Net-Zero America - Florida data

October 29, 2021 (updated November 17, 2023)

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

E. Larson, C. Greig, J. Jenkins, E. Mayfield, A. Pascale, C. Zhang, J. Drossman, R. Williams, S. Pacala, R. Socolow, EJ Baik, R. Birdsey, R. Duke, R. Jones, B. Haley, E. Leslie, K. Paustian, and A. Swan, Net-Zero America: Potential Pathways, Infrastructure, and Impacts, Final Report, Princeton University, Princeton, NJ, 29 October 2021. Report available at https://net-zeroamerica.princeton.edu.

Contents

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 (%)	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 (%)	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
Capital invested - Offshore Wind - Base (billion $2018)		0.266	0	0	1.43	0.916	9.44

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Constrained (billion $2018)		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
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-4,354

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

Item	2020	2025	2030	2035	2040	2045	2050
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
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,185

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		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
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

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-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
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,227

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
By education level - All sectors - Associates degree or some college (jobs)		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

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		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 (%)	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 (%)	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

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed renewables - Solar - Constrained land use assumptions (MW)	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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-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
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

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

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

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

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

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of cooking units - Electric Resistance (%)	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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - 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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - 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
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
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

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
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
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

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - 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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - 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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - 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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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
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 (%)	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 (%)	69.5	87.9	88	88	87.9	88	88.1
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
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 73: *REF 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 73: *REF 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