water heating units - Electric Heat Pump (%)	0	1.92	7.38	23.1	47.4	63.4	69.1
Sales of water heating units - Electric Resistance (%)	46.7	61.2	58.5	50.3	37.7	29.5	26.6
Sales of water heating units - Gas Furnace (%)	49.7	33.6	30.9	23.3	11.7	3.86	1.03
Sales of water heating units - Other (%)	3.58	3.23	3.22	3.25	3.25	3.24	3.24
Sales of cooking units - Electric Resistance (%)	82.8	83.2	84.8	89	94.7	98.3	99.5
Sales of cooking units - Gas (%)	17.2	16.8	15.2	11	5.27	1.7	0.457
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		8.98	12.7				

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 (%)	9.42	15.4	21.2	37.7	63.9	82.8	90.3
Sales of space heating units - Electric Resistance (%)	8.85	3.71	3.77	3.94	4.58	5.53	6.06
Sales of space heating units - Gas (%)	81.7	80.6	74.8	58.2	31.5	11.7	3.68
Sales of space heating units - Fossil (%)	0	0.221	0.208	0.157	0.076	0.024	0.007
Sales of water heating units - Electric Heat Pump (%)	0.083	1.86	7.04	22	45.1	60.6	66.1
Sales of water heating units - Electric Resistance (%)	4.09	2.3	4.52	11	21.1	28	30.5
Sales of water heating units - Gas (%)	94.7	95.5	88	66.6	33.4	11.1	2.96
Sales of water heating units - Other (%)	1.09	0.39	0.388	0.391	0.39	0.389	0.388

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)		15,683	17,443				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	3,632	2,903	0	0	0	0	0
Installed thermal - Natural gas (MW)	13,240	11,808	12,265	11,831	8,997	6,540	10,928
Installed thermal - Nuclear (MW)	4,210	4,210	4,210	1,403	0.026	0.073	0.136

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)							-903
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-310
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,696
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-48.1
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-7.32
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,682
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-5,789
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,352
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,083
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,858
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-96.2
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-277
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-52
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,335
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-11,053
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,802
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,857

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)							-7,019
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-144
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-410
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-96.6
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-16,318
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,989
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							147
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							236
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,371
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0
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)							20.5
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.476
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,001
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,776
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							221
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							244
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,475
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0
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)							29.7

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)							3.44
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,015
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,988
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							295
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							251
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,579
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0
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)							38.9
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							2.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,654
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							5,821

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)							-227
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-4.96
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-232
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-450

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-9.92
Carbon sink potential - Aggressive deployment - Total (1000 tCO ₂ e/y)							-460
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)							257
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							7.61
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							264
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)							506
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							15.2
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							521

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)		17.4	0.023	0.023	0.014	0.009	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		20.4	17.4	8.13	5.51	2.56	0.302
Premature deaths from air pollution - Mobile - On-Road (deaths)		163	154	118	68.6	30.9	11.4
Premature deaths from air pollution - Gas Stations (deaths)		6.93	6.45	4.92	2.94	1.43	0.673
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		13.3	10.4	6.5	3.64	2.11	1.4
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.213	0.184	0.152	0.119	0.09	0.063
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.25	1.08	0.829	0.595	0.405	0.281
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.112	0.109	0.106	0.102	0.098	0.093
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		12.6	11	7.96	4.88	2.81	1.64
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.34	1.08	0.869	0.672	0.489	0.321
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.98	1.68	1.39	1.1	0.813	0.539

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)		0.3	0.034	0.032	0.028	0.026	0.008
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		35.3	33.6	29.1	21.2	13	1.85
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		154	0.207	0.207	0.126	0.076	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		181	154	72	48.8	22.7	2.68
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,446	1,367	1,051	610	275	101
Monetary damages from air pollution - Gas Stations (million \$2019)		61.4	57.1	43.5	26	12.7	5.96
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		118	91.8	57.6	32.3	18.7	12.4
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		1.89	1.63	1.35	1.06	0.794	0.558
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		11.1	9.55	7.34	5.27	3.59	2.49
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		0.987	0.963	0.935	0.901	0.864	0.822
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		111	97.3	70.4	43.2	24.9	14.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		11.8	9.59	7.69	5.95	4.33	2.85
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		17.5	14.9	12.3	9.72	7.2	4.77
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		2.65	0.3	0.278	0.247	0.231	0.074
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		313	298	258	189	116	16.4

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		96.6	109	109	64.9	21.9	43.1
By economic sector - Construction (jobs)		11,776	11,084	11,882	14,862	17,746	21,466
By economic sector - Manufacturing (jobs)		2,576	2,414	2,492	2,463	2,510	3,020
By economic sector - Mining (jobs)		1,928	1,209	707	347	123	21.2
By economic sector - Other (jobs)		1,513	1,573	1,868	2,836	3,805	5,431
By economic sector - Pipeline (jobs)		391	323	222	136	67.1	29.9
By economic sector - Professional (jobs)		5,090	4,770	5,186	6,763	8,457	10,837
By economic sector - Trade (jobs)		3,701	3,257	3,433	4,456	5,657	7,583
By economic sector - Utilities (jobs)		11,720	10,449	10,796	11,912	13,825	14,101
By resource sector - Biomass (jobs)		244	261	255	170	85	203
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		1,318	391	4.02	2.94	2.28	0.006
By resource sector - Grid (jobs)		16,079	15,055	17,326	19,191	22,851	25,878

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

Item	2020	2025	2030	2035	2040	2045	2050
By resource sector - Natural Gas (jobs)		4,459	3,656	2,960	3,475	4,146	2,049
By resource sector - Nuclear (jobs)		2,125	1,805	1,372	1,073	665	386
By resource sector - Oil (jobs)		4,242	3,225	2,108	1,120	395	0.277
By resource sector - Solar (jobs)		9,729	9,707	10,843	16,295	20,801	29,161
By resource sector - Wind (jobs)		595	1,088	1,828	2,511	3,268	4,855
By education level - All sectors - High school diploma or less (jobs)		16,401	14,902	15,592	18,564	22,003	26,315
By education level - All sectors - Associates degree or some college (jobs)		12,324	11,238	11,817	14,246	17,083	20,409
By education level - All sectors - Bachelors degree (jobs)		7,843	7,037	7,208	8,525	10,122	12,151
By education level - All sectors - Masters or professional degree (jobs)		1,946	1,759	1,816	2,178	2,611	3,164
By education level - All sectors - Doctoral degree (jobs)		277	253	262	325	394	493
Related work experience - All sectors - None (jobs)		5,643	5,137	5,375	6,439	7,692	9,209
Related work experience - All sectors - Up to 1 year (jobs)		7,696	7,014	7,359	8,835	10,506	12,726
Related work experience - All sectors - 1 to 4 years (jobs)		13,995	12,657	13,170	15,707	18,715	22,394
Related work experience - All sectors - 4 to 10 years (jobs)		9,100	8,246	8,582	10,249	12,214	14,538
Related work experience - All sectors - Over 10 years (jobs)		2,357	2,133	2,209	2,608	3,086	3,665
On-the-Job Training - All sectors - None (jobs)		2,120	1,922	1,994	2,405	2,871	3,504
On-the-Job Training - All sectors - Up to 1 year (jobs)		25,152	22,757	23,678	28,171	33,488	40,230
On-the-Job Training - All sectors - 1 to 4 years (jobs)		8,351	7,604	7,963	9,545	11,393	13,511
On-the-Job Training - All sectors - 4 to 10 years (jobs)		2,804	2,571	2,715	3,303	3,971	4,700
On-the-Job Training - All sectors - Over 10 years (jobs)		365	334	345	415	488	587
On-Site or In-Plant Training - All sectors - None (jobs)		6,217	5,654	5,892	7,094	8,469	10,230
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		22,949	20,762	21,610	25,705	30,556	36,662
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		6,453	5,872	6,147	7,359	8,778	10,431
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		2,831	2,586	2,714	3,280	3,929	4,640
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		342	314	332	400	481	568
Wage income - All (million \$2019)		2,126	1,945	2,045	2,456	2,959	3,559

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	577	543	484	411	345	303	285
Final energy use - Residential (PJ)	190	187	180	168	158	153	152
Final energy use - Commercial (PJ)	154	154	150	142	136	133	134
Final energy use - Industry (PJ)	138	138	137	143	157	161	165

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)		5.56	5.85	7.13	7.54	7.14	7.45

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	140	607	1,073	2,707	4,340	5,646	6,951
Vehicle stocks - LDV – All others (1000 units)	5,796	5,519	5,242	3,820	2,398	1,357	315
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		1,096	2,868	4,551	6,933	7,503	7,177
Public EV charging plugs - DC Fast (1000 units)	0.323		1.88		7.6		12.2
Public EV charging plugs - L2 (1000 units)	1.11		45.2		183		293

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 (%)	20.5	39.8	77.9	87.9	88.7	88.6	88.5
Sales of space heating units - Electric Resistance (%)	25.1	29.4	12.9	8.67	8.4	8.53	8.6
Sales of space heating units - Gas (%)	50.6	26.1	6.34	1.28	0.966	0.96	0.955
Sales of space heating units - Fossil (%)	3.8	4.75	2.83	2.2	1.94	1.88	1.97
Sales of water heating units - Electric Heat Pump (%)	0	11.1	59.1	70.5	71.1	71.1	71.1
Sales of water heating units - Electric Resistance (%)	46.7	56.4	31.4	25.8	25.6	25.6	25.6
Sales of water heating units - Gas Furnace (%)	49.7	29.2	6.29	0.391	0.01	0	0
Sales of water heating units - Other (%)	3.58	3.23	3.22	3.24	3.23	3.24	3.24
Sales of cooking units - Electric Resistance (%)	82.8	86.5	97.7	99.9	100	100	100
Sales of cooking units - Gas (%)	17.2	13.5	2.31	0.116	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		9.03	12.9				

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 (%)	9.42	24.7	74.5	91.3	93	93.1	93.1
Sales of space heating units - Electric Resistance (%)	8.85	3.72	4.18	5.96	6.38	6.41	6.34
Sales of space heating units - Gas (%)	81.7	71.4	21.3	2.75	0.604	0.53	0.531
Sales of space heating units - Fossil (%)	0	0.191	0.037	0.002	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.083	10.5	56.1	67.4	68.1	68.1	68.1
Sales of water heating units - Electric Resistance (%)	4.09	5.98	25.6	31.1	31.5	31.5	31.5
Sales of water heating units - Gas (%)	94.7	83.1	18	1.12	0.029	0	0
Sales of water heating units - Other (%)	1.09	0.39	0.388	0.391	0.39	0.389	0.388
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)		15,691	17,430				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	3,632	2,903	0	0	0	0	0
Installed thermal - Natural gas (MW)	13,240	11,812	12,196	12,444	11,905	13,169	13,610

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Nuclear (MW)	4,210	4,210	2,806	2,806	1,403	1,403	0
Installed renewables - Rooftop PV (MW)	1,845	2,808	3,773	4,985	6,485	8,313	10,586
Installed renewables - Solar - Base land use assumptions (MW)	5,833	5,833	5,833	5,833	9,455	14,992	19,411
Installed renewables - Wind - Base land use assumptions (MW)	618	618	765	1,129	1,405	1,640	3,085
Installed renewables - Solar - Constrained land use assumptions (MW)	5,834	5,834	5,834	6,949	12,696	22,467	28,794
Installed renewables - Wind - Constrained land use assumptions (MW)	728	1,049	1,933	14,183	39,903	43,568	44,452
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion \$2018)		0	0	0	3.77	5.43	4.09
Capital invested - Wind - Base (billion \$2018)		0	0.196	0.451	0.325	0.263	1.53

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	14,540	14,540	14,540	14,540	23,385	36,849	47,539
Wind - Base land use assumptions (GWh)	1,920	1,920	2,374	3,436	4,185	4,831	8,726
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	29,080	29,080	29,080	34,450	62,200	109,562	140,279
Wind - Constrained land use assumptions (GWh)	4,286	5,987	9,990	61,175	148,477	161,126	165,214
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)							-903
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-310
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,696
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-48.1
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-7.32
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,682
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-5,789
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,352
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,083
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,858

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Improve plantations (1000 tCO ₂ e/y)							0
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO ₂ e/y)							-96.2
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO ₂ e/y)							-277
Carbon sink potential - Mid - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO ₂ e/y)							-52
Carbon sink potential - Mid - Restore productivity (1000 tCO ₂ e/y)							-3,335
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO ₂ e/y)							-11,053
Carbon sink potential - High - Accelerate regeneration (1000 tCO ₂ e/y)							-1,802
Carbon sink potential - High - Avoid deforestation (1000 tCO ₂ e/y)							-1,857
Carbon sink potential - High - Extend rotation length (1000 tCO ₂ e/y)							-7,019
Carbon sink potential - High - Improve plantations (1000 tCO ₂ e/y)							0
Carbon sink potential - High - Increase retention of HWP (1000 tCO ₂ e/y)							-144
Carbon sink potential - High - Increase trees outside forests (1000 tCO ₂ e/y)							-410
Carbon sink potential - High - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO ₂ e/y)							-96.6
Carbon sink potential - High - All (not counting overlap) (1000 tCO ₂ e/y)							-16,318
Carbon sink potential - High - Restore productivity (1000 tCO ₂ e/y)							-4,989
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							147
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							236
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,371
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0
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)							20.5
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.476
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,001

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)							2,776
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							221
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							244
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,475
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0
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)							29.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							3.44
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,015
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,988
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							295
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							251
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,579
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0
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)							38.9
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							2.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,654
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							5,821

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)							-227
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-4.96
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-232
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-450
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-9.92
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-460
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)							257
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							7.61
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							264
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)							506
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							15.2
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							521

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)		17.4	0.023	0.023	0.014	0.009	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		26.7	19	16.3	17.1	9.34	1.09
Premature deaths from air pollution - Mobile - On-Road (deaths)		163	154	118	68.6	30.9	11.4
Premature deaths from air pollution - Gas Stations (deaths)		6.93	6.45	4.92	2.94	1.43	0.673

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)		13.3	10.4	6.5	3.64	2.11	1.4
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.213	0.184	0.152	0.119	0.09	0.063
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.25	1.08	0.829	0.595	0.405	0.281
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.112	0.109	0.106	0.102	0.098	0.093
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		12.6	11	7.96	4.88	2.81	1.64
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.34	1.08	0.869	0.672	0.489	0.321
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.98	1.68	1.39	1.1	0.813	0.539
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.224	0.034	0.032	0.028	0.027	0.008
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		36.4	35.7	35.5	30.7	26.1	19.7
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		154	0.207	0.207	0.126	0.076	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		236	168	145	151	82.7	9.62
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,446	1,367	1,051	610	275	101
Monetary damages from air pollution - Gas Stations (million \$2019)		61.4	57.1	43.5	26	12.7	5.96
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		118	91.8	57.6	32.3	18.7	12.4
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		1.89	1.63	1.35	1.06	0.794	0.558
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		11.1	9.55	7.34	5.27	3.59	2.49
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		0.987	0.963	0.935	0.901	0.864	0.822
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		111	97.3	70.4	43.2	24.9	14.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		11.8	9.59	7.69	5.95	4.33	2.85
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		17.5	14.9	12.3	9.72	7.2	4.77
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		1.98	0.297	0.279	0.249	0.234	0.073

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)		323	317	315	273	231	175

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		98.2	180	126	73	25.6	43.6
By economic sector - Construction (jobs)		11,598	11,068	11,476	12,171	12,042	17,439
By economic sector - Manufacturing (jobs)		2,570	2,291	2,250	2,124	1,806	2,259
By economic sector - Mining (jobs)		1,936	1,264	831	511	302	183
By economic sector - Other (jobs)		1,457	1,488	1,768	2,072	2,365	4,145
By economic sector - Pipeline (jobs)		410	459	309	276	203	215
By economic sector - Professional (jobs)		4,999	4,668	4,846	5,164	5,374	8,663
By economic sector - Trade (jobs)		3,618	3,169	3,269	3,473	3,675	5,938
By economic sector - Utilities (jobs)		11,870	11,117	10,951	11,244	10,815	17,513
By resource sector - Biomass (jobs)		245	436	331	210	102	195
By resource sector - CO2 (jobs)		0	857	19	186	75.5	530
By resource sector - Coal (jobs)		1,218	349	4.04	2.97	2.33	0
By resource sector - Grid (jobs)		16,322	14,676	16,336	17,373	15,991	20,972
By resource sector - Natural Gas (jobs)		4,659	4,276	4,326	4,856	5,245	4,305
By resource sector - Nuclear (jobs)		2,125	2,091	1,494	675	665	6,557
By resource sector - Oil (jobs)		4,240	3,276	2,218	1,371	830	510
By resource sector - Solar (jobs)		9,266	9,096	10,335	11,539	12,770	22,393
By resource sector - Wind (jobs)		481	647	763	894	928	936
By education level - All sectors - High school diploma or less (jobs)		16,290	15,118	15,228	15,774	15,461	23,394
By education level - All sectors - Associates degree or some college (jobs)		12,258	11,411	11,547	12,109	12,002	18,154
By education level - All sectors - Bachelors degree (jobs)		7,800	7,141	7,034	7,161	7,081	11,438
By education level - All sectors - Masters or professional degree (jobs)		1,935	1,781	1,766	1,807	1,804	2,965
By education level - All sectors - Doctoral degree (jobs)		274	253	251	256	261	448
Related work experience - All sectors - None (jobs)		5,613	5,225	5,262	5,482	5,416	8,231
Related work experience - All sectors - Up to 1 year (jobs)		7,631	7,081	7,148	7,389	7,280	11,276
Related work experience - All sectors - 1 to 4 years (jobs)		13,915	12,852	12,868	13,317	13,145	20,298
Related work experience - All sectors - 4 to 10 years (jobs)		9,052	8,381	8,391	8,703	8,593	13,192
Related work experience - All sectors - Over 10 years (jobs)		2,346	2,165	2,157	2,216	2,175	3,401
On-the-Job Training - All sectors - None (jobs)		2,101	1,941	1,941	1,995	1,984	3,191
On-the-Job Training - All sectors - Up to 1 year (jobs)		24,995	23,068	23,090	23,805	23,448	36,397
On-the-Job Training - All sectors - 1 to 4 years (jobs)		8,310	7,738	7,796	8,144	8,039	12,153
On-the-Job Training - All sectors - 4 to 10 years (jobs)		2,788	2,621	2,664	2,819	2,798	4,125
On-the-Job Training - All sectors - Over 10 years (jobs)		362	337	336	345	339	532
On-Site or In-Plant Training - All sectors - None (jobs)		6,171	5,727	5,737	5,933	5,886	9,239
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		22,809	21,051	21,084	21,751	21,419	33,185

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)		6,420	5,969	6,014	6,274	6,188	9,363
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		2,817	2,638	2,665	2,804	2,776	4,119
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		340	319	325	344	340	494
Wage income - All (million \$2019)		2,116	1,982	2,003	2,095	2,091	3,302

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	577	543	484	411	345	303	285
Final energy use - Residential (PJ)	190	187	180	168	158	153	152
Final energy use - Commercial (PJ)	154	154	150	142	136	133	134
Final energy use - Industry (PJ)	138	138	137	143	157	161	165

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)		5.56	5.85	7.13	7.54	7.14	7.45

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	140	607	1,073	2,707	4,340	5,646	6,951
Vehicle stocks - LDV – All others (1000 units)	5,796	5,519	5,242	3,820	2,398	1,357	315
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		1,096	2,868	4,551	6,933	7,503	7,177
Public EV charging plugs - DC Fast (1000 units)	0.323		1.88		7.6		12.2
Public EV charging plugs - L2 (1000 units)	1.11		45.2		183		293

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 (%)	20.5	39.8	77.9	87.9	88.7	88.6	88.5
Sales of space heating units - Electric Resistance (%)	25.1	29.4	12.9	8.67	8.4	8.53	8.6
Sales of space heating units - Gas (%)	50.6	26.1	6.34	1.28	0.966	0.96	0.955
Sales of space heating units - Fossil (%)	3.8	4.75	2.83	2.2	1.94	1.88	1.97
Sales of water heating units - Electric Heat Pump (%)	0	11.1	59.1	70.5	71.1	71.1	71.1
Sales of water heating units - Electric Resistance (%)	46.7	56.4	31.4	25.8	25.6	25.6	25.6
Sales of water heating units - Gas Furnace (%)	49.7	29.2	6.29	0.391	0.01	0	0
Sales of water heating units - Other (%)	3.58	3.23	3.22	3.24	3.23	3.24	3.24
Sales of cooking units - Electric Resistance (%)	82.8	86.5	97.7	99.9	100	100	100
Sales of cooking units - Gas (%)	17.2	13.5	2.31	0.116	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		9.03	12.9				

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 (%)	9.42	24.7	74.5	91.3	93	93.1	93.1
Sales of space heating units - Electric Resistance (%)	8.85	3.72	4.18	5.96	6.38	6.41	6.34
Sales of space heating units - Gas (%)	81.7	71.4	21.3	2.75	0.604	0.53	0.531
Sales of space heating units - Fossil (%)	0	0.191	0.037	0.002	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.083	10.5	56.1	67.4	68.1	68.1	68.1
Sales of water heating units - Electric Resistance (%)	4.09	5.98	25.6	31.1	31.5	31.5	31.5
Sales of water heating units - Gas (%)	94.7	83.1	18	1.12	0.029	0	0
Sales of water heating units - Other (%)	1.09	0.39	0.388	0.391	0.39	0.389	0.388
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)		15,691	17,430				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	3,632	2,591	0	0	0	0	0
Installed thermal - Natural gas (MW)	13,209	11,744	13,044	16,185	14,885	14,323	20,364
Installed thermal - Nuclear (MW)	4,210	4,210	4,210	1,403	1,403	1,403	4,002
Installed renewables - Rooftop PV (MW)	1,845	2,808	3,773	4,985	6,485	8,313	10,586
Installed renewables - Solar - Base land use assumptions (MW)	5,833	5,833	5,833	5,833	5,833	5,833	5,833
Installed renewables - Wind - Base land use assumptions (MW)	618	618	618	691	871	1,019	1,129
Installed renewables - Solar - Constrained land use assumptions (MW)	5,834	5,834	5,834	6,565	6,805	6,805	6,805
Installed renewables - Wind - Constrained land use assumptions (MW)	618	726	916	1,318	4,174	5,481	13,012
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion \$2018)		0	0	0	0	0	0
Capital invested - Wind - Base (billion \$2018)		0	0	0.09	0.214	0.166	0.116
Capital invested - Solar PV - Constrained (billion \$2018)		0	0	0.805	0.25	0	0
Capital invested - Wind - Constrained (billion \$2018)		0.159	0.253	0.498	3.38	1.47	7.97

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	14,540	14,540	14,540	14,540	14,540	14,540	14,540
Wind - Base land use assumptions (GWh)	1,920	1,920	1,920	2,147	2,685	3,113	3,436
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	14,540	14,540	14,540	16,277	16,855	16,855	16,855
Wind - Constrained land use assumptions (GWh)	1,920	2,250	2,756	3,727	9,887	12,669	28,390
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)							-903
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-310
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,696
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-48.1
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-7.32
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,682
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-5,789
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,352
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,083
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,858
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-96.2
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-277
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-52
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,335
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-11,053
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,802
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,857
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,019
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-144
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-410
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-96.6
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-16,318
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,989

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)							147
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							236
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,371
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0
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)							20.5
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.476
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,001
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,776
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							221
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							244
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,475
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0
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)							29.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							3.44
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,015
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,988
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							295
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							251

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)							3,579
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0
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)							38.9
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							2.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,654
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							5,821

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO ₂ e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO ₂ e/y)							-227
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-4.96
Carbon sink potential - Moderate deployment - Total (1000 tCO ₂ e/y)							-232
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO ₂ e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO ₂ e/y)							-450
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-9.92
Carbon sink potential - Aggressive deployment - Total (1000 tCO ₂ e/y)							-460
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)							257
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							7.61
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							264

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)							506
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							15.2
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							521

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)		17.4	0.023	0.023	0.014	0.009	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		22.2	14.5	10.5	7.97	4.91	0.808
Premature deaths from air pollution - Mobile - On-Road (deaths)		165	169	167	152	122	84.4
Premature deaths from air pollution - Gas Stations (deaths)		7.08	7.23	7.07	6.4	5.14	3.59
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		13.5	12.3	11.1	9.21	6.8	4.53
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.222	0.205	0.187	0.167	0.146	0.126
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.27	1.23	1.19	1.08	0.893	0.697
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.112	0.109	0.106	0.102	0.098	0.093
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		12.7	12.8	12.4	10.9	8.61	6.12
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.34	1.16	1.02	0.891	0.768	0.653
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.98	1.8	1.63	1.45	1.27	1.1
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.26	0.034	0.034	0.032	0.031	0.028
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		35.8	32.7	28.5	25	22.3	16
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		154	0.207	0.207	0.126	0.076	0
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		196	128	93.2	70.6	43.5	7.16
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,471	1,506	1,485	1,353	1,087	750
Monetary damages from air pollution - Gas Stations (million \$2019)		62.7	64	62.6	56.7	45.5	31.8

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)		120	109	98	81.6	60.3	40.1
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		1.97	1.82	1.66	1.48	1.3	1.11
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		11.3	10.9	10.6	9.58	7.91	6.17
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		0.987	0.963	0.935	0.901	0.864	0.822
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		113	113	110	96.9	76.2	54.2
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		11.8	10.3	9.04	7.89	6.8	5.78
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		17.5	16	14.4	12.9	11.3	9.72
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		2.3	0.304	0.3	0.287	0.269	0.248
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		318	291	253	222	198	142

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		97.9	115	97	55.7	34	32.7
By economic sector - Construction (jobs)		12,041	11,893	11,107	11,215	11,625	16,355
By economic sector - Manufacturing (jobs)		2,599	2,564	2,238	1,986	1,909	1,876
By economic sector - Mining (jobs)		1,953	1,299	949	696	436	207
By economic sector - Other (jobs)		1,530	1,606	1,765	2,016	2,347	4,287
By economic sector - Pipeline (jobs)		399	427	278	257	187	173
By economic sector - Professional (jobs)		5,199	5,015	4,796	4,929	5,363	7,897
By economic sector - Trade (jobs)		3,760	3,429	3,360	3,500	3,782	5,793
By economic sector - Utilities (jobs)		12,169	11,790	9,729	8,993	9,081	9,507
By resource sector - Biomass (jobs)		250	274	233	151	154	168
By resource sector - CO2 (jobs)		0	779	17.3	169	68.6	481
By resource sector - Coal (jobs)		1,308	391	4.44	3.6	2.83	2.2
By resource sector - Grid (jobs)		16,982	16,691	14,843	13,739	14,448	16,885
By resource sector - Natural Gas (jobs)		4,524	3,611	3,080	3,979	4,040	1,972
By resource sector - Nuclear (jobs)		2,125	2,091	1,494	398	0.098	0.141
By resource sector - Oil (jobs)		4,298	3,556	2,950	2,446	1,706	846
By resource sector - Solar (jobs)		9,698	9,688	10,460	11,477	12,749	23,690
By resource sector - Wind (jobs)		562	1,058	1,238	1,285	1,597	2,084
By education level - All sectors - High school diploma or less (jobs)		16,804	16,152	14,581	14,288	14,712	19,513
By education level - All sectors - Associates degree or some college (jobs)		12,639	12,196	10,980	10,893	11,335	15,038
By education level - All sectors - Bachelors degree (jobs)		8,028	7,620	6,803	6,567	6,746	8,904
By education level - All sectors - Masters or professional degree (jobs)		1,993	1,900	1,707	1,656	1,717	2,310
By education level - All sectors - Doctoral degree (jobs)		283	269	248	243	255	363

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

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - All sectors - None (jobs)		5,786	5,574	5,022	4,957	5,136	6,819
Related work experience - All sectors - Up to 1 year (jobs)		7,877	7,572	6,882	6,734	6,958	9,421
Related work experience - All sectors - 1 to 4 years (jobs)		14,342	13,727	12,332	12,083	12,483	16,512
Related work experience - All sectors - 4 to 10 years (jobs)		9,327	8,950	8,019	7,872	8,133	10,698
Related work experience - All sectors - Over 10 years (jobs)		2,415	2,315	2,065	2,001	2,055	2,679
On-the-Job Training - All sectors - None (jobs)		2,167	2,073	1,882	1,837	1,899	2,605
On-the-Job Training - All sectors - Up to 1 year (jobs)		25,762	24,647	22,184	21,651	22,335	29,639
On-the-Job Training - All sectors - 1 to 4 years (jobs)		8,566	8,264	7,410	7,315	7,574	9,956
On-the-Job Training - All sectors - 4 to 10 years (jobs)		2,878	2,795	2,519	2,527	2,632	3,491
On-the-Job Training - All sectors - Over 10 years (jobs)		372	360	325	317	324	437
On-Site or In-Plant Training - All sectors - None (jobs)		6,362	6,112	5,518	5,413	5,606	7,554
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		23,510	22,496	20,242	19,760	20,382	27,018
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		6,618	6,378	5,726	5,646	5,842	7,693
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		2,906	2,812	2,527	2,520	2,615	3,445
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		351	341	307	307	320	418
Wage income - All (million \$2019)		2,180	2,114	1,912	1,888	1,972	2,611

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	578	547	504	469	441	408	369
Final energy use - Residential (PJ)	190	188	187	184	176	167	161
Final energy use - Commercial (PJ)	154	154	154	153	150	146	143
Final energy use - Industry (PJ)	138	139	137	144	160	164	168

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)		5.08	5.31	5.56	5.79	6.91	7.24

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	108	245	382	1,015	1,649	3,050	4,452
Vehicle stocks - LDV – All others (1000 units)	5,820	5,820	5,820	5,520	5,221	4,023	2,826
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	188	371	1,276	3,945	5,771
Public EV charging plugs - DC Fast (1000 units)	0.323		0.669		2.89		7.8
Public EV charging plugs - L2 (1000 units)	1.11		16.1		69.5		188

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 (%)	20.5	32.5	36.8	49.4	69.2	82.3	86.9
Sales of space heating units - Electric Resistance (%)	25.1	32.5	30.6	25.2	16.8	11.2	9.24
Sales of space heating units - Gas (%)	50.6	29.9	27.6	21.1	11.1	4.33	1.85
Sales of space heating units - Fossil (%)	3.8	5.13	5.09	4.25	2.87	2.13	2.05
Sales of water heating units - Electric Heat Pump (%)	0	1.92	7.38	23.1	47.4	63.4	69.1
Sales of water heating units - Electric Resistance (%)	46.7	61.2	58.5	50.3	37.7	29.5	26.6
Sales of water heating units - Gas Furnace (%)	49.7	33.6	30.9	23.3	11.7	3.86	1.03
Sales of water heating units - Other (%)	3.58	3.23	3.22	3.25	3.25	3.24	3.24
Sales of cooking units - Electric Resistance (%)	82.8	83.2	84.8	89	94.7	98.3	99.5
Sales of cooking units - Gas (%)	17.2	16.8	15.2	11	5.27	1.7	0.457
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		8.98	12.7				

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 (%)	9.42	15.4	21.2	37.7	63.9	82.8	90.3
Sales of space heating units - Electric Resistance (%)	8.85	3.71	3.77	3.94	4.58	5.53	6.06
Sales of space heating units - Gas (%)	81.7	80.6	74.8	58.2	31.5	11.7	3.68
Sales of space heating units - Fossil (%)	0	0.221	0.208	0.157	0.076	0.024	0.007
Sales of water heating units - Electric Heat Pump (%)	0.083	1.86	7.04	22	45.1	60.6	66.1
Sales of water heating units - Electric Resistance (%)	4.09	2.3	4.52	11	21.1	28	30.5
Sales of water heating units - Gas (%)	94.7	95.5	88	66.6	33.4	11.1	2.96
Sales of water heating units - Other (%)	1.09	0.39	0.388	0.391	0.39	0.389	0.388
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)		15,683	17,443				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	3,632	2,591	0	0	0	0	0
Installed thermal - Natural gas (MW)	13,239	11,808	12,197	11,892	12,622	10,321	9,796
Installed thermal - Nuclear (MW)	4,210	4,210	4,210	1,403	0.023	0.061	0.11
Capital invested - Biomass power plant (billion \$2018)	0	0.002	0.061	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0.007	0.02
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	0	0.001	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	4.19	124	124	124	124	124
Biomass w/ccu power plant (GWh)	0	0	0	0	0	1.2	1.2
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	6.99	26.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	1	1	1	1	1	1
Number of facilities - Power ccu (quantity)	0	0	0	0	0	1	1
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	1	1
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	1	1
Number of facilities - Diesel (quantity)	0	0	0	1	1	1	1
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	1	1
Number of facilities - Pyrolysis (quantity)	0	0	0	1	1	1	1
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	1	1
Number of facilities - Sng (quantity)	0	1	1	1	1	1	1
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment - Cumulative 5-yr (million \$2018)		2.42	68	21.8	2.59	253	166
Biomass purchases (million \$2018/y)		0.513	8.84	10.5	10.6	30.4	39.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0.15	3.44	3.83	4.06
Annual - BECCS (MMT)		0	0	0	0	0.31	0.44
Annual - NGCC (MMT)		0	0	0.15	0.12	0.1	0.08
Annual - Cement and lime (MMT)		0	0	0	3.32	3.42	3.53
Cumulative - All (MMT)		0	0	0.15	3.59	7.42	11.5
Cumulative - BECCS (MMT)		0	0	0	0	0.31	0.75
Cumulative - NGCC (MMT)		0	0	0.15	0.27	0.37	0.45
Cumulative - Cement and lime (MMT)		0	0	0	3.32	6.74	10.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	406	406	406	406	406
Spur (km)		0	0	9.36	98.6	303	303
All (km)		0	406	415	504	708	708
Cumulative investment - Trunk (million \$2018)		0	440	440	440	440	440
Cumulative investment - Spur (million \$2018)		0	0	5.33	91.1	203	207
Cumulative investment - All (million \$2018)		0	440	445	531	643	646

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)							-903
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-310
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,696
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-48.1
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-7.32
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,682
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-5,789
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,352
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,083
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,858
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-96.2
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-277
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-52
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,335
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-11,053
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,802
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,857
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,019
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-144
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-410
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-96.6
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-16,318
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,989

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)							147
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							236
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,371
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0
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)							20.5
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.476
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,001
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,776
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							221
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							244
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,475
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0
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)							29.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							3.44
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,015
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,988
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							295
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							251

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)							3,579
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0
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)							38.9
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							2.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,654
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							5,821

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)							-227
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-4.96
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)							-232
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-450
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-9.92
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)							-460

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)							257
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							7.61
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)							264
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,249
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							15.2
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)							1,264

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)		29.6	16.7	8.83	6.68	6.18	5.81
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		33.2	32.3	29.3	22	23	11.2
Premature deaths from air pollution - Mobile - On-Road (deaths)		165	172	178	185	192	199
Premature deaths from air pollution - Gas Stations (deaths)		7.05	7.29	7.51	7.78	8.02	8.25
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		13.5	12.5	11.9	11.8	11.9	12.1
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.237	0.233	0.225	0.217	0.211	0.208
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.26	1.26	1.29	1.35	1.41	1.47
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.117	0.119	0.121	0.123	0.124	0.125

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)		12.8	12.6	11.7	10.8	10.5	10.8
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		1.4	1.38	1.38	1.4	1.41	1.43
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		2.07	2.14	2.22	2.29	2.35	2.42
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.701	0.461	0.357	0.337	0.323	0.299
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		36	38.8	40.5	39.4	39.9	38.1
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		262	148	78.3	59.2	54.8	51.5
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		294	286	260	195	204	99
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		1,469	1,526	1,582	1,645	1,708	1,772
Monetary damages from air pollution - Gas Stations (million \$2019)		62.5	64.6	66.5	68.9	71	73
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		119	111	106	105	106	107
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		2.1	2.07	2	1.92	1.87	1.84
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		11.2	11.2	11.4	11.9	12.5	13.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		1.03	1.05	1.07	1.09	1.1	1.11
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		113	111	104	95.6	93	95.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		12.4	12.2	12.2	12.4	12.5	12.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		18.3	18.9	19.6	20.2	20.8	21.4
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		6.18	4.07	3.15	2.97	2.85	2.64
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		320	344	359	350	354	338

Table 65: REF scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		97.2	96	95.9	93.9	93.9	94.6
By economic sector - Construction (jobs)		5,830	10,296	11,287	11,931	12,732	16,299
By economic sector - Manufacturing (jobs)		2,193	2,220	2,335	2,358	2,363	2,292
By economic sector - Mining (jobs)		2,010	1,547	1,216	961	817	692

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		325	1,370	1,679	1,982	2,314	3,994
By economic sector - Pipeline (jobs)		410	420	421	400	405	404
By economic sector - Professional (jobs)		3,047	4,429	4,761	5,147	5,609	7,472
By economic sector - Trade (jobs)		2,434	3,234	3,410	3,676	4,072	5,746
By economic sector - Utilities (jobs)		10,647	10,731	11,184	11,616	12,306	11,139
By resource sector - Biomass (jobs)		246	237	229	220	217	214
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		1,411	899	493	165	40	32.3
By resource sector - Grid (jobs)		13,976	14,051	15,400	15,610	16,234	16,627
By resource sector - Natural Gas (jobs)		4,675	4,851	4,757	5,516	6,780	4,560
By resource sector - Nuclear (jobs)		2,125	2,091	2,058	2,025	1,721	1,309
By resource sector - Oil (jobs)		4,324	3,638	3,169	2,928	2,794	2,702
By resource sector - Solar (jobs)			8,241	9,860	11,147	12,387	22,107
By resource sector - Wind (jobs)		236	334	424	553	540	581
By education level - All sectors - High school diploma or less (jobs)		11,163	14,499	15,420	16,141	17,194	20,411
By education level - All sectors - Associates degree or some college (jobs)		8,509	10,938	11,651	12,278	13,175	15,550
By education level - All sectors - Bachelors degree (jobs)		5,734	6,939	7,253	7,575	8,033	9,402
By education level - All sectors - Masters or professional degree (jobs)		1,406	1,724	1,810	1,900	2,022	2,403
By education level - All sectors - Doctoral degree (jobs)		181	243	256	271	289	367
Related work experience - All sectors - None (jobs)		3,920	5,012	5,328	5,605	6,005	7,111
Related work experience - All sectors - Up to 1 year (jobs)		5,125	6,783	7,226	7,578	8,067	9,761
Related work experience - All sectors - 1 to 4 years (jobs)		9,867	12,395	13,105	13,736	14,654	17,269
Related work experience - All sectors - 4 to 10 years (jobs)		6,393	8,064	8,529	8,945	9,546	11,167
Related work experience - All sectors - Over 10 years (jobs)		1,688	2,088	2,203	2,301	2,441	2,825
On-the-Job Training - All sectors - None (jobs)		1,429	1,871	1,982	2,082	2,216	2,708
On-the-Job Training - All sectors - Up to 1 year (jobs)		17,697	22,245	23,519	24,627	26,226	31,031
On-the-Job Training - All sectors - 1 to 4 years (jobs)		5,778	7,412	7,880	8,281	8,858	10,355
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,857	2,492	2,668	2,818	3,034	3,583
On-the-Job Training - All sectors - Over 10 years (jobs)		233	321	342	358	379	456
On-Site or In-Plant Training - All sectors - None (jobs)		4,237	5,495	5,826	6,123	6,531	7,831
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		16,148	20,303	21,472	22,482	23,945	28,299
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		4,465	5,724	6,084	6,390	6,831	8,009
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,908	2,517	2,683	2,827	3,036	3,563
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		236	304	325	344	371	431
Wage income - All (million \$2019)		1,527	1,911	2,042	2,166	2,339	2,750

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	577	551	515	496	500	516	538

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Residential (PJ)	190	190	195	202	212	222	230
Final energy use - Commercial (PJ)	154	157	160	162	165	172	181
Final energy use - Industry (PJ)	138	144	147	154	162	173	185

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)		5.57	5.85	6.55	6.89	7.44	7.8

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 (%)	19.5	39.9	40.6	41.7	43.2	45.2	47.9
Sales of space heating units - Electric Resistance (%)	25.4	29.6	29.2	28.6	27.5	25.7	23
Sales of space heating units - Gas (%)	51.3	26.5	26.2	25.7	25.7	25.7	25.6
Sales of space heating units - Fossil (%)	3.83	3.9	4.03	3.98	3.57	3.36	3.58
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	46.7	62.2	62.4	62.4	62.4	62.5	62.5
Sales of water heating units - Gas Furnace (%)	49.7	34.5	34.4	34.3	34.3	34.3	34.2
Sales of water heating units - Other (%)	3.58	3.23	3.23	3.25	3.26	3.26	3.26
Sales of cooking units - Electric Resistance (%)	82.6	82.6	82.6	82.6	82.6	82.6	82.6
Sales of cooking units - Gas (%)	17.4	17.4	17.4	17.4	17.4	17.4	17.4
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		8.41	8.88				

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 (%)	9.42	27.3	68.2	78	78.7	78.8	78.8
Sales of space heating units - Electric Resistance (%)	8.85	5.52	11.3	16.2	20	20.6	20.6
Sales of space heating units - Gas (%)	81.7	67	20.4	5.76	1.23	0.588	0.532
Sales of space heating units - Fossil (%)	0	0.189	0.074	0.026	0.004	0	0
Sales of water heating units - Electric Heat Pump (%)	0.083	0.031	0.031	0.031	0.031	0.031	0.031
Sales of water heating units - Electric Resistance (%)	4.09	1.51	1.51	1.53	1.5	1.51	1.5
Sales of water heating units - Gas (%)	94.7	98.1	98.1	98.1	98.1	98.1	98.1
Sales of water heating units - Other (%)	1.09	0.39	0.388	0.391	0.39	0.389	0.388
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)		15,479	16,145				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	3,632	2,903	1,755	916	0	0	0
Installed thermal - Natural gas (MW)	13,229	12,034	14,033	14,083	13,546	16,155	14,850
Installed thermal - Nuclear (MW)	4,210	4,210	4,210	4,210	4,210	2,806	2,806
Installed renewables - Rooftop PV (MW)	1,845	2,808	3,773	4,985	6,485	8,313	10,586

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)	5,833	5,833	5,833	5,833	5,833	5,833	5,833
Installed renewables - Wind - Base land use assumptions (MW)	618	618	618	618	618	691	765

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	14,540	14,540	14,540	14,540	14,540	14,540	14,540
Wind - Base land use assumptions (GWh)	1,920	1,920	1,920	1,920	1,920	2,147	2,374
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)	7.56		2.19				0.629
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.039		-0.082				-0.086
Business-as-usual carbon sink - Total (Mt CO2e/y)	7.52		2.11				0.543

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)							-903
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-310
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,696
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-48.1
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-7.32
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,682
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-5,789
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,352
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,083
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,858
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-96.2
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-277
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest pasture (1000 tCO ₂ e/y)							-52
Carbon sink potential - Mid - Restore productivity (1000 tCO ₂ e/y)							-3,335
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO ₂ e/y)							-11,053
Carbon sink potential - High - Accelerate regeneration (1000 tCO ₂ e/y)							-1,802
Carbon sink potential - High - Avoid deforestation (1000 tCO ₂ e/y)							-1,857
Carbon sink potential - High - Extend rotation length (1000 tCO ₂ e/y)							-7,019
Carbon sink potential - High - Improve plantations (1000 tCO ₂ e/y)							0
Carbon sink potential - High - Increase retention of HWP (1000 tCO ₂ e/y)							-144
Carbon sink potential - High - Increase trees outside forests (1000 tCO ₂ e/y)							-410
Carbon sink potential - High - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO ₂ e/y)							-96.6
Carbon sink potential - High - All (not counting overlap) (1000 tCO ₂ e/y)							-16,318
Carbon sink potential - High - Restore productivity (1000 tCO ₂ e/y)							-4,989
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							147
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							236
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,371
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0
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)							20.5
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.476
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,001
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,776
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							221
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							244

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,475
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0
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)							29.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							3.44
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,015
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,988
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							295
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							251
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,579
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0
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)							38.9
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							2.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,654
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							5,821