Net-Zero America - Florida data

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		59.2	0.262	0.193	0.088	0.042	0.002
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		83.7	78.1	65.2	58.1	27.3	5.51
Premature deaths from air pollution - Mobile - On-Road (deaths)		655	621	479	281	129	49.3
Premature deaths from air pollution - Gas Stations (deaths)		53	49.2	37.4	22.2	10.5	4.55
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		13.4	11.2	8.21	5.44	3.62	2.58
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		1.63	1.34	0.939	0.57	0.28	0.122
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		3.96	3.68	3.09	2.37	1.67	1.14
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.82	2.76	2.68	2.59	2.5	2.39
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		25.4	23.5	18.4	12.8	9.16	7.27
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		2.22	1.87	1.48	1.1	0.792	0.533
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.42	1.22	1.02	0.813	0.609	0.409
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.27	0.481	0.481	0.476	0.486	0.49
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		61.4	59	55	43.9	33.4	21.3
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		524	2.32	1.71	0.784	0.369	0.022
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		741	692	577	515	242	48.8
Monetary damages from air pollution - Mobile - On-Road (million $2019)		5,828	5,517	4,260	2,502	1,148	438
Monetary damages from air pollution - Gas Stations (million $2019)		469	436	331	197	93.2	40.3
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		119	99.6	72.7	48.2	32.1	22.9
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		14.5	11.9	8.32	5.05	2.48	1.08
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		35.1	32.6	27.4	21	14.8	10.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		25	24.4	23.7	22.9	22.1	21.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		225	208	163	114	81.1	64.4

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)		19.7	16.5	13.1	9.77	7.01	4.71
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		12.6	10.8	9.02	7.2	5.39	3.62
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		11.2	4.24	4.24	4.2	4.29	4.32
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		545	524	488	390	297	189

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		441	918	473	1,041	1,170	1,057
By economic sector - Construction (jobs)		22,966	35,607	49,148	48,285	48,084	62,039
By economic sector - Manufacturing (jobs)		9,354	14,893	15,700	14,391	16,206	16,559
By economic sector - Mining (jobs)		5,402	3,987	2,732	1,719	1,176	734
By economic sector - Other (jobs)		2,764	5,515	9,050	9,204	9,800	14,543
By economic sector - Pipeline (jobs)		1,350	1,447	948	737	544	481
By economic sector - Professional (jobs)		10,149	14,407	19,890	20,829	21,797	28,774
By economic sector - Trade (jobs)		7,282	9,818	13,586	13,808	14,498	20,077
By economic sector - Utilities (jobs)		21,430	26,203	34,015	38,434	40,387	48,245
By resource sector - Biomass (jobs)		1,893	2,532	1,348	3,135	4,266	4,514
By resource sector - CO2 (jobs)		82	2,816	892	1,078	1,646	2,234
By resource sector - Coal (jobs)		1,089	0	0	0	0	0
By resource sector - Grid (jobs)		25,471	35,420	55,439	65,178	70,297	88,648
By resource sector - Natural Gas (jobs)		16,891	14,613	12,227	11,292	9,629	7,108
By resource sector - Nuclear (jobs)		1,917	1,886	1,856	1,827	1,799	1,604
By resource sector - Oil (jobs)		11,673	9,194	6,500	4,263	2,686	1,516
By resource sector - Solar (jobs)		22,070	45,666	66,763	60,147	59,835	84,164
By resource sector - Wind (jobs)		52.9	667	516	1,529	3,503	2,722
By education level - All sectors - High school diploma or less (jobs)		34,232	48,560	62,678	63,807	65,907	82,346
By education level - All sectors - Associates degree or some college (jobs)		25,716	36,070	47,016	48,031	49,754	62,529
By education level - All sectors - Bachelors degree (jobs)		16,591	22,044	27,938	28,470	29,542	36,906
By education level - All sectors - Masters or professional degree (jobs)		4,032	5,353	6,904	7,116	7,399	9,361
By education level - All sectors - Doctoral degree (jobs)		567	767	1,006	1,025	1,059	1,367
Related work experience - All sectors - None (jobs)		11,803	16,482	21,334	21,863	22,650	28,449
Related work experience - All sectors - Up to 1 year (jobs)		16,007	22,947	29,780	30,259	31,352	39,390
Related work experience - All sectors - 1 to 4 years (jobs)		29,289	40,339	51,946	53,066	54,926	68,811
Related work experience - All sectors - 4 to 10 years (jobs)		19,049	26,185	33,753	34,400	35,544	44,462
Related work experience - All sectors - Over 10 years (jobs)		4,990	6,840	8,728	8,862	9,189	11,398
On-the-Job Training - All sectors - None (jobs)		4,403	6,138	7,974	8,064	8,342	10,581
On-the-Job Training - All sectors - Up to 1 year (jobs)		52,916	73,384	94,125	96,090	99,742	124,678

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)		17,359	24,169	31,414	32,044	33,046	41,401
On-the-Job Training - All sectors - 4 to 10 years (jobs)		5,675	7,975	10,588	10,832	11,079	14,044
On-the-Job Training - All sectors - Over 10 years (jobs)		785	1,128	1,441	1,419	1,454	1,805
On-Site or In-Plant Training - All sectors - None (jobs)		13,083	18,309	23,608	23,975	24,816	31,167
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		48,143	66,744	85,758	87,554	90,839	113,613
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		13,429	18,725	24,317	24,798	25,591	32,064
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		5,774	8,021	10,554	10,780	11,028	13,924
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		709	994	1,304	1,342	1,388	1,742
Wage income - All (million $2019)		4,077	5,591	7,239	7,501	7,859	9,940

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		251	213	161	113	74.7	44.5
Oil consumption - Cumulative (million bbls)							4,994
Oil production - Annual (million bbls)		2.38	2.39	2.39	1.89	1.54	1.02
Natural gas consumption - Annual (tcf)		1,143	964	773	582	366	254
Natural gas consumption - Cumulative (tcf)							23,282
Natural gas production - Annual (tcf)		0.703	0.665	0.579	0.49	0.388	0.302

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	1,917	1,804	1,617	1,384	1,172	1,037	974
Final energy use - Residential (PJ)	511	493	475	450	430	422	425
Final energy use - Commercial (PJ)	434	437	427	413	402	400	406
Final energy use - Industry (PJ)	555	584	599	624	651	665	684

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)		7.9	7.56	13.5	13.9	16.3	17

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	237	1,656	3,074	8,041	13,008	16,976	20,945
Vehicle stocks - LDV – All others (1000 units)	17,465	16,630	15,795	11,510	7,226	4,088	950
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		3,333	8,621	13,843	21,020	22,822	21,789
Public EV charging plugs - DC Fast (1000 units)	0.717		5.18		21.9		35.3
Public EV charging plugs - L2 (1000 units)	3.3		124		526		848

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 (%)	51.7	60.3	83.9	89.2	89.3	89.1	89
Sales of space heating units - Electric Resistance (%)	40	35.5	15	10.4	10.3	10.5	10.6
Sales of space heating units - Gas (%)	7.51	3.51	0.99	0.435	0.414	0.413	0.412
Sales of space heating units - Fossil (%)	0.822	0.7	0.133	0.006	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0	12.3	65.2	77	77.6	77.6	77.6
Sales of water heating units - Electric Resistance (%)	88.4	81.8	31.6	20.4	19.9	19.9	19.9
Sales of water heating units - Gas Furnace (%)	6.88	3.27	0.619	0.026	0	0	0
Sales of water heating units - Other (%)	4.69	2.6	2.57	2.58	2.57	2.54	2.53
Sales of cooking units - Electric Resistance (%)	96	96.9	99.5	100	100	100	100
Sales of cooking units - Gas (%)	3.99	3.14	0.538	0.027	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		16.2	21.3				

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 (%)	23.9	27	70.6	83.8	84.8	85	85.1
Sales of space heating units - Electric Resistance (%)	22.7	8.53	10.3	12.4	13.2	13	12.8
Sales of space heating units - Gas Furnace (%)	53.5	60.7	18.4	3.73	1.99	2	2.02
Sales of space heating units - Fossil (%)	0	3.82	0.711	0.031	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.849	10.5	54.3	64	64.4	64.5	64.5
Sales of water heating units - Electric Resistance (%)	20.9	11.5	28.7	32.5	32.7	32.7	32.7
Sales of water heating units - Gas Furnace (%)	69.5	73.9	14	0.589	0	0	0
Sales of water heating units - Other (%)	8.69	4.13	3.09	2.85	2.86	2.83	2.82
Sales of cooking units - Electric Resistance (%)	32	46	79.9	86.5	86.9	86.9	86.9
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		66,758	74,510				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	8,052	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	45,532	40,312	41,543	44,980	38,512	25,734	20,051
Installed thermal - Nuclear (MW)	3,797	3,797	3,797	3,797	3,797	3,797	2,921
Installed renewables - Rooftop PV (MW)	723	1,179	1,661	2,333	3,256	4,426	5,903
Installed renewables - Solar - Base land use assumptions (MW)	2,649	11,767	33,745	71,032	96,323	118,754	164,102
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	93.8	93.8	93.8	920	1,541	9,078
Installed renewables - Solar - Constrained land use assumptions (MW)	2,649	9,317	32,836	61,238	88,139	113,583	162,293
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	9,078
Capital invested - Solar PV - Base (billion $2018)		12.2	26.3	41.1	26.3	22	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Offshore Wind - Base (billion $2018)		0.266	0	0	1.43	0.916	9.44
Capital invested - Solar PV - Constrained (billion $2018)		13.8	28.1	31.2	32.4	20.3	0
Capital invested - Biomass power plant (billion $2018)	0	0.003	0.163	0.013	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0.02	0.005	0.002	0.019
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0.043	0	0.006	2.06	0.012

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	6,248	24,952	69,352	144,033	194,716	239,156	331,849
Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
OffshoreWind - Base land use assumptions (GWh)	0	285	285	285	2,790	4,681	27,587
Solar - Constrained land use assumptions (GWh)	6,093	19,784	67,349	124,210	178,091	228,553	328,145
Wind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
OffshoreWind - Constrained land use assumptions (GWh)	0	285	285	285	2,790	4,681	27,587
Biomass power plant (GWh)	0	5.92	326	351	351	351	351
Biomass w/ccu power plant (GWh)	0	0	48.5	48.5	55.5	2,368	2,382
Biomass w/ccu allam power plant (GWh)	0	0	0	20.2	24.9	26.9	45.8

Table 11: *E+ 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	1	1	2	4	5
Number of facilities - Allam power w ccu (quantity)	0	0	0	1	2	3	4
Number of facilities - Beccs hydrogen (quantity)	0	0	0	1	7	9	12
Number of facilities - Diesel (quantity)	0	0	0	1	1	1	1
Number of facilities - Diesel ccu (quantity)	0	0	0	1	2	3	4
Number of facilities - Pyrolysis (quantity)	0	0	0	1	1	1	1
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	1	2	3	4
Number of facilities - Sng (quantity)	0	1	1	1	1	1	1
Number of facilities - Sng ccu (quantity)	0	0	1	1	1	1	1
Conversion capital investment - Cumulative 5-yr (million $2018)		3.4	221	785	5,743	5,424	2,560
Biomass purchases (million $2018/y)		7.28	21.8	58.6	333	579	700

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0.08	3.73	14.5	24.6	31.4
Annual - BECCS (MMT)		0	0.05	0.98	8.35	15.1	18.4
Annual - NGCC (MMT)		0	0.03	2.75	2.87	2.62	5.94
Annual - Cement and lime (MMT)		0	0	0	3.32	6.84	7.07
Cumulative - All (MMT)		0	0.08	3.81	18.3	42.9	74.3
Cumulative - BECCS (MMT)		0	0.05	1.03	9.38	24.5	42.8
Cumulative - NGCC (MMT)		0	0.03	2.78	5.65	8.27	14.2
Cumulative - Cement and lime (MMT)		0	0	0	3.32	10.2	17.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	636	636	636	636	636
Spur (km)		0	104	460	897	1,644	2,685
All (km)		0	739	1,095	1,533	2,279	3,321
Cumulative investment - Trunk (million $2018)		0	3,047	3,047	3,047	3,047	3,047
Cumulative investment - Spur (million $2018)		0	55	278	553	1,109	1,708
Cumulative investment - All (million $2018)		0	3,102	3,325	3,600	4,157	4,755

Table 14: *E+ scenario - PILLAR 4: CCUS - CO2 storage*

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	4.39	10.6	19.9	31	42.9
Injection wells (wells)		0	8	32	56	92	116
Resource characterization, appraisal, permitting costs (million $2020)		159	552	785	785	785	785
Wells and facilities construction costs (million $2020)		0	245	955	1,702	2,846	3,533

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)							-665
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-654
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,380
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,929
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,101
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-344
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-231
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-613
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,612
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-11,529
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-997
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-2,289
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,287
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,827
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-6,203
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-664
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-346

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-4,354
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,196
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-25,162
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,328
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,923
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-6,195
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-9,304
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-983
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-462
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-8,095
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-38,862
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,781
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							109
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							499
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,210
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							698
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)							49.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							15.3
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							39.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							959
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,579
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							163
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							515

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)							2,185
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,051
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)							71.3
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							22.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							288
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,931
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,227
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							217
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							531
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,159
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,397
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)							93.4
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							30.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							230
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,585
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,243

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,066

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.8
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,081
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,077
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-29.6
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-2,107
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)							559
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							26.9
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							586
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)							1,091
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							53.8
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,144

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)		59.2	0.262	0.193	0.088	0.042	0.002
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		83.8	66.2	37.2	13.5	2.94	1.37
Premature deaths from air pollution - Mobile - On-Road (deaths)		668	687	681	624	506	353
Premature deaths from air pollution - Gas Stations (deaths)		54.2	55.7	54.7	49.8	40.1	28
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		13.5	12.4	11.4	10.1	8.42	6.5
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		1.66	1.6	1.54	1.37	1.07	0.748
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		4.02	4.06	4.08	3.91	3.45	2.88

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)		2.82	2.76	2.68	2.59	2.5	2.39
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		25.7	27.2	27.6	25.3	21	16.4
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		2.23	2.04	1.87	1.65	1.41	1.18
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.42	1.31	1.19	1.07	0.954	0.834
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.22	0.483	0.489	0.489	0.488	0.462
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		61.3	56.9	50.7	45.6	41.4	29.7
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		524	2.32	1.71	0.784	0.369	0.022
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		743	587	329	119	26.1	12.1
Monetary damages from air pollution - Mobile - On-Road (million $2019)		5,938	6,110	6,052	5,549	4,499	3,142
Monetary damages from air pollution - Gas Stations (million $2019)		480	493	484	441	355	248
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		120	110	101	89.9	74.6	57.6
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		14.7	14.2	13.6	12.1	9.52	6.63
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		35.6	36	36.2	34.7	30.6	25.6
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		25	24.4	23.7	22.9	22.1	21.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		227	241	244	224	186	146
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		19.7	18.1	16.5	14.6	12.5	10.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		12.6	11.6	10.6	9.51	8.44	7.38
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		10.8	4.26	4.31	4.32	4.3	4.08
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		544	505	450	405	367	263

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		537	784	507	1,578	1,524	1,059
By economic sector - Construction (jobs)		23,730	37,661	43,412	43,631	49,920	64,995

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Manufacturing (jobs)		9,713	15,723	13,939	14,028	19,893	19,167
By economic sector - Mining (jobs)		5,448	4,183	3,287	2,439	1,985	1,265
By economic sector - Other (jobs)		2,887	5,773	7,755	8,160	10,100	14,753
By economic sector - Pipeline (jobs)		1,355	1,641	996	895	830	791
By economic sector - Professional (jobs)		10,426	15,602	18,991	21,516	24,079	30,293
By economic sector - Trade (jobs)		7,455	10,486	12,749	13,675	15,739	20,995
By economic sector - Utilities (jobs)		21,751	32,310	37,486	40,948	45,272	55,734
By resource sector - Biomass (jobs)		2,038	2,109	1,683	6,635	6,489	4,367
By resource sector - CO2 (jobs)		85.2	4,760	1,526	1,873	2,823	3,799
By resource sector - Coal (jobs)		1,089	0	0	0	0	0
By resource sector - Grid (jobs)		26,630	36,197	48,267	53,835	70,863	94,554
By resource sector - Natural Gas (jobs)		16,432	13,557	11,453	12,365	6,175	5,588
By resource sector - Nuclear (jobs)		1,917	8,951	11,273	11,112	9,885	8,274
By resource sector - Oil (jobs)		11,811	9,869	8,262	6,592	4,990	2,960
By resource sector - Solar (jobs)		23,244	48,022	56,202	52,969	62,950	85,200
By resource sector - Wind (jobs)		55.9	699	458	1,489	5,167	4,308
By education level - All sectors - High school diploma or less (jobs)		35,233	52,894	58,977	62,183	72,155	89,044
By education level - All sectors - Associates degree or some college (jobs)		26,377	39,434	44,282	46,570	53,974	67,474
By education level - All sectors - Bachelors degree (jobs)		16,983	24,882	27,891	29,555	33,577	40,731
By education level - All sectors - Masters or professional degree (jobs)		4,127	6,077	6,949	7,452	8,410	10,304
By education level - All sectors - Doctoral degree (jobs)		581	876	1,024	1,110	1,226	1,497
Related work experience - All sectors - None (jobs)		12,120	18,011	20,195	21,421	24,731	30,730
Related work experience - All sectors - Up to 1 year (jobs)		16,488	25,127	28,188	29,832	34,651	42,637
Related work experience - All sectors - 1 to 4 years (jobs)		30,052	44,491	49,883	52,672	60,603	74,829
Related work experience - All sectors - 4 to 10 years (jobs)		19,525	28,904	32,368	34,051	39,086	48,333
Related work experience - All sectors - Over 10 years (jobs)		5,116	7,629	8,488	8,894	10,271	12,521
On-the-Job Training - All sectors - None (jobs)		4,521	6,847	7,750	8,159	9,353	11,536
On-the-Job Training - All sectors - Up to 1 year (jobs)		54,355	80,914	90,444	95,880	110,758	135,754
On-the-Job Training - All sectors - 1 to 4 years (jobs)		17,801	26,511	29,732	31,140	35,879	44,794
On-the-Job Training - All sectors - 4 to 10 years (jobs)		5,817	8,640	9,822	10,283	11,727	14,993
On-the-Job Training - All sectors - Over 10 years (jobs)		806	1,250	1,375	1,408	1,625	1,973
On-Site or In-Plant Training - All sectors - None (jobs)		13,435	20,255	22,700	23,967	27,550	33,890
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		49,446	73,586	82,332	87,169	100,711	123,672
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		13,778	20,520	23,005	24,112	27,835	34,696
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		5,915	8,732	9,882	10,349	11,772	14,931
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		726	1,070	1,203	1,273	1,475	1,861
Wage income - All (million $2019)		4,179	6,242	7,090	7,592	8,784	10,918

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	1,919	1,820	1,686	1,572	1,479	1,369	1,239
Final energy use - Residential (PJ)	511	494	487	477	464	448	440
Final energy use - Commercial (PJ)	434	438	434	430	423	419	420
Final energy use - Industry (PJ)	555	584	600	630	661	675	696

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)		6.42	5.91	9.28	9.23	14.5	15.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	183	600	1,016	2,946	4,875	9,145	13,415
Vehicle stocks - LDV – All others (1000 units)	17,536	17,536	17,536	16,634	15,732	12,123	8,514
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		0	553	1,131	3,850	12,021	17,546
Public EV charging plugs - DC Fast (1000 units)	0.717		1.71		8.21		22.6
Public EV charging plugs - L2 (1000 units)	3.3		41.1		197		543

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 (%)	51.7	55.7	58.3	66.2	77.9	85.5	88.2
Sales of space heating units - Electric Resistance (%)	40	39.5	37.2	30.4	20.2	13.6	11.3
Sales of space heating units - Gas (%)	7.51	3.99	3.69	2.89	1.63	0.801	0.513
Sales of space heating units - Fossil (%)	0.822	0.81	0.749	0.558	0.266	0.083	0.021
Sales of water heating units - Electric Heat Pump (%)	0	2.12	8.14	25.5	52.1	69.4	75.5
Sales of water heating units - Electric Resistance (%)	88.4	91.5	85.8	69.3	44.1	27.6	21.9
Sales of water heating units - Gas Furnace (%)	6.88	3.79	3.49	2.63	1.29	0.412	0.107
Sales of water heating units - Other (%)	4.69	2.6	2.57	2.58	2.57	2.54	2.52
Sales of cooking units - Electric Resistance (%)	96	96.1	96.5	97.4	98.8	99.6	99.9
Sales of cooking units - Gas (%)	4.01	3.91	3.54	2.57	1.23	0.395	0.106
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		16	20				

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 (%)	23.9	18.7	23.8	38	60.4	76.6	82.8
Sales of space heating units - Electric Resistance (%)	22.7	8.23	8.33	9.11	10.8	11.9	12.5
Sales of space heating units - Gas Furnace (%)	53.5	68.6	63.8	49.8	27.3	11	4.53
Sales of space heating units - Fossil (%)	0	4.41	4	3.07	1.56	0.485	0.126
Sales of water heating units - Electric Heat Pump (%)	0.849	2.05	7.03	21.4	43.4	57.8	62.8
Sales of water heating units - Electric Resistance (%)	20.9	8.16	9.94	15.6	24.4	30	32

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	69.5	85.5	78.7	59.1	28.9	9.24	2.41
Sales of water heating units - Other (%)	8.69	4.32	4.29	3.91	3.39	3	2.87
Sales of cooking units - Electric Resistance (%)	32	36.2	40.9	53.4	71	81.7	85.5
Sales of cooking units - Gas (%)	68	63.8	59.1	46.6	29	18.3	14.5
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		66,742	74,583				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	8,052	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	45,536	42,257	38,441	34,017	15,175	12,729	15,830
Installed thermal - Nuclear (MW)	3,797	3,797	6,718	10,073	12,747	14,414	14,294

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)							-665
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-654
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,380
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,929
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,101
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-344
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-231
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-613
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,612
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-11,529
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-997
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-2,289
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,287
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,827
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-6,203
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-664
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-346
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-4,354
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,196
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-25,162

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,328
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,923
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-6,195
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-9,304
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-983
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-462
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-8,095
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-38,862
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,781
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							109
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							499
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,210
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							698
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)							49.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							15.3
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							39.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							959
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,579
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							163
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							515
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,185
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,051

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 - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							71.3
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							22.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							288
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,931
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,227
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							217
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							531
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,159
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,397
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)							93.4
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							30.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							230
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,585
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,243

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)							-1,066
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.8
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,081

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,077
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-29.6
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-2,107
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)							559
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							26.9
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							586
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)							1,091
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							53.8
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,144

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)		59.2	0.262	0.193	0.088	0.042	0.002
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		83.4	72.5	52.9	32.5	6.61	2.8
Premature deaths from air pollution - Mobile - On-Road (deaths)		655	621	479	281	129	49.3
Premature deaths from air pollution - Gas Stations (deaths)		53	49.2	37.4	22.2	10.5	4.55
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		13.4	11.2	8.21	5.44	3.62	2.58
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		1.63	1.34	0.939	0.57	0.28	0.122
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		3.96	3.68	3.09	2.37	1.67	1.14
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.82	2.76	2.68	2.59	2.5	2.39
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		25.4	23.5	18.4	12.8	9.16	7.27

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		2.22	1.87	1.48	1.1	0.792	0.533
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.42	1.22	1.02	0.813	0.609	0.409
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.4	0.481	0.48	0.475	0.485	0.428
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		60.4	58.1	51.5	38	23.9	3.7
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		524	2.32	1.71	0.784	0.369	0.022
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		739	642	469	288	58.6	24.8
Monetary damages from air pollution - Mobile - On-Road (million $2019)		5,828	5,517	4,260	2,502	1,148	438
Monetary damages from air pollution - Gas Stations (million $2019)		469	436	331	197	93.2	40.3
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		119	99.6	72.7	48.2	32.1	22.9
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		14.5	11.9	8.32	5.05	2.48	1.08
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		35.1	32.6	27.4	21	14.8	10.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		25	24.4	23.7	22.9	22.1	21.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		225	208	163	114	81.1	64.4
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		19.7	16.5	13.1	9.77	7.01	4.71
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		12.6	10.8	9.02	7.2	5.39	3.62
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		12.4	4.24	4.24	4.19	4.28	3.77
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		536	516	457	337	212	32.9

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		444	921	460	932	1,005	1,044
By economic sector - Construction (jobs)		17,801	38,469	60,731	49,792	37,333	116,514
By economic sector - Manufacturing (jobs)		11,014	15,160	22,744	18,748	17,731	33,219
By economic sector - Mining (jobs)		5,293	3,722	2,261	1,194	494	92.1
By economic sector - Other (jobs)		1,790	6,493	11,916	9,753	7,077	30,476
By economic sector - Pipeline (jobs)		1,313	1,088	754	476	252	115
By economic sector - Professional (jobs)		8,330	15,760	24,455	21,632	16,700	54,238

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Trade (jobs)		6,101	10,730	16,720	14,297	10,796	39,132
By economic sector - Utilities (jobs)		19,976	24,499	37,000	38,498	33,889	76,329
By resource sector - Biomass (jobs)		1,726	2,598	1,239	3,042	3,734	4,594
By resource sector - CO2 (jobs)		0	0.001	0.001	0.001	0.001	0.001
By resource sector - Coal (jobs)		1,089	0	0	0	0	0
By resource sector - Grid (jobs)		22,656	35,954	63,454	67,199	65,277	147,197
By resource sector - Natural Gas (jobs)		16,748	12,840	10,670	10,794	4,265	9,188
By resource sector - Nuclear (jobs)		1,917	1,886	1,527	1,039	813	297
By resource sector - Oil (jobs)		11,676	9,068	6,215	3,616	1,549	41.3
By resource sector - Solar (jobs)		16,200	53,590	91,633	64,990	42,654	186,383
By resource sector - Wind (jobs)		48.8	905	2,303	4,641	6,985	3,459
By education level - All sectors - High school diploma or less (jobs)		30,239	50,446	76,557	66,840	54,057	150,207
By education level - All sectors - Associates degree or some college (jobs)		22,782	37,244	57,212	50,334	40,546	114,394
By education level - All sectors - Bachelors degree (jobs)		14,970	22,772	33,755	29,720	23,949	67,015
By education level - All sectors - Masters or professional degree (jobs)		3,584	5,560	8,296	7,372	5,912	17,002
By education level - All sectors - Doctoral degree (jobs)		485	820	1,223	1,057	813	2,541
Related work experience - All sectors - None (jobs)		10,452	17,034	25,892	22,831	18,422	51,837
Related work experience - All sectors - Up to 1 year (jobs)		14,085	24,034	36,652	31,820	25,673	72,491
Related work experience - All sectors - 1 to 4 years (jobs)		26,080	41,712	62,992	55,427	44,718	125,262
Related work experience - All sectors - 4 to 10 years (jobs)		16,937	27,015	40,884	35,927	28,887	80,862
Related work experience - All sectors - Over 10 years (jobs)		4,507	7,047	10,622	9,317	7,578	20,707
On-the-Job Training - All sectors - None (jobs)		3,864	6,438	9,765	8,433	6,705	19,561
On-the-Job Training - All sectors - Up to 1 year (jobs)		47,332	76,069	114,738	100,794	81,741	227,427
On-the-Job Training - All sectors - 1 to 4 years (jobs)		15,325	24,912	38,036	33,427	26,849	75,293
On-the-Job Training - All sectors - 4 to 10 years (jobs)		4,845	8,241	12,710	11,162	8,795	25,511
On-the-Job Training - All sectors - Over 10 years (jobs)		694	1,182	1,793	1,505	1,187	3,367
On-Site or In-Plant Training - All sectors - None (jobs)		11,592	19,067	28,888	25,150	20,137	57,316
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		43,006	69,156	104,441	91,769	74,407	207,101
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		11,869	19,327	29,488	25,894	20,835	58,365
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		4,970	8,272	12,651	11,110	8,769	25,220
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		623	1,020	1,574	1,400	1,129	3,157
Wage income - All (million $2019)		3,644	5,757	8,717	7,798	6,381	17,928

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	1,917	1,804	1,617	1,384	1,172	1,037	974
Final energy use - Residential (PJ)	511	493	475	450	430	422	425
Final energy use - Commercial (PJ)	434	437	427	413	402	400	406
Final energy use - Industry (PJ)	555	584	599	624	651	665	684

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)		7.9	7.56	13.5	13.9	16.3	17

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	237	1,656	3,074	8,041	13,008	16,976	20,945
Vehicle stocks - LDV – All others (1000 units)	17,465	16,630	15,795	11,510	7,226	4,088	950
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		3,333	8,621	13,843	21,020	22,822	21,789
Public EV charging plugs - DC Fast (1000 units)	0.717		5.18		21.9		35.3
Public EV charging plugs - L2 (1000 units)	3.3		124		526		848

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 (%)	51.7	60.3	83.9	89.2	89.3	89.1	89
Sales of space heating units - Electric Resistance (%)	40	35.5	15	10.4	10.3	10.5	10.6
Sales of space heating units - Gas (%)	7.51	3.51	0.99	0.435	0.414	0.413	0.412
Sales of space heating units - Fossil (%)	0.822	0.7	0.133	0.006	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0	12.3	65.2	77	77.6	77.6	77.6
Sales of water heating units - Electric Resistance (%)	88.4	81.8	31.6	20.4	19.9	19.9	19.9
Sales of water heating units - Gas Furnace (%)	6.88	3.27	0.619	0.026	0	0	0
Sales of water heating units - Other (%)	4.69	2.6	2.57	2.58	2.57	2.54	2.53
Sales of cooking units - Electric Resistance (%)	96	96.9	99.5	100	100	100	100
Sales of cooking units - Gas (%)	3.99	3.14	0.538	0.027	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		16.2	21.3				

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 (%)	23.9	27	70.6	83.8	84.8	85	85.1
Sales of space heating units - Electric Resistance (%)	22.7	8.53	10.3	12.4	13.2	13	12.8
Sales of space heating units - Gas Furnace (%)	53.5	60.7	18.4	3.73	1.99	2	2.02
Sales of space heating units - Fossil (%)	0	3.82	0.711	0.031	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.849	10.5	54.3	64	64.4	64.5	64.5
Sales of water heating units - Electric Resistance (%)	20.9	11.5	28.7	32.5	32.7	32.7	32.7
Sales of water heating units - Gas Furnace (%)	69.5	73.9	14	0.589	0	0	0
Sales of water heating units - Other (%)	8.69	4.13	3.09	2.85	2.86	2.83	2.82
Sales of cooking units - Electric Resistance (%)	32	46	79.9	86.5	86.9	86.9	86.9
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		66,758	74,510				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	8,052	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	45,536	39,522	40,432	36,849	18,740	19,630	34,273
Installed thermal - Nuclear (MW)	3,797	3,797	3,797	2,160	2,160	1,080	0
Installed renewables - Rooftop PV (MW)	723	1,179	1,661	2,333	3,256	4,426	5,903
Installed renewables - Solar - Base land use assumptions (MW)	2,649	6,453	34,939	88,909	111,574	111,574	258,378
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	93.8	93.8	801	5,502	9,350	13,530
Installed renewables - Solar - Constrained land use assumptions (MW)	2,651	7,449	42,401	96,442	111,688	111,688	263,909
Installed renewables - Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	9,078
Capital invested - Solar PV - Base (billion $2018)		5.09	34.1	59.5	23.6	0	136
Capital invested - Offshore Wind - Base (billion $2018)		0.266	0	1.45	8.16	5.68	5.24

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	6,248	14,014	71,600	179,721	224,672	224,672	522,445
Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
OffshoreWind - Base land use assumptions (GWh)	0	285	285	2,430	16,673	28,401	41,096
Solar - Constrained land use assumptions (GWh)	12,496	32,171	173,230	389,409	449,632	449,632	1,066,188
Wind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	55,174

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)							-665
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-654
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,380
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,929
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,101
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-344
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-231
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-613
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,612
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-11,529

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-997
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-2,289
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,287
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,827
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-6,203
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-664
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-346
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-4,354
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,196
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-25,162
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,328
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,923
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-6,195
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-9,304
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-983
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-462
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-8,095
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-38,862
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,781
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							109
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							499
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,210
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							698
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)							49.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							15.3

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 - Reforest pasture (1000 hectares)							39.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							959
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,579
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							163
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							515
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,185
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,051
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)							71.3
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							22.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							288
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,931
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,227
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							217
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							531
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,159
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,397
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)							93.4
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							30.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							230
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,585

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 - High - Total impacted (over 30 years) (1000 hectares)							7,243

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)							-1,066
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.8
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,081
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,077
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-29.6
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-2,107
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)							559
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							26.9
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							586
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)							1,091
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							53.8
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,144

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)		59.2	0.262	0.193	0.088	0.042	0.002

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		82.6	79.6	60.5	54.3	24.6	3.65
Premature deaths from air pollution - Mobile - On-Road (deaths)		655	621	479	281	129	49.3
Premature deaths from air pollution - Gas Stations (deaths)		53	49.2	37.4	22.2	10.5	4.55
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		13.4	11.2	8.21	5.44	3.62	2.58
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		1.63	1.34	0.939	0.57	0.28	0.122
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		3.96	3.68	3.09	2.37	1.67	1.14
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.82	2.76	2.68	2.59	2.5	2.39
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		25.4	23.5	18.4	12.8	9.16	7.27
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		2.22	1.87	1.48	1.1	0.792	0.533
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.42	1.22	1.02	0.813	0.609	0.409
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.14	0.479	0.48	0.475	0.487	0.428
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		62.1	61.4	61.5	53.1	45.4	34.5
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		524	2.32	1.71	0.784	0.369	0.022
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		732	705	536	481	218	32.4
Monetary damages from air pollution - Mobile - On-Road (million $2019)		5,828	5,517	4,260	2,502	1,148	438
Monetary damages from air pollution - Gas Stations (million $2019)		469	436	331	197	93.2	40.3
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		119	99.6	72.7	48.2	32.1	22.9
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		14.5	11.9	8.32	5.05	2.48	1.08
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		35.1	32.6	27.4	21	14.8	10.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		25	24.4	23.7	22.9	22.1	21.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		225	208	163	114	81.1	64.4
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		19.7	16.5	13.1	9.77	7.01	4.71

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		12.6	10.8	9.02	7.2	5.39	3.62
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		10.1	4.23	4.24	4.19	4.29	3.77
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		552	545	546	472	403	306

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		504	825	490	1,328	1,282	1,068
By economic sector - Construction (jobs)		22,135	29,008	22,323	22,686	24,150	26,444
By economic sector - Manufacturing (jobs)		8,182	9,105	8,353	7,922	8,568	7,374
By economic sector - Mining (jobs)		5,491	4,220	3,209	2,212	1,781	1,262
By economic sector - Other (jobs)		2,613	3,732	2,566	2,696	2,980	3,763
By economic sector - Pipeline (jobs)		1,386	1,807	1,187	1,077	967	975
By economic sector - Professional (jobs)		9,753	13,187	11,098	12,510	14,193	16,995
By economic sector - Trade (jobs)		7,054	8,406	6,753	6,916	7,517	8,857
By economic sector - Utilities (jobs)		20,999	35,686	35,935	38,269	47,995	63,340
By resource sector - Biomass (jobs)		1,766	2,116	1,678	4,966	5,022	4,439
By resource sector - CO2 (jobs)		86.4	5,388	1,739	2,103	3,171	4,284
By resource sector - Coal (jobs)		1,211	174	165	157	149	57.3
By resource sector - Grid (jobs)		24,010	30,372	36,140	38,508	43,089	42,018
By resource sector - Natural Gas (jobs)		17,491	17,647	12,956	13,213	11,894	11,854
By resource sector - Nuclear (jobs)		1,917	14,416	16,882	17,675	27,766	47,501
By resource sector - Oil (jobs)		11,671	9,194	6,499	4,263	2,825	1,910
By resource sector - Solar (jobs)		19,753	26,409	15,828	14,655	15,317	17,931
By resource sector - Wind (jobs)		213	261	25.3	75.4	201	85.5
By education level - All sectors - High school diploma or less (jobs)		32,928	44,146	37,861	39,489	44,563	51,693
By education level - All sectors - Associates degree or some college (jobs)		24,749	33,452	28,845	29,886	33,968	39,860
By education level - All sectors - Bachelors degree (jobs)		15,995	22,097	19,612	20,349	23,905	29,698
By education level - All sectors - Masters or professional degree (jobs)		3,897	5,495	4,910	5,159	6,112	7,699
By education level - All sectors - Doctoral degree (jobs)		548	786	685	732	873	1,129
Related work experience - All sectors - None (jobs)		11,376	15,333	13,206	13,801	15,646	18,331
Related work experience - All sectors - Up to 1 year (jobs)		15,352	20,822	17,881	18,750	21,365	25,179
Related work experience - All sectors - 1 to 4 years (jobs)		28,235	38,283	33,322	34,613	39,678	47,341
Related work experience - All sectors - 4 to 10 years (jobs)		18,361	24,950	21,675	22,445	25,748	30,761
Related work experience - All sectors - Over 10 years (jobs)		4,793	6,589	5,828	6,006	6,985	8,468
On-the-Job Training - All sectors - None (jobs)		4,234	5,842	5,056	5,252	6,106	7,505
On-the-Job Training - All sectors - Up to 1 year (jobs)		50,887	68,955	60,115	62,710	71,927	85,645
On-the-Job Training - All sectors - 1 to 4 years (jobs)		16,743	22,727	19,621	20,280	23,107	27,282
On-the-Job Training - All sectors - 4 to 10 years (jobs)		5,503	7,423	6,252	6,491	7,264	8,415

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

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - All sectors - Over 10 years (jobs)		750	1,028	868	883	1,018	1,233
On-Site or In-Plant Training - All sectors - None (jobs)		12,581	17,240	14,872	15,504	17,859	21,532
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		46,309	62,762	54,740	57,031	65,404	77,856
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		12,945	17,513	15,125	15,638	17,797	20,962
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		5,599	7,556	6,402	6,636	7,463	8,717
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		683	906	774	806	897	1,013
Wage income - All (million $2019)		3,937	5,499	4,922	5,193	6,147	7,662

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	1,917	1,804	1,617	1,384	1,172	1,037	974
Final energy use - Residential (PJ)	511	493	475	450	430	422	425
Final energy use - Commercial (PJ)	434	437	427	413	402	400	406
Final energy use - Industry (PJ)	555	584	599	624	651	665	684

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)		7.9	7.56	13.5	13.9	16.3	17

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	237	1,656	3,074	8,041	13,008	16,976	20,945
Vehicle stocks - LDV – All others (1000 units)	17,465	16,630	15,795	11,510	7,226	4,088	950
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		3,333	8,621	13,843	21,020	22,822	21,789
Public EV charging plugs - DC Fast (1000 units)	0.717		5.18		21.9		35.3
Public EV charging plugs - L2 (1000 units)	3.3		124		526		848

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 (%)	51.7	60.3	83.9	89.2	89.3	89.1	89
Sales of space heating units - Electric Resistance (%)	40	35.5	15	10.4	10.3	10.5	10.6
Sales of space heating units - Gas (%)	7.51	3.51	0.99	0.435	0.414	0.413	0.412
Sales of space heating units - Fossil (%)	0.822	0.7	0.133	0.006	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0	12.3	65.2	77	77.6	77.6	77.6
Sales of water heating units - Electric Resistance (%)	88.4	81.8	31.6	20.4	19.9	19.9	19.9
Sales of water heating units - Gas Furnace (%)	6.88	3.27	0.619	0.026	0	0	0
Sales of water heating units - Other (%)	4.69	2.6	2.57	2.58	2.57	2.54	2.53
Sales of cooking units - Electric Resistance (%)	96	96.9	99.5	100	100	100	100
Sales of cooking units - Gas (%)	3.99	3.14	0.538	0.027	0	0	0

Table 43: *E+RE- scenario - PILLAR 1: Efficiency/Electrification - Residential (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		16.2	21.3				

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 (%)	23.9	27	70.6	83.8	84.8	85	85.1
Sales of space heating units - Electric Resistance (%)	22.7	8.53	10.3	12.4	13.2	13	12.8
Sales of space heating units - Gas Furnace (%)	53.5	60.7	18.4	3.73	1.99	2	2.02
Sales of space heating units - Fossil (%)	0	3.82	0.711	0.031	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.849	10.5	54.3	64	64.4	64.5	64.5
Sales of water heating units - Electric Resistance (%)	20.9	11.5	28.7	32.5	32.7	32.7	32.7
Sales of water heating units - Gas Furnace (%)	69.5	73.9	14	0.589	0	0	0
Sales of water heating units - Other (%)	8.69	4.13	3.09	2.85	2.86	2.83	2.82
Sales of cooking units - Electric Resistance (%)	32	46	79.9	86.5	86.9	86.9	86.9
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		66,758	74,510				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	8,052	464	464	464	464	464	0
Installed thermal - Natural gas (MW)	45,534	38,955	37,249	37,651	35,136	33,955	17,165
Installed thermal - Nuclear (MW)	3,797	3,797	8,977	14,225	18,847	27,013	41,575
Installed renewables - Rooftop PV (MW)	723	1,179	1,661	2,333	3,256	4,426	5,903
Installed renewables - Solar - Base land use assumptions (MW)	2,586	13,500	28,228	29,554	29,554	29,554	29,554
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	93.8	93.8	93.8	93.8	93.8	93.8
Installed renewables - Solar - Constrained land use assumptions (MW)	2,651	13,709	27,709	29,123	29,123	29,228	29,228
Installed renewables - Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion $2018)		14.6	17.6	1.46	0	0	0
Capital invested - Offshore Wind - Base (billion $2018)		0.266	0	0	0	0	0
Capital invested - Solar PV - Constrained (billion $2018)		14.8	16.7	1.56	0	0.104	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	6,248	28,551	58,304	60,985	60,985	60,985	60,985
Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
OffshoreWind - Base land use assumptions (GWh)	0	285	285	285	285	285	285
Solar - Constrained land use assumptions (GWh)	6,248	28,832	57,133	59,957	59,957	60,169	60,169

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

Item	2020	2025	2030	2035	2040	2045	2050
Wind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
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)							-665
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-654
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,380
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,929
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,101
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-344
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-231
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-613
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,612
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-11,529
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-997
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-2,289
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,287
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,827
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-6,203
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-664
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-346
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-4,354
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,196
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-25,162
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,328
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,923
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-6,195
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-9,304
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-983

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-462
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-8,095
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-38,862
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,781
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							109
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							499
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,210
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							698
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)							49.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							15.3
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							39.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							959
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,579
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							163
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							515
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,185
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,051
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)							71.3
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							22.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							288
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,931

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 - Mid - Total impacted (over 30 years) (1000 hectares)							6,227
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							217
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							531
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,159
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,397
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)							93.4
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							30.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							230
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,585
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,243

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,066
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.8
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,081
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,077
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-29.6
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-2,107
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							559
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							26.9
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							586
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)							1,091
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							53.8
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,144

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)		59.2	0.262	0.193	0.088	0.042	0.002
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		85.6	69.7	50.7	28.7	14.7	4.89
Premature deaths from air pollution - Mobile - On-Road (deaths)		668	687	681	624	506	353
Premature deaths from air pollution - Gas Stations (deaths)		54.2	55.7	54.7	49.8	40.1	28
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		13.5	12.4	11.4	10.1	8.42	6.5
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		1.66	1.6	1.54	1.37	1.07	0.748
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		4.02	4.06	4.08	3.91	3.45	2.88
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.82	2.76	2.68	2.59	2.5	2.39
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		25.7	27.2	27.6	25.3	21	16.4
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		2.23	2.04	1.87	1.65	1.41	1.18
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.42	1.31	1.19	1.07	0.954	0.834
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.26	0.482	0.489	0.49	0.5	0.498
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		61.3	56.9	50.7	45.6	41.4	29.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		524	2.32	1.71	0.784	0.369	0.022
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		758	617	449	255	130	43.3
Monetary damages from air pollution - Mobile - On-Road (million $2019)		5,938	6,110	6,052	5,549	4,499	3,142
Monetary damages from air pollution - Gas Stations (million $2019)		480	493	484	441	355	248
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		120	110	101	89.9	74.6	57.6
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		14.7	14.2	13.6	12.1	9.52	6.63
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		35.6	36	36.2	34.7	30.6	25.6
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		25	24.4	23.7	22.9	22.1	21.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		227	241	244	224	186	146
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		19.7	18.1	16.5	14.6	12.5	10.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		12.6	11.6	10.6	9.51	8.44	7.38
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		11.2	4.26	4.31	4.33	4.42	4.39
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		544	505	450	405	367	263

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		492	793	1,130	1,235	1,661	1,782
By economic sector - Construction (jobs)		23,542	37,062	39,726	36,595	39,357	56,156
By economic sector - Manufacturing (jobs)		9,629	15,376	12,578	10,733	14,301	16,719
By economic sector - Mining (jobs)		5,426	4,172	3,305	2,552	2,010	1,200
By economic sector - Other (jobs)		2,858	5,690	6,929	6,509	7,563	13,085
By economic sector - Pipeline (jobs)		1,341	1,652	1,012	923	822	773
By economic sector - Professional (jobs)		10,368	14,440	17,124	16,862	19,394	27,616
By economic sector - Trade (jobs)		7,424	10,098	11,616	11,224	12,555	18,721
By economic sector - Utilities (jobs)		21,733	26,791	29,339	30,521	33,914	42,451
By resource sector - Biomass (jobs)		1,955	2,133	3,825	5,185	7,687	8,407
By resource sector - CO2 (jobs)		85.3	4,862	1,551	1,949	2,918	3,852
By resource sector - Coal (jobs)		1,089	0	0	0	0	0
By resource sector - Grid (jobs)		26,426	35,993	45,989	49,091	56,179	75,530
By resource sector - Natural Gas (jobs)		16,539	13,214	11,562	10,505	9,606	6,870
By resource sector - Nuclear (jobs)		1,917	1,887	1,857	1,828	1,799	1,605
By resource sector - Oil (jobs)		11,812	9,869	8,262	6,926	5,035	2,758
By resource sector - Solar (jobs)		22,931	47,395	49,316	40,898	45,310	76,653
By resource sector - Wind (jobs)		58.1	722	396	775	3,041	2,828

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

Item	2020	2025	2030	2035	2040	2045	2050
By education level - All sectors - High school diploma or less (jobs)		34,992	50,064	52,823	50,210	56,348	76,388
By education level - All sectors - Associates degree or some college (jobs)		26,235	37,165	39,241	37,470	42,079	57,483
By education level - All sectors - Bachelors degree (jobs)		16,900	22,601	23,902	22,906	25,752	34,557
By education level - All sectors - Masters or professional degree (jobs)		4,107	5,466	5,925	5,733	6,456	8,768
By education level - All sectors - Doctoral degree (jobs)		578	778	868	836	942	1,306
Related work experience - All sectors - None (jobs)		12,048	16,971	18,012	17,250	19,379	26,358
Related work experience - All sectors - Up to 1 year (jobs)		16,372	23,620	25,057	23,796	26,883	36,733
Related work experience - All sectors - 1 to 4 years (jobs)		29,883	41,490	43,922	41,976	47,068	63,755
Related work experience - All sectors - 4 to 10 years (jobs)		19,422	26,953	28,420	27,138	30,373	41,097
Related work experience - All sectors - Over 10 years (jobs)		5,089	7,040	7,347	6,995	7,873	10,561
On-the-Job Training - All sectors - None (jobs)		4,494	6,316	6,724	6,388	7,175	9,866
On-the-Job Training - All sectors - Up to 1 year (jobs)		54,026	75,439	79,768	76,189	85,929	116,173
On-the-Job Training - All sectors - 1 to 4 years (jobs)		17,706	24,918	26,264	25,046	27,947	37,992
On-the-Job Training - All sectors - 4 to 10 years (jobs)		5,786	8,234	8,811	8,428	9,292	12,795
On-the-Job Training - All sectors - Over 10 years (jobs)		801	1,166	1,192	1,103	1,233	1,678
On-Site or In-Plant Training - All sectors - None (jobs)		13,355	18,822	19,892	18,899	21,273	29,007
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		49,149	68,643	72,599	69,360	78,142	105,700
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		13,701	19,305	20,355	19,405	21,678	29,466
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		5,885	8,279	8,825	8,442	9,310	12,733
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		723	1,025	1,089	1,048	1,174	1,597
Wage income - All (million $2019)		4,157	5,747	6,155	5,975	6,774	9,225

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	1,919	1,820	1,686	1,572	1,479	1,369	1,239
Final energy use - Residential (PJ)	511	494	487	477	464	448	440
Final energy use - Commercial (PJ)	434	438	434	430	423	419	420
Final energy use - Industry (PJ)	555	584	600	630	661	675	696

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)		6.42	5.91	9.28	9.23	14.5	15.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	183	600	1,016	2,946	4,875	9,145	13,415

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – All others (1000 units)	17,536	17,536	17,536	16,634	15,732	12,123	8,514
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		0	553	1,131	3,850	12,021	17,546
Public EV charging plugs - DC Fast (1000 units)	0.717		1.71		8.21		22.6
Public EV charging plugs - L2 (1000 units)	3.3		41.1		197		543

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 (%)	51.7	55.7	58.3	66.2	77.9	85.5	88.2
Sales of space heating units - Electric Resistance (%)	40	39.5	37.2	30.4	20.2	13.6	11.3
Sales of space heating units - Gas (%)	7.51	3.99	3.69	2.89	1.63	0.801	0.513
Sales of space heating units - Fossil (%)	0.822	0.81	0.749	0.558	0.266	0.083	0.021
Sales of water heating units - Electric Heat Pump (%)	0	2.12	8.14	25.5	52.1	69.4	75.5
Sales of water heating units - Electric Resistance (%)	88.4	91.5	85.8	69.3	44.1	27.6	21.9
Sales of water heating units - Gas Furnace (%)	6.88	3.79	3.49	2.63	1.29	0.412	0.107
Sales of water heating units - Other (%)	4.69	2.6	2.57	2.58	2.57	2.54	2.52
Sales of cooking units - Electric Resistance (%)	96	96.1	96.5	97.4	98.8	99.6	99.9
Sales of cooking units - Gas (%)	4.01	3.91	3.54	2.57	1.23	0.395	0.106
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		16	20				

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 (%)	23.9	18.7	23.8	38	60.4	76.6	82.8
Sales of space heating units - Electric Resistance (%)	22.7	8.23	8.33	9.11	10.8	11.9	12.5
Sales of space heating units - Gas Furnace (%)	53.5	68.6	63.8	49.8	27.3	11	4.53
Sales of space heating units - Fossil (%)	0	4.41	4	3.07	1.56	0.485	0.126
Sales of water heating units - Electric Heat Pump (%)	0.849	2.05	7.03	21.4	43.4	57.8	62.8
Sales of water heating units - Electric Resistance (%)	20.9	8.16	9.94	15.6	24.4	30	32
Sales of water heating units - Gas Furnace (%)	69.5	85.5	78.7	59.1	28.9	9.24	2.41
Sales of water heating units - Other (%)	8.69	4.32	4.29	3.91	3.39	3	2.87
Sales of cooking units - Electric Resistance (%)	32	36.2	40.9	53.4	71	81.7	85.5
Sales of cooking units - Gas (%)	68	63.8	59.1	46.6	29	18.3	14.5
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		66,742	74,583				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	8,052	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	45,534	41,886	41,256	38,498	32,509	19,990	12,718
Installed thermal - Nuclear (MW)	3,797	3,797	3,798	3,798	3,798	3,798	2,922

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant (billion $2018)	0	0.004	0.523	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0.038	0.007	0.016	0.021
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0.049	11.5	2.18	5.85	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	7.52	1,035	1,035	1,035	1,035	1,035
Biomass w/ccu power plant (GWh)	0	0	55.3	12,921	15,365	21,928	21,928
Biomass w/ccu allam power plant (GWh)	0	0	0	37.7	44.2	60.6	81.5

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	1	10	12	17	17
Number of facilities - Allam power w ccu (quantity)	0	0	0	1	2	3	4
Number of facilities - Beccs hydrogen (quantity)	0	0	0	2	6	13	18
Number of facilities - Diesel (quantity)	0	0	0	1	1	1	1
Number of facilities - Diesel ccu (quantity)	0	0	0	1	2	3	3
Number of facilities - Pyrolysis (quantity)	0	0	0	1	1	1	1
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	1	2	4	5
Number of facilities - Sng (quantity)	0	1	1	1	1	1	1
Number of facilities - Sng ccu (quantity)	0	0	1	1	1	1	1
Conversion capital investment - Cumulative 5-yr (million $2018)		4.32	629	12,720	5,513	11,510	4,739
Biomass purchases (million $2018/y)		1.01	80.4	1,065	1,523	2,465	2,875

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0.07	17.3	27.8	45.3	53
Annual - BECCS (MMT)		0	0.06	15.5	22.4	36.8	42.7
Annual - NGCC (MMT)		0	0.02	1.74	2.06	1.65	3.24
Annual - Cement and lime (MMT)		0	0	0	3.32	6.84	7.07
Cumulative - All (MMT)		0	0.07	17.3	45.1	90.4	144
Cumulative - BECCS (MMT)		0	0.06	15.6	38	74.8	118
Cumulative - NGCC (MMT)		0	0.02	1.76	3.82	5.47	8.71
Cumulative - Cement and lime (MMT)		0	0	0	3.32	10.2	17.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	636	636	636	636	636
Spur (km)		0	251	722	986	1,813	2,568
All (km)		0	886	1,358	1,622	2,448	3,203
Cumulative investment - Trunk (million $2018)		0	3,047	3,047	3,250	3,250	3,250
Cumulative investment - Spur (million $2018)		0	129	608	902	1,634	2,133
Cumulative investment - All (million $2018)		0	3,177	3,655	4,152	4,884	5,383

Table 61: *E-B+ scenario - PILLAR 4: CCUS - CO2 storage*

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	3.69	15	33.3	45.3	48.5
Injection wells (wells)		0	8	34	62	102	128
Resource characterization, appraisal, permitting costs (million $2020)		159	625	906	906	906	906
Wells and facilities construction costs (million $2020)		0	270	1,053	1,877	3,138	3,896

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)							-665
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-654
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,380
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,929
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,101
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-344
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-231
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-613
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,612
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-11,529
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-997
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-2,289
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,287
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,827
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-6,203
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-664
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-346
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-4,354
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,196
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-25,162
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,328
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,923
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-6,195
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,791

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-9,304
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-983
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-462
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-8,095
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-38,862
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,781
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							109
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							499
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,210
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							698
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)							49.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							15.3
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							39.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							959
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,579
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							163
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							515
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,185
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,051
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)							71.3
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							22.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							288

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 - Mid - Restore productivity (1000 hectares)							1,931
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,227
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							217
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							531
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,159
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,397
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)							93.4
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							30.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							230
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,585
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,243

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)							-12.5
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,055
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.6
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)							-1,082
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-12.5
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,056

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-29.1
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)							-2,098
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							7.89
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							555
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							26.5
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							5.31
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							365
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							960
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							7.89
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							2,674
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							52.9
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							5.31
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							365
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							3,105

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)		226	156	111	97.2	88.6	86.7
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		88.6	93.9	99.9	116	116	111
Premature deaths from air pollution - Mobile - On-Road (deaths)		666	695	724	759	795	832
Premature deaths from air pollution - Gas Stations (deaths)		54	56.1	58.2	60.8	63.4	65.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		13.4	12.4	11.8	11.5	11.6	11.7
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		1.62	1.38	1.03	0.709	0.472	0.338
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		3.99	4.15	4.4	4.71	5.01	5.31
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.95	3.01	3.08	3.13	3.18	3.22
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		25.8	26.6	25.9	24.7	24.7	26.2
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		2.31	2.3	2.28	2.21	2.18	2.19
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.48	1.55	1.62	1.69	1.76	1.84
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		2.78	1.95	1.61	1.55	1.53	1.46
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		61.6	66.2	69.2	67.9	69	66
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		1,999	1,382	986	862	786	769
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		785	831	885	1,027	1,024	986
Monetary damages from air pollution - Mobile - On-Road (million $2019)		5,924	6,179	6,441	6,746	7,065	7,402
Monetary damages from air pollution - Gas Stations (million $2019)		478	497	515	538	561	583
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		119	110	104	102	103	103
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		14.3	12.3	9.1	6.28	4.18	3
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		35.4	36.8	39	41.7	44.4	47.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		26.1	26.7	27.2	27.7	28.1	28.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		228	235	230	219	218	232
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		20.4	20.4	20.1	19.6	19.3	19.4
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		13.1	13.7	14.4	15	15.6	16.3
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		24.5	17.2	14.2	13.7	13.5	12.9

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		547	588	615	603	613	586

Table 65: *REF scenario - IMPACTS - Jobs*

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		466	418	413	336	336	364
By economic sector - Construction (jobs)		12,419	14,484	16,577	19,431	21,033	26,511
By economic sector - Manufacturing (jobs)		5,072	5,286	5,506	5,922	5,979	8,359
By economic sector - Mining (jobs)		5,594	4,568	3,697	3,001	2,518	2,117
By economic sector - Other (jobs)		586	1,065	1,408	2,188	2,594	4,636
By economic sector - Pipeline (jobs)		1,382	1,438	1,456	1,373	1,389	1,377
By economic sector - Professional (jobs)		6,599	6,748	7,239	8,432	9,093	11,605
By economic sector - Trade (jobs)		5,058	5,024	5,125	5,906	6,332	8,447
By economic sector - Utilities (jobs)		20,036	19,378	21,319	23,085	24,864	25,489
By resource sector - Biomass (jobs)		1,799	1,684	1,564	1,398	1,430	1,454
By resource sector - CO2 (jobs)		0	0.053	0.067	0.072	0.08	0.085
By resource sector - Coal (jobs)		1,702	877	557	378	141	0
By resource sector - Grid (jobs)		23,287	22,197	26,226	27,870	29,785	33,356
By resource sector - Natural Gas (jobs)		16,511	17,041	17,208	18,778	20,511	18,548
By resource sector - Nuclear (jobs)		1,917	1,886	1,856	1,827	1,799	1,603
By resource sector - Oil (jobs)		11,903	10,128	8,888	8,221	7,831	7,522
By resource sector - Solar (jobs)			4,351	6,216	10,992	12,616	24,948
By resource sector - Wind (jobs)		94.6	246	223	211	22.8	1,475
By education level - All sectors - High school diploma or less (jobs)		23,591	24,388	26,383	29,350	31,254	37,737
By education level - All sectors - Associates degree or some college (jobs)		17,996	18,514	20,071	22,461	24,019	28,797
By education level - All sectors - Bachelors degree (jobs)		12,248	12,155	12,758	13,972	14,742	17,456
By education level - All sectors - Masters or professional degree (jobs)		2,987	2,960	3,116	3,430	3,633	4,315
By education level - All sectors - Doctoral degree (jobs)		392	394	411	461	488	601
Related work experience - All sectors - None (jobs)		8,344	8,545	9,221	10,268	10,962	13,140
Related work experience - All sectors - Up to 1 year (jobs)		10,736	11,130	12,022	13,442	14,309	17,561
Related work experience - All sectors - 1 to 4 years (jobs)		20,964	21,283	22,789	25,238	26,830	32,031
Related work experience - All sectors - 4 to 10 years (jobs)		13,601	13,839	14,849	16,472	17,527	20,815
Related work experience - All sectors - Over 10 years (jobs)		3,568	3,613	3,859	4,255	4,509	5,359
On-the-Job Training - All sectors - None (jobs)		3,014	3,080	3,281	3,660	3,887	4,761
On-the-Job Training - All sectors - Up to 1 year (jobs)		37,491	38,074	40,709	45,054	47,831	57,514
On-the-Job Training - All sectors - 1 to 4 years (jobs)		12,254	12,597	13,647	15,213	16,247	19,298
On-the-Job Training - All sectors - 4 to 10 years (jobs)		3,953	4,130	4,534	5,110	5,496	6,501
On-the-Job Training - All sectors - Over 10 years (jobs)		501	528	568	637	676	831
On-Site or In-Plant Training - All sectors - None (jobs)		9,029	9,239	9,895	11,028	11,727	14,214
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		34,143	34,700	37,140	41,115	43,668	52,446

Table 65: *REF 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)		9,462	9,723	10,524	11,725	12,513	14,906
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		4,077	4,228	4,611	5,168	5,543	6,528
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		502	519	569	638	686	811
Wage income - All (million $2019)		2,980	3,041	3,283	3,659	3,933	4,699

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	1,917	1,833	1,727	1,667	1,682	1,736	1,802
Final energy use - Residential (PJ)	511	502	512	530	554	579	605
Final energy use - Commercial (PJ)	434	444	452	461	471	489	515
Final energy use - Industry (PJ)	555	597	628	656	683	707	739

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)		8.36	8.08	14.3	14.8	14.9	15.4

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 (%)	51.1	66.6	66.9	67.9	68.8	70.5	73.6
Sales of space heating units - Electric Resistance (%)	40.4	30.3	30.1	29.2	28.4	26.7	23.6
Sales of space heating units - Gas (%)	7.6	2.83	2.7	2.57	2.51	2.48	2.48
Sales of space heating units - Fossil (%)	0.826	0.333	0.334	0.332	0.321	0.314	0.316
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	88.4	93.5	93.5	93.5	93.5	93.5	93.5
Sales of water heating units - Gas Furnace (%)	6.88	3.89	3.9	3.92	3.93	3.93	3.93
Sales of water heating units - Other (%)	4.69	2.6	2.57	2.58	2.57	2.54	2.53
Sales of cooking units - Electric Resistance (%)	96	96	96	96	96	96	96
Sales of cooking units - Gas (%)	4.04	4.04	4.04	4.04	4.04	4.04	4.04
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		15.8	16.2				

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	23.9	29.3	65.2	72.1	72.1	72.3	72.4
Sales of space heating units - Electric Resistance (%)	22.7	9.78	14.9	20.3	25.2	25.6	25.6
Sales of space heating units - Gas Furnace (%)	53.5	56.8	17.5	6.48	2.56	2.06	2.02
Sales of space heating units - Fossil (%)	0	4.02	2.38	1.17	0.182	0.016	0
Sales of water heating units - Electric Heat Pump (%)	0.849	0.3	0.292	0.292	0.293	0.29	0.29
Sales of water heating units - Electric Resistance (%)	20.9	7.47	7.27	7.29	7.31	7.22	7.19
Sales of water heating units - Gas Furnace (%)	69.5	87.9	88	88	87.9	88	88.1

Table 69: *REF scenario - PILLAR 1: Efficiency/Electrification - Commercial (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Other (%)	8.69	4.37	4.46	4.43	4.48	4.48	4.46
Sales of cooking units - Electric Resistance (%)	32	34.3	34.3	34.3	34.4	34.3	34.3
Sales of cooking units - Gas (%)	68	65.7	65.7	65.7	65.6	65.7	65.7
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		65,779	68,382				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	8,052	2,344	2,344	1,122	1,122	0	0
Installed thermal - Natural gas (MW)	45,526	43,635	41,452	43,134	42,809	46,960	47,352
Installed thermal - Nuclear (MW)	3,797	3,797	3,797	3,797	3,797	3,797	2,920
Installed renewables - Rooftop PV (MW)	723	1,179	1,661	2,333	3,256	4,426	5,903
Installed renewables - Solar - Base land use assumptions (MW)	2,586	2,586	2,586	2,893	7,764	11,905	22,118
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	93.8	93.8	93.8	93.8	144	352

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	6,248	6,248	6,248	6,888	16,859	25,329	46,066
Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
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)	-24.6		-13.3				-10.8
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-2.53		-4.22				-4.44
Business-as-usual carbon sink - Total (Mt CO2e/y)	-27.1		-17.5				-15.2

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)							-665
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-654
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,380
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,929
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,101
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-344
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-231
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-613
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,612
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-11,529

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-997
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-2,289
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,287
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,827
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-6,203
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-664
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-346
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-4,354
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,196
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-25,162
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,328
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,923
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-6,195
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-9,304
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-983
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-462
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-8,095
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-38,862
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,781
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							109
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							499
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,210
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							698
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)							49.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							15.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							39.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							959
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,579
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							163
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							515
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,185
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,051
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)							71.3
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							22.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							288
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,931
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,227
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							217
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							531
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,159
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,397
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)							93.4
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							30.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							230
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,585

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,243