Net-Zero America - Virginia data

October 29, 2021 (updated January 9, 2022)

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		95.4	0.087	0.086	0.077	0.055	0.005
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		24.7	17.9	10.8	9.14	4.48	1.78
Premature deaths from air pollution - Mobile - On-Road (deaths)		106	98.5	74.8	43.3	19.5	7.37
Premature deaths from air pollution - Gas Stations (deaths)		11.9	10.9	8.15	4.75	2.21	0.938
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		14.2	11.7	7.86	4.35	2.08	0.894
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		6.31	5.12	3.47	2	0.889	0.306
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		2.6	2.33	1.8	1.21	0.701	0.387
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.33	2.21	2.08	1.95	1.83	1.69
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		12.9	11.3	8.24	5.13	3.06	1.87
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		3.39	2.75	2.04	1.38	0.932	0.614
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.91	1.65	1.38	1.1	0.822	0.551
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		2.22	1.31	1.24	1.17	1.13	1.07
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		43.1	38.9	33.4	25.7	18	10.7
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		846	0.773	0.761	0.678	0.485	0.043
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		219	159	96.1	80.9	39.7	15.8
Monetary damages from air pollution - Mobile - On-Road (million $2019)		939	876	665	385	173	65.5
Monetary damages from air pollution - Gas Stations (million $2019)		105	96.4	72.2	42.1	19.6	8.31
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		126	104	69.6	38.5	18.4	7.92
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		55.9	45.4	30.8	17.7	7.88	2.71
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		23	20.6	15.9	10.8	6.21	3.43
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		20.7	19.6	18.4	17.3	16.2	14.9
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		115	100	73	45.4	27.1	16.6

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)		30	24.4	18	12.2	8.25	5.44
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		16.9	14.6	12.2	9.73	7.28	4.88
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		19.6	11.5	10.9	10.3	10	9.48
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		383	345	297	228	160	94.6

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		419	857	450	328	212	290
By economic sector - Construction (jobs)		21,464	18,557	24,671	25,079	23,107	22,734
By economic sector - Manufacturing (jobs)		6,621	10,874	11,163	10,018	10,780	10,372
By economic sector - Mining (jobs)		3,933	2,711	1,871	1,247	811	532
By economic sector - Other (jobs)		3,342	2,806	4,081	4,429	4,622	4,771
By economic sector - Pipeline (jobs)		638	540	692	330	223	190
By economic sector - Professional (jobs)		8,896	8,273	9,947	10,655	10,057	10,198
By economic sector - Trade (jobs)		6,312	5,483	6,743	7,155	6,963	7,100
By economic sector - Utilities (jobs)		12,953	14,800	19,801	22,297	19,905	20,561
By resource sector - Biomass (jobs)		1,600	2,314	1,219	953	778	1,254
By resource sector - CO2 (jobs)		0	0	2,189	128	159	444
By resource sector - Coal (jobs)		2,025	1,063	849	742	670	594
By resource sector - Grid (jobs)		18,108	23,763	32,754	40,044	36,142	38,111
By resource sector - Natural Gas (jobs)		8,140	6,617	5,566	5,298	3,940	3,030
By resource sector - Nuclear (jobs)		989	973	958	943	928	914
By resource sector - Oil (jobs)		5,733	4,544	3,230	2,161	1,402	860
By resource sector - Solar (jobs)		27,942	24,874	32,059	29,732	29,875	29,549
By resource sector - Wind (jobs)		40.4	752	595	1,537	2,786	1,992
By education level - All sectors - High school diploma or less (jobs)		27,960	28,141	34,407	35,128	32,998	32,985
By education level - All sectors - Associates degree or some college (jobs)		20,410	20,547	25,612	26,423	24,884	24,926
By education level - All sectors - Bachelors degree (jobs)		12,638	12,709	15,193	15,605	14,687	14,701
By education level - All sectors - Masters or professional degree (jobs)		3,102	3,069	3,694	3,849	3,611	3,635
By education level - All sectors - Doctoral degree (jobs)		467	433	513	532	500	500
Related work experience - All sectors - None (jobs)		9,363	9,432	11,624	11,965	11,243	11,280
Related work experience - All sectors - Up to 1 year (jobs)		13,317	13,376	16,268	16,592	15,679	15,681
Related work experience - All sectors - 1 to 4 years (jobs)		23,118	23,214	28,350	29,164	27,398	27,434
Related work experience - All sectors - 4 to 10 years (jobs)		14,911	14,916	18,362	18,887	17,713	17,713
Related work experience - All sectors - Over 10 years (jobs)		3,868	3,961	4,814	4,928	4,646	4,639
On-the-Job Training - All sectors - None (jobs)		3,575	3,501	4,267	4,365	4,131	4,132
On-the-Job Training - All sectors - Up to 1 year (jobs)		42,049	42,721	51,683	52,960	49,941	50,011

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)		13,729	13,680	17,074	17,600	16,473	16,475
On-the-Job Training - All sectors - 4 to 10 years (jobs)		4,579	4,358	5,614	5,835	5,397	5,403
On-the-Job Training - All sectors - Over 10 years (jobs)		646	640	780	776	737	726
On-Site or In-Plant Training - All sectors - None (jobs)		10,477	10,499	12,781	13,063	12,342	12,334
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		38,285	38,795	47,074	48,283	45,491	45,559
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		10,655	10,644	13,238	13,634	12,777	12,781
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		4,604	4,402	5,617	5,820	5,381	5,383
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		556	559	709	737	688	690
Wage income - All (million $2019)		3,545	3,602	4,440	4,631	4,389	4,454

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		129	111	85.7	61.8	42.9	28
Oil consumption - Cumulative (million bbls)							2,649
Oil production - Annual (million bbls)		0.006	0.006	0.006	0.005	0.004	0.003
Natural gas consumption - Annual (tcf)		491	414	332	250	157	109
Natural gas consumption - Cumulative (tcf)							9,993
Natural gas production - Annual (tcf)		136	129	112	94.7	75.1	58.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	709	660	582	488	403	349	324
Final energy use - Residential (PJ)	313	296	274	246	223	210	204
Final energy use - Commercial (PJ)	246	247	237	223	212	208	211
Final energy use - Industry (PJ)	381	402	412	418	428	431	439

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)		4.76	4.85	8.11	8.58	8.03	8.37

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	61.2	681	1,300	3,469	5,638	7,371	9,104
Vehicle stocks - LDV – All others (1000 units)	7,591	7,228	6,865	5,003	3,141	1,777	413
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		1,456	3,742	6,046	9,166	9,967	9,508
Public EV charging plugs - DC Fast (1000 units)	0.39		2.58		11.2		18
Public EV charging plugs - L2 (1000 units)	1.37		61.9		268		433

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 (%)	25.4	42.2	78.8	86.9	87.3	87.3	87.3
Sales of space heating units - Electric Resistance (%)	18.4	18.4	7.74	5.33	5.23	5.33	5.34
Sales of space heating units - Gas (%)	44.1	23.6	6.62	2.84	2.69	2.7	2.7
Sales of space heating units - Fossil (%)	12.1	15.8	6.87	4.89	4.78	4.71	4.71
Sales of water heating units - Electric Heat Pump (%)	0	8.78	46.5	54.9	55.3	55.3	55.3
Sales of water heating units - Electric Resistance (%)	50.1	62.2	46.3	42.7	42.5	42.5	42.5
Sales of water heating units - Gas Furnace (%)	45.5	26.1	4.92	0.208	0	0	0
Sales of water heating units - Other (%)	4.39	2.95	2.33	2.2	2.21	2.22	2.23
Sales of cooking units - Electric Resistance (%)	70.5	76.8	96	99.8	100	100	100
Sales of cooking units - Gas (%)	29.5	23.2	3.97	0.2	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		6.43	6.21				

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 (%)	4.92	28.4	70.7	83.8	85.1	85.1	85.1
Sales of space heating units - Electric Resistance (%)	4.71	8.37	10.5	12.6	13	13	13
Sales of space heating units - Gas Furnace (%)	82.5	59.2	18.1	3.58	1.92	1.89	1.88
Sales of space heating units - Fossil (%)	7.87	4.09	0.778	0.033	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.167	10.5	54.6	64.4	64.8	64.8	64.8
Sales of water heating units - Electric Resistance (%)	4.19	10.8	28.4	32.3	32.5	32.5	32.5
Sales of water heating units - Gas Furnace (%)	91.5	74.5	14.1	0.593	0	0	0
Sales of water heating units - Other (%)	4.17	4.15	3.01	2.72	2.72	2.72	2.72
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)		31,138	34,700				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	2,617	668	0	0	0	0	0
Installed thermal - Natural gas (MW)	11,601	17,437	17,785	17,843	17,555	14,839	14,849
Installed thermal - Nuclear (MW)	1,959	1,959	1,959	1,959	1,959	1,959	1,959
Installed renewables - Rooftop PV (MW)	130	209	296	422	598	827	1,120
Installed renewables - Solar - Base land use assumptions (MW)	3,411	18,470	27,136	41,133	52,153	62,783	70,345
Installed renewables - Wind - Base land use assumptions (MW)	72	72	5,894	10,245	19,094	20,551	21,780
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	55.5	135	331	2,326	2,326	2,326
Installed renewables - Solar - Constrained land use assumptions (MW)	2,536	17,674	26,896	43,509	50,782	59,294	64,519
Installed renewables - Wind - Constrained land use assumptions (MW)	72	72	15,209	23,173	23,248	23,248	23,248

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	79.7	160	299	2,326	2,326	2,326
Capital invested - Solar PV - Base (billion $2018)		21.3	10.4	15.4	11.5	10.4	7.01
Capital invested - Wind - Base (billion $2018)		0	7.75	5.4	10.5	1.63	1.3
Capital invested - Offshore Wind - Base (billion $2018)		0.157	0.192	0.399	3.46	0	0
Capital invested - Solar PV - Constrained (billion $2018)		25	11.8	20	11	12.1	8.72
Capital invested - Wind - Constrained (billion $2018)		0	20.7	9.24	0.089	0	1.8
Capital invested - Offshore Wind - Constrained (billion $2018)		0.226	0.192	0.285	3.52	0	0
Capital invested - Biomass power plant (billion $2018)	0	0.005	0.924	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	5,353	35,628	51,990	78,384	99,117	119,043	133,329
Wind - Base land use assumptions (GWh)	269	269	20,321	33,997	59,060	62,885	66,109
OffshoreWind - Base land use assumptions (GWh)	0	250	612	1,495	10,640	10,640	10,640
Solar - Constrained land use assumptions (GWh)	5,284	34,037	51,473	82,716	96,466	112,459	122,342
Wind - Constrained land use assumptions (GWh)	269	269	48,379	69,057	69,220	69,220	69,220
OffshoreWind - Constrained land use assumptions (GWh)	0	250	612	1,495	10,640	10,640	10,640
Biomass power plant (GWh)	0	8.72	1,823	1,823	1,823	1,823	1,823
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	1	1	1	1	1	1
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	2
Number of facilities - Diesel (quantity)	0	0	0	1	1	1	1
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	1	1	1	1
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	1	1	1	1	1	1
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment - Cumulative 5-yr (million $2018)		5.03	1,031	30.1	0.478	0	2,067
Biomass purchases (million $2018/y)		135	422	423	423	423	520

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	3.88	3.76	3.76	6.49
Annual - BECCS (MMT)		0	0	0	0	0	2.66
Annual - NGCC (MMT)		0	0	0.53	0.45	0.34	0.3
Annual - Cement and lime (MMT)		0	0	3.35	3.32	3.42	3.53
Cumulative - All (MMT)		0	0	3.88	7.64	11.4	17.9
Cumulative - BECCS (MMT)		0	0	0	0	0	2.66
Cumulative - NGCC (MMT)		0	0	0.53	0.98	1.32	1.62
Cumulative - Cement and lime (MMT)		0	0	3.35	6.67	10.1	13.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	0	353	353	353	353
Spur (km)		0	0	154	154	154	452
All (km)		0	0	507	507	507	805
Cumulative investment - Trunk (million $2018)		0	0	2,104	2,104	2,104	2,104
Cumulative investment - Spur (million $2018)		0	0	155	154	157	396
Cumulative investment - All (million $2018)		0	0	2,259	2,258	2,260	2,500

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	0	0	0	0	0
Injection wells (wells)		0	0	0	0	0	0
Resource characterization, appraisal, permitting costs (million $2020)		0	0	0	0	0	0
Wells and facilities construction costs (million $2020)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-127
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-358
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,605
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,153
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,187
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-246
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-150
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-469
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,130
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-10,423
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-190
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,254

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,494
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1,689
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-6,373
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-474
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-225
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,327
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,240
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-22,267
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-254
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,149
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-9,384
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,265
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-9,560
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-702
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-300
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-6,186
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-34,151
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,351
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							20.8
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							273
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,833
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							417
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)							35.1
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							9.91
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							30.5
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							672

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,292
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							31.1
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							282
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,309
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							628
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)							50.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							14.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							220
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,354
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,890
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							41.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							291
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,785
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							835
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)							66.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							19.8
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							176
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,111
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,325

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)							-986
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-33.7
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,020
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,871
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-67.3
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-1,938
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)							594
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							61.2
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							655
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)							1,127
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							122
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,249

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)		95.4	0.087	0.086	0.077	0.055	0.005
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		21.1	14.3	5.82	2.59	0.866	0.512
Premature deaths from air pollution - Mobile - On-Road (deaths)		108	109	106	95.6	76	51.9
Premature deaths from air pollution - Gas Stations (deaths)		12.2	12.3	11.8	10.6	8.34	5.69

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		14.3	13.1	11.6	9.55	7.07	4.64
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		6.41	6.15	5.89	5.15	3.85	2.42
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		2.63	2.65	2.62	2.41	1.94	1.41
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.33	2.21	2.08	1.95	1.83	1.69
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		13.1	12.9	12.3	10.9	8.7	6.41
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		3.4	3.02	2.64	2.21	1.82	1.46
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.91	1.76	1.61	1.45	1.29	1.12
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		2.17	1.31	1.25	1.18	1.13	1.05
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		43	36.7	29.2	23.6	19.7	14.1
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		846	0.773	0.761	0.678	0.485	0.043
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		187	126	51.6	23	7.67	4.53
Monetary damages from air pollution - Mobile - On-Road (million $2019)		957	969	943	850	676	462
Monetary damages from air pollution - Gas Stations (million $2019)		108	109	105	93.5	73.8	50.4
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		127	116	103	84.6	62.6	41.1
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		56.8	54.5	52.2	45.7	34.1	21.5
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		23.3	23.4	23.2	21.3	17.2	12.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		20.7	19.6	18.4	17.3	16.2	14.9
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		116	114	109	96.2	77	56.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		30.1	26.7	23.3	19.5	16.1	12.9
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		16.9	15.6	14.3	12.9	11.4	9.94
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		19.1	11.6	11	10.4	10	9.29

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		381	326	259	210	175	125

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		488	1,058	483	328	208	291
By economic sector - Construction (jobs)		22,079	18,798	22,042	22,028	23,401	22,423
By economic sector - Manufacturing (jobs)		6,787	11,301	9,416	9,042	13,015	11,712
By economic sector - Mining (jobs)		4,006	2,749	2,026	1,483	1,071	704
By economic sector - Other (jobs)		3,506	2,914	3,498	3,871	4,739	4,731
By economic sector - Pipeline (jobs)		640	528	888	388	329	306
By economic sector - Professional (jobs)		9,101	8,504	8,790	9,520	10,195	9,945
By economic sector - Trade (jobs)		6,522	5,638	6,124	6,568	7,244	7,080
By economic sector - Utilities (jobs)		12,470	14,198	17,714	18,919	18,961	19,094
By resource sector - Biomass (jobs)		1,704	2,803	1,496	1,279	884	1,217
By resource sector - CO2 (jobs)		0	0	3,754	219	273	761
By resource sector - Coal (jobs)		2,322	1,225	851	745	671	589
By resource sector - Grid (jobs)		17,421	22,860	27,259	33,853	34,466	35,895
By resource sector - Natural Gas (jobs)		7,633	5,929	5,002	4,301	3,866	3,014
By resource sector - Nuclear (jobs)		989	973	958	943	738	269
By resource sector - Oil (jobs)		5,800	4,882	4,121	3,323	2,541	1,609
By resource sector - Solar (jobs)		29,687	26,227	27,013	25,987	31,614	29,781
By resource sector - Wind (jobs)		42.7	788	527	1,496	4,109	3,152
By education level - All sectors - High school diploma or less (jobs)		28,484	28,570	30,770	31,099	34,131	32,889
By education level - All sectors - Associates degree or some college (jobs)		20,690	20,701	22,823	23,232	25,595	24,747
By education level - All sectors - Bachelors degree (jobs)		12,808	12,867	13,622	13,913	15,222	14,590
By education level - All sectors - Masters or professional degree (jobs)		3,141	3,106	3,306	3,424	3,701	3,572
By education level - All sectors - Doctoral degree (jobs)		477	443	460	478	512	490
Related work experience - All sectors - None (jobs)		9,506	9,544	10,405	10,571	11,578	11,206
Related work experience - All sectors - Up to 1 year (jobs)		13,595	13,622	14,505	14,716	16,264	15,644
Related work experience - All sectors - 1 to 4 years (jobs)		23,466	23,479	25,360	25,818	28,260	27,245
Related work experience - All sectors - 4 to 10 years (jobs)		15,113	15,044	16,420	16,681	18,239	17,572
Related work experience - All sectors - Over 10 years (jobs)		3,919	3,998	4,290	4,360	4,820	4,622
On-the-Job Training - All sectors - None (jobs)		3,645	3,558	3,818	3,887	4,281	4,107
On-the-Job Training - All sectors - Up to 1 year (jobs)		42,747	43,346	46,184	46,993	51,767	49,831
On-the-Job Training - All sectors - 1 to 4 years (jobs)		13,909	13,765	15,250	15,473	16,891	16,317
On-the-Job Training - All sectors - 4 to 10 years (jobs)		4,638	4,367	5,034	5,104	5,448	5,302
On-the-Job Training - All sectors - Over 10 years (jobs)		660	651	695	689	775	732
On-Site or In-Plant Training - All sectors - None (jobs)		10,664	10,659	11,409	11,572	12,781	12,277
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		38,909	39,329	42,070	42,820	47,104	45,364

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

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		10,803	10,725	11,823	12,003	13,125	12,674
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		4,662	4,414	5,045	5,106	5,450	5,290
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		562	561	633	645	702	683
Wage income - All (million $2019)		3,592	3,637	3,977	4,100	4,514	4,408

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	710	666	609	562	524	480	428
Final energy use - Residential (PJ)	313	297	288	278	263	239	221
Final energy use - Commercial (PJ)	246	247	244	240	233	227	224
Final energy use - Industry (PJ)	381	403	413	422	433	437	443

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)		4.07	4.08	5.45	5.62	6.97	7.29

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	47.4	229	411	1,255	2,098	3,965	5,831
Vehicle stocks - LDV – All others (1000 units)	7,622	7,622	7,622	7,230	6,838	5,269	3,701
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		0	237	495	1,674	5,255	7,661
Public EV charging plugs - DC Fast (1000 units)	0.39		0.815		4.16		11.6
Public EV charging plugs - L2 (1000 units)	1.37		19.6		99.8		277

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 (%)	25.4	35.1	39.3	51.3	69.7	81.7	85.8
Sales of space heating units - Electric Resistance (%)	18.4	20.5	19.2	15.6	10.3	6.88	5.68
Sales of space heating units - Gas (%)	44.1	26.9	24.9	19.4	10.9	5.32	3.37
Sales of space heating units - Fossil (%)	12.1	17.5	16.6	13.7	9.14	6.15	5.13
Sales of water heating units - Electric Heat Pump (%)	0	1.51	5.8	18.2	37.1	49.5	53.8
Sales of water heating units - Electric Resistance (%)	50.1	65.3	63.5	58.2	50.1	44.9	43.1
Sales of water heating units - Gas Furnace (%)	45.5	30.1	27.7	20.8	10.2	3.27	0.852
Sales of water heating units - Other (%)	4.39	3.08	3.01	2.82	2.52	2.32	2.25
Sales of cooking units - Electric Resistance (%)	70.4	71.2	73.9	81	91	97.1	99.2
Sales of cooking units - Gas (%)	29.6	28.8	26.1	19	9.05	2.92	0.786
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		6.4	6.15				

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 (%)	4.92	20.4	25.2	39.1	61.2	76.9	82.9
Sales of space heating units - Electric Resistance (%)	4.71	8.04	8.28	9.07	10.5	11.9	12.7
Sales of space heating units - Gas Furnace (%)	82.5	66.9	62.2	48.4	26.6	10.7	4.34
Sales of space heating units - Fossil (%)	7.87	4.72	4.38	3.33	1.64	0.517	0.135
Sales of water heating units - Electric Heat Pump (%)	0.167	2.04	7.05	21.5	43.6	58.1	63.1
Sales of water heating units - Electric Resistance (%)	4.19	7.46	9.4	15.2	24	29.7	31.8
Sales of water heating units - Gas Furnace (%)	91.5	86.1	79.2	59.5	29.1	9.3	2.42
Sales of water heating units - Other (%)	4.17	4.38	4.34	3.87	3.3	2.91	2.76
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)		31,112	34,614				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	2,617	668	0	0	0	0	0
Installed thermal - Natural gas (MW)	11,605	14,877	14,832	14,011	13,728	11,432	11,257
Installed thermal - Nuclear (MW)	1,959	1,959	1,959	1,959	1,959	980	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-127
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-358
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,605
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,153
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,187
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-246
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-150
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-469
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,130
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-10,423
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-190
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,254
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,494
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1,689
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-6,373

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-474
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-225
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,327
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,240
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-22,267
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-254
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,149
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-9,384
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,265
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-9,560
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-702
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-300
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-6,186
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-34,151
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,351
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							20.8
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							273
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,833
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							417
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)							35.1
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							9.91
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							30.5
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							672
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,292
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							31.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							282
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,309
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							628
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)							50.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							14.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							220
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,354
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,890
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							41.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							291
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,785
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							835
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)							66.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							19.8
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							176
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,111
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,325

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

Table 26: *E- 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)							-986
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-33.7
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,020
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,871
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-67.3
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-1,938
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)							594
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							61.2
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							655
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)							1,127
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							122
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,249

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)		95.4	0.087	0.086	0.077	0.055	0.005
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		19.1	14.5	8.57	5.47	1.66	0.413
Premature deaths from air pollution - Mobile - On-Road (deaths)		106	98.5	74.8	43.3	19.5	7.37
Premature deaths from air pollution - Gas Stations (deaths)		11.9	10.9	8.15	4.75	2.21	0.938
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		14.2	11.7	7.86	4.35	2.08	0.894
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		6.31	5.12	3.47	2	0.889	0.306

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		2.6	2.33	1.8	1.21	0.701	0.387
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.33	2.21	2.08	1.95	1.83	1.69
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		12.9	11.3	8.24	5.13	3.06	1.87
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		3.39	2.75	2.04	1.38	0.932	0.614
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.91	1.65	1.38	1.1	0.822	0.551
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		2.35	1.31	1.24	1.17	1.13	1.03
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		42.1	38	30.5	21.4	11.9	1.11
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		846	0.773	0.761	0.678	0.485	0.043
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		169	128	75.9	48.4	14.7	3.66
Monetary damages from air pollution - Mobile - On-Road (million $2019)		939	876	665	385	173	65.5
Monetary damages from air pollution - Gas Stations (million $2019)		105	96.4	72.2	42.1	19.6	8.31
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		126	104	69.6	38.5	18.4	7.92
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		55.9	45.4	30.8	17.7	7.88	2.71
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		23	20.6	15.9	10.8	6.21	3.43
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		20.7	19.6	18.4	17.3	16.2	14.9
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		115	100	73	45.4	27.1	16.6
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		30	24.4	18	12.2	8.25	5.44
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		16.9	14.6	12.2	9.73	7.28	4.88
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		20.8	11.5	10.9	10.3	9.99	9.06
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		373	338	271	190	106	9.87

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		421	765	440	287	188	278
By economic sector - Construction (jobs)		20,994	21,930	32,510	28,282	30,772	81,094
By economic sector - Manufacturing (jobs)		8,002	11,216	16,977	13,863	13,958	24,511
By economic sector - Mining (jobs)		3,925	2,658	1,748	1,085	634	300
By economic sector - Other (jobs)		3,296	3,572	5,988	5,041	5,859	21,844
By economic sector - Pipeline (jobs)		621	519	365	235	129	49.2
By economic sector - Professional (jobs)		8,621	9,455	13,347	11,914	13,050	37,261
By economic sector - Trade (jobs)		6,172	6,306	9,018	7,955	8,856	27,511
By economic sector - Utilities (jobs)		12,217	15,347	22,722	24,620	27,955	49,503
By resource sector - Biomass (jobs)		1,480	2,100	1,137	887	703	1,242
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		2,081	1,063	849	741	670	582
By resource sector - Grid (jobs)		17,190	25,153	41,680	47,051	54,752	98,831
By resource sector - Natural Gas (jobs)		7,483	6,161	4,774	4,125	3,686	2,975
By resource sector - Nuclear (jobs)		989	973	761	278	0	0
By resource sector - Oil (jobs)		5,735	4,487	3,107	1,881	913	0.227
By resource sector - Solar (jobs)		29,274	30,808	48,694	34,224	35,003	136,103
By resource sector - Wind (jobs)		37.3	1,023	2,112	4,096	5,674	2,618
By education level - All sectors - High school diploma or less (jobs)		27,902	31,155	44,769	40,306	43,730	103,799
By education level - All sectors - Associates degree or some college (jobs)		20,288	22,786	33,232	30,287	33,091	78,982
By education level - All sectors - Bachelors degree (jobs)		12,566	13,953	19,671	17,760	19,216	46,147
By education level - All sectors - Masters or professional degree (jobs)		3,057	3,386	4,767	4,339	4,726	11,673
By education level - All sectors - Doctoral degree (jobs)		457	489	675	591	637	1,750
Related work experience - All sectors - None (jobs)		9,296	10,429	15,032	13,667	14,907	35,718
Related work experience - All sectors - Up to 1 year (jobs)		13,318	14,867	21,393	19,083	20,673	50,214
Related work experience - All sectors - 1 to 4 years (jobs)		22,983	25,622	36,697	33,301	36,222	86,402
Related work experience - All sectors - 4 to 10 years (jobs)		14,802	16,494	23,727	21,562	23,458	55,719
Related work experience - All sectors - Over 10 years (jobs)		3,870	4,355	6,264	5,669	6,141	14,298
On-the-Job Training - All sectors - None (jobs)		3,556	3,908	5,598	4,976	5,398	13,558
On-the-Job Training - All sectors - Up to 1 year (jobs)		41,979	47,068	67,319	60,745	65,890	157,033
On-the-Job Training - All sectors - 1 to 4 years (jobs)		13,609	15,175	22,013	20,090	21,927	51,893
On-the-Job Training - All sectors - 4 to 10 years (jobs)		4,475	4,900	7,146	6,573	7,225	17,519
On-the-Job Training - All sectors - Over 10 years (jobs)		651	717	1,037	899	961	2,348
On-Site or In-Plant Training - All sectors - None (jobs)		10,446	11,651	16,723	14,958	16,216	39,629
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		38,193	42,765	61,238	55,345	60,079	142,992
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		10,576	11,801	17,103	15,582	16,996	40,254
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		4,505	4,930	7,140	6,555	7,185	17,309
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		549	620	910	842	924	2,167
Wage income - All (million $2019)		3,517	3,964	5,713	5,267	5,798	13,876

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	709	660	582	488	403	349	324
Final energy use - Residential (PJ)	313	296	274	246	223	210	204
Final energy use - Commercial (PJ)	246	247	237	223	212	208	211
Final energy use - Industry (PJ)	381	402	412	418	428	431	439

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)		4.76	4.85	8.11	8.58	8.03	8.37

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	61.2	681	1,300	3,469	5,638	7,371	9,104
Vehicle stocks - LDV – All others (1000 units)	7,591	7,228	6,865	5,003	3,141	1,777	413
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		1,456	3,742	6,046	9,166	9,967	9,508
Public EV charging plugs - DC Fast (1000 units)	0.39		2.58		11.2		18
Public EV charging plugs - L2 (1000 units)	1.37		61.9		268		433

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 (%)	25.4	42.2	78.8	86.9	87.3	87.3	87.3
Sales of space heating units - Electric Resistance (%)	18.4	18.4	7.74	5.33	5.23	5.33	5.34
Sales of space heating units - Gas (%)	44.1	23.6	6.62	2.84	2.69	2.7	2.7
Sales of space heating units - Fossil (%)	12.1	15.8	6.87	4.89	4.78	4.71	4.71
Sales of water heating units - Electric Heat Pump (%)	0	8.78	46.5	54.9	55.3	55.3	55.3
Sales of water heating units - Electric Resistance (%)	50.1	62.2	46.3	42.7	42.5	42.5	42.5
Sales of water heating units - Gas Furnace (%)	45.5	26.1	4.92	0.208	0	0	0
Sales of water heating units - Other (%)	4.39	2.95	2.33	2.2	2.21	2.22	2.23
Sales of cooking units - Electric Resistance (%)	70.5	76.8	96	99.8	100	100	100
Sales of cooking units - Gas (%)	29.5	23.2	3.97	0.2	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		6.43	6.21				

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 (%)	4.92	28.4	70.7	83.8	85.1	85.1	85.1
Sales of space heating units - Electric Resistance (%)	4.71	8.37	10.5	12.6	13	13	13
Sales of space heating units - Gas Furnace (%)	82.5	59.2	18.1	3.58	1.92	1.89	1.88
Sales of space heating units - Fossil (%)	7.87	4.09	0.778	0.033	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.167	10.5	54.6	64.4	64.8	64.8	64.8
Sales of water heating units - Electric Resistance (%)	4.19	10.8	28.4	32.3	32.5	32.5	32.5

Table 33: *E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Commercial (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	91.5	74.5	14.1	0.593	0	0	0
Sales of water heating units - Other (%)	4.17	4.15	3.01	2.72	2.72	2.72	2.72
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)		31,138	34,700				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	2,617	668	0	0	0	0	0
Installed thermal - Natural gas (MW)	11,565	15,140	15,627	16,228	14,650	16,120	17,548
Installed thermal - Nuclear (MW)	1,959	1,959	1,959	980	0	0	0
Installed renewables - Rooftop PV (MW)	130	209	296	422	598	827	1,120
Installed renewables - Solar - Base land use assumptions (MW)	2,902	18,799	31,402	55,173	65,078	75,404	190,052
Installed renewables - Wind - Base land use assumptions (MW)	72	72	8,141	14,360	26,312	27,364	27,364
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	55.5	160	2,326	7,990	15,958	15,958
Installed renewables - Solar - Constrained land use assumptions (MW)	5,001	18,945	29,883	44,854	54,305	63,139	202,126
Installed renewables - Wind - Constrained land use assumptions (MW)	72	72	20,416	23,248	23,248	23,248	33,787
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	79.7	160	2,326	2,326	2,326	15,958
Capital invested - Solar PV - Base (billion $2018)		21.3	15.1	26.2	10.3	10.1	106
Capital invested - Wind - Base (billion $2018)		0	10.7	7.72	14.1	1.18	0
Capital invested - Offshore Wind - Base (billion $2018)		0.157	0.251	4.43	9.84	11.8	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	6,021	36,233	60,020	104,910	123,532	143,020	360,420
Wind - Base land use assumptions (GWh)	269	269	27,500	46,204	77,676	80,178	80,178
OffshoreWind - Base land use assumptions (GWh)	0	250	721	10,640	36,059	73,536	73,536
Solar - Constrained land use assumptions (GWh)	20,077	73,118	114,622	170,803	206,419	239,962	766,843
Wind - Constrained land use assumptions (GWh)	538	538	124,462	138,441	138,441	138,441	205,791
OffshoreWind - Constrained land use assumptions (GWh)	0	719	1,442	21,281	21,281	21,281	147,073

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)							-127
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-358
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,605
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,153

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,187
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-246
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-150
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-469
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,130
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-10,423
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-190
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,254
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,494
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1,689
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-6,373
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-474
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-225
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,327
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,240
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-22,267
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-254
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,149
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-9,384
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,265
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-9,560
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-702
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-300
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-6,186
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-34,151
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,351
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							20.8
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							273
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,833

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							417
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)							35.1
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							9.91
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							30.5
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							672
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,292
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							31.1
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							282
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,309
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							628
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)							50.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							14.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							220
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,354
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,890
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							41.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							291
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,785
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							835
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							66.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							19.8
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							176
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,111
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,325

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-986
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-33.7
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,020
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,871
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-67.3
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-1,938
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)							594
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							61.2
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							655
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)							1,127
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							122

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,249

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)		95.4	0.087	0.086	0.077	0.055	0.005
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		24.1	18.2	19.5	14.9	4.78	1.56
Premature deaths from air pollution - Mobile - On-Road (deaths)		106	98.5	74.8	43.3	19.5	7.37
Premature deaths from air pollution - Gas Stations (deaths)		11.9	10.9	8.15	4.75	2.21	0.938
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		14.2	11.7	7.86	4.35	2.08	0.894
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		6.31	5.12	3.47	2	0.889	0.306
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		2.6	2.33	1.8	1.21	0.701	0.387
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.33	2.21	2.08	1.95	1.83	1.69
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		12.9	11.3	8.24	5.13	3.06	1.87
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		3.39	2.75	2.04	1.38	0.932	0.614
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.91	1.65	1.38	1.1	0.822	0.551
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		2.08	1.31	1.24	1.17	1.13	1.03
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		43.9	41.3	39.8	34.6	28.8	21.5
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		846	0.773	0.761	0.678	0.485	0.043
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		213	161	173	132	42.3	13.8
Monetary damages from air pollution - Mobile - On-Road (million $2019)		939	876	665	385	173	65.5
Monetary damages from air pollution - Gas Stations (million $2019)		105	96.4	72.2	42.1	19.6	8.31
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		126	104	69.6	38.5	18.4	7.92
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		55.9	45.4	30.8	17.7	7.88	2.71
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		23	20.6	15.9	10.8	6.21	3.43

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		20.7	19.6	18.4	17.3	16.2	14.9
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		115	100	73	45.4	27.1	16.6
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		30	24.4	18	12.2	8.25	5.44
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		16.9	14.6	12.2	9.73	7.28	4.88
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		18.4	11.5	10.9	10.3	10	9.06
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		390	367	354	307	256	191

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		465	1,118	471	319	212	299
By economic sector - Construction (jobs)		10,745	12,076	12,774	13,746	13,598	11,888
By economic sector - Manufacturing (jobs)		5,198	5,598	4,964	4,603	4,562	3,427
By economic sector - Mining (jobs)		3,941	2,786	2,035	1,438	1,012	713
By economic sector - Other (jobs)		1,341	1,680	1,473	2,099	2,277	1,871
By economic sector - Pipeline (jobs)		654	571	1,026	462	379	377
By economic sector - Professional (jobs)		5,032	5,890	4,944	6,503	6,022	6,026
By economic sector - Trade (jobs)		3,858	3,953	3,466	4,204	4,087	3,740
By economic sector - Utilities (jobs)		8,865	10,260	13,213	17,029	14,487	18,108
By resource sector - Biomass (jobs)		1,509	2,838	1,495	1,118	832	1,261
By resource sector - CO2 (jobs)		0	0	4,241	248	308	860
By resource sector - Coal (jobs)		1,969	1,062	849	741	670	582
By resource sector - Grid (jobs)		10,887	14,137	17,023	21,354	21,975	19,876
By resource sector - Natural Gas (jobs)		7,384	6,996	6,165	5,996	5,997	5,955
By resource sector - Nuclear (jobs)		989	973	958	5,706	1,700	7,305
By resource sector - Oil (jobs)		5,732	4,544	3,230	2,161	1,462	1,047
By resource sector - Solar (jobs)		11,421	13,095	10,384	13,006	13,528	9,492
By resource sector - Wind (jobs)		208	289	19.9	73.9	162	70.6
By education level - All sectors - High school diploma or less (jobs)		17,228	19,065	19,180	21,237	19,895	19,301
By education level - All sectors - Associates degree or some college (jobs)		12,456	13,665	14,256	15,998	15,090	14,768
By education level - All sectors - Bachelors degree (jobs)		8,159	8,746	8,580	10,241	9,082	9,602
By education level - All sectors - Masters or professional degree (jobs)		1,973	2,146	2,075	2,566	2,258	2,436
By education level - All sectors - Doctoral degree (jobs)		283	311	275	362	310	341
Related work experience - All sectors - None (jobs)		5,781	6,410	6,538	7,314	6,853	6,739
Related work experience - All sectors - Up to 1 year (jobs)		8,127	9,016	8,866	10,051	9,326	9,141
Related work experience - All sectors - 1 to 4 years (jobs)		14,487	15,802	15,934	18,171	16,762	16,789
Related work experience - All sectors - 4 to 10 years (jobs)		9,255	10,065	10,337	11,760	10,867	10,896

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

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - All sectors - Over 10 years (jobs)		2,449	2,642	2,691	3,109	2,826	2,884
On-the-Job Training - All sectors - None (jobs)		2,187	2,375	2,329	2,749	2,487	2,538
On-the-Job Training - All sectors - Up to 1 year (jobs)		26,472	29,022	28,811	32,880	30,245	30,258
On-the-Job Training - All sectors - 1 to 4 years (jobs)		8,385	9,166	9,614	10,784	10,102	9,972
On-the-Job Training - All sectors - 4 to 10 years (jobs)		2,668	2,953	3,194	3,518	3,368	3,253
On-the-Job Training - All sectors - Over 10 years (jobs)		387	417	418	473	432	427
On-Site or In-Plant Training - All sectors - None (jobs)		6,446	7,093	7,030	8,109	7,435	7,483
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		24,066	26,333	26,284	29,967	27,597	27,586
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		6,527	7,137	7,433	8,334	7,808	7,686
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		2,727	2,998	3,217	3,558	3,372	3,293
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		334	372	401	436	422	402
Wage income - All (million $2019)		2,241	2,468	2,527	2,960	2,724	2,847

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	709	660	582	488	403	349	324
Final energy use - Residential (PJ)	313	296	274	246	223	210	204
Final energy use - Commercial (PJ)	246	247	237	223	212	208	211
Final energy use - Industry (PJ)	381	402	412	418	428	431	439

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)		4.76	4.85	8.11	8.58	8.03	8.37

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	61.2	681	1,300	3,469	5,638	7,371	9,104
Vehicle stocks - LDV – All others (1000 units)	7,591	7,228	6,865	5,003	3,141	1,777	413
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		1,456	3,742	6,046	9,166	9,967	9,508
Public EV charging plugs - DC Fast (1000 units)	0.39		2.58		11.2		18
Public EV charging plugs - L2 (1000 units)	1.37		61.9		268		433

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 (%)	25.4	42.2	78.8	86.9	87.3	87.3	87.3
Sales of space heating units - Electric Resistance (%)	18.4	18.4	7.74	5.33	5.23	5.33	5.34
Sales of space heating units - Gas (%)	44.1	23.6	6.62	2.84	2.69	2.7	2.7
Sales of space heating units - Fossil (%)	12.1	15.8	6.87	4.89	4.78	4.71	4.71

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Electric Heat Pump (%)	0	8.78	46.5	54.9	55.3	55.3	55.3
Sales of water heating units - Electric Resistance (%)	50.1	62.2	46.3	42.7	42.5	42.5	42.5
Sales of water heating units - Gas Furnace (%)	45.5	26.1	4.92	0.208	0	0	0
Sales of water heating units - Other (%)	4.39	2.95	2.33	2.2	2.21	2.22	2.23
Sales of cooking units - Electric Resistance (%)	70.5	76.8	96	99.8	100	100	100
Sales of cooking units - Gas (%)	29.5	23.2	3.97	0.2	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		6.43	6.21				

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 (%)	4.92	28.4	70.7	83.8	85.1	85.1	85.1
Sales of space heating units - Electric Resistance (%)	4.71	8.37	10.5	12.6	13	13	13
Sales of space heating units - Gas Furnace (%)	82.5	59.2	18.1	3.58	1.92	1.89	1.88
Sales of space heating units - Fossil (%)	7.87	4.09	0.778	0.033	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.167	10.5	54.6	64.4	64.8	64.8	64.8
Sales of water heating units - Electric Resistance (%)	4.19	10.8	28.4	32.3	32.5	32.5	32.5
Sales of water heating units - Gas Furnace (%)	91.5	74.5	14.1	0.593	0	0	0
Sales of water heating units - Other (%)	4.17	4.15	3.01	2.72	2.72	2.72	2.72
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)		31,138	34,700				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	2,617	668	0	0	0	0	0
Installed thermal - Natural gas (MW)	11,565	12,329	12,744	13,702	15,254	16,798	11,802
Installed thermal - Nuclear (MW)	1,959	1,959	1,959	1,959	3,992	3,012	4,712
Installed renewables - Rooftop PV (MW)	130	209	296	422	598	827	1,120
Installed renewables - Solar - Base land use assumptions (MW)	2,825	9,646	16,563	19,552	26,404	32,740	33,240
Installed renewables - Wind - Base land use assumptions (MW)	72	653	2,489	2,489	2,873	2,948	3,060
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	55.5	135	135	135	195	195
Installed renewables - Solar - Constrained land use assumptions (MW)	3,289	7,243	10,927	12,841	18,255	26,293	26,793
Installed renewables - Wind - Constrained land use assumptions (MW)	72	850	8,277	8,277	8,967	9,229	9,503
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	79.7	79.7	160	160	219	219
Capital invested - Solar PV - Base (billion $2018)		9.13	8.28	3.3	7.12	6.22	0.463
Capital invested - Wind - Base (billion $2018)		0.803	2.45	0	0.453	0.085	0.118

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Offshore Wind - Base (billion $2018)		0.157	0.192	0	0	0.088	0
Capital invested - Solar PV - Constrained (billion $2018)		5.29	4.41	2.11	5.62	7.88	0.463
Capital invested - Wind - Constrained (billion $2018)		1.14	9.89	0	0.816	0.294	0.29
Capital invested - Offshore Wind - Constrained (billion $2018)		0	0	0	0	0	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)	5,869	18,890	32,001	37,647	50,592	62,587	63,535
Wind - Base land use assumptions (GWh)	269	2,295	8,784	8,784	10,077	10,324	10,690
OffshoreWind - Base land use assumptions (GWh)	0	250	612	612	612	881	881
Solar - Constrained land use assumptions (GWh)	6,759	14,243	21,220	24,850	35,118	50,282	51,217
Wind - Constrained land use assumptions (GWh)	269	3,131	27,867	27,867	30,016	30,799	31,620
OffshoreWind - Constrained land use assumptions (GWh)	0	359	359	721	721	989	989

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)							-127
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-358
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,605
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,153
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,187
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-246
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-150
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-469
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,130
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-10,423
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-190
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,254
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,494
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1,689
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-6,373
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-474
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-225

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,327
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,240
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-22,267
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-254
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,149
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-9,384
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,265
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-9,560
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-702
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-300
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-6,186
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-34,151
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,351
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							20.8
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							273
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,833
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							417
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)							35.1
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							9.91
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							30.5
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							672
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,292
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							31.1
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							282

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,309
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							628
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)							50.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							14.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							220
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,354
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,890
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							41.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							291
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,785
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							835
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)							66.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							19.8
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							176
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,111
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,325

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)							-986

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-33.7
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,020
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,871
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-67.3
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-1,938
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)							594
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							61.2
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							655
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)							1,127
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							122
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,249

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)		95.4	0.087	0.086	0.077	0.055	0.005
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		20.4	13.2	6.66	4.67	2.63	0.993
Premature deaths from air pollution - Mobile - On-Road (deaths)		108	109	106	95.6	76	51.9
Premature deaths from air pollution - Gas Stations (deaths)		12.2	12.3	11.8	10.6	8.34	5.69
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		14.3	13.1	11.6	9.55	7.07	4.64
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		6.41	6.15	5.89	5.15	3.85	2.42
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		2.63	2.65	2.62	2.41	1.94	1.41

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.33	2.21	2.08	1.95	1.83	1.69
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		13.1	12.9	12.3	10.9	8.7	6.41
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		3.4	3.02	2.64	2.21	1.82	1.46
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.91	1.76	1.61	1.45	1.29	1.12
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		2.21	1.31	1.25	1.18	1.14	1.08
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		43	36.7	29.2	23.6	19.7	14.1
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		846	0.773	0.761	0.678	0.485	0.043
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		181	117	59	41.4	23.3	8.8
Monetary damages from air pollution - Mobile - On-Road (million $2019)		957	969	943	850	676	462
Monetary damages from air pollution - Gas Stations (million $2019)		108	109	105	93.5	73.8	50.4
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		127	116	103	84.6	62.6	41.1
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		56.8	54.5	52.2	45.7	34.1	21.5
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		23.3	23.4	23.2	21.3	17.2	12.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		20.7	19.6	18.4	17.3	16.2	14.9
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		116	114	109	96.2	77	56.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		30.1	26.7	23.3	19.5	16.1	12.9
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		16.9	15.6	14.3	12.9	11.4	9.94
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		19.5	11.6	11	10.4	10.1	9.53
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		381	326	259	210	175	125

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		456	597	284	190	122	422
By economic sector - Construction (jobs)		21,734	18,529	20,270	17,803	18,079	19,624

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Manufacturing (jobs)		6,688	11,049	8,245	6,604	8,783	10,244
By economic sector - Mining (jobs)		3,936	2,746	2,037	1,528	1,071	683
By economic sector - Other (jobs)		3,450	2,871	3,121	3,028	3,453	4,092
By economic sector - Pipeline (jobs)		634	527	906	400	324	296
By economic sector - Professional (jobs)		8,928	7,892	7,827	7,559	7,820	9,111
By economic sector - Trade (jobs)		6,371	5,512	5,598	5,382	5,601	6,308
By economic sector - Utilities (jobs)		12,236	13,999	16,760	15,770	15,854	17,143
By resource sector - Biomass (jobs)		1,645	1,565	846	699	560	2,005
By resource sector - CO2 (jobs)		0	0	3,853	225	280	781
By resource sector - Coal (jobs)		2,022	1,063	851	745	674	596
By resource sector - Grid (jobs)		17,053	22,453	25,421	27,385	27,793	31,121
By resource sector - Natural Gas (jobs)		7,656	6,106	4,875	4,305	3,837	2,908
By resource sector - Nuclear (jobs)		989	973	958	943	928	726
By resource sector - Oil (jobs)		5,800	4,882	4,121	3,475	2,558	1,520
By resource sector - Solar (jobs)		29,223	25,867	23,669	19,709	22,059	26,198
By resource sector - Wind (jobs)		44.4	814	457	778	2,418	2,070
By education level - All sectors - High school diploma or less (jobs)		27,964	27,651	28,164	25,081	26,285	29,238
By education level - All sectors - Associates degree or some college (jobs)		20,327	20,210	20,967	18,753	19,751	21,924
By education level - All sectors - Bachelors degree (jobs)		12,586	12,454	12,480	11,270	11,792	13,095
By education level - All sectors - Masters or professional degree (jobs)		3,087	2,988	3,023	2,775	2,882	3,220
By education level - All sectors - Doctoral degree (jobs)		468	420	416	386	397	448
Related work experience - All sectors - None (jobs)		9,337	9,249	9,538	8,541	8,948	9,969
Related work experience - All sectors - Up to 1 year (jobs)		13,347	13,150	13,223	11,813	12,450	13,948
Related work experience - All sectors - 1 to 4 years (jobs)		23,046	22,774	23,263	20,892	21,869	24,262
Related work experience - All sectors - 4 to 10 years (jobs)		14,850	14,651	15,087	13,501	14,125	15,632
Related work experience - All sectors - Over 10 years (jobs)		3,852	3,900	3,937	3,519	3,715	4,114
On-the-Job Training - All sectors - None (jobs)		3,581	3,451	3,489	3,135	3,291	3,670
On-the-Job Training - All sectors - Up to 1 year (jobs)		41,973	41,911	42,235	37,893	39,863	44,461
On-the-Job Training - All sectors - 1 to 4 years (jobs)		13,670	13,447	14,038	12,530	13,097	14,457
On-the-Job Training - All sectors - 4 to 10 years (jobs)		4,559	4,276	4,651	4,155	4,268	4,687
On-the-Job Training - All sectors - Over 10 years (jobs)		649	637	635	552	588	649
On-Site or In-Plant Training - All sectors - None (jobs)		10,477	10,312	10,421	9,310	9,813	10,948
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		38,206	38,078	38,509	34,557	36,313	40,452
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		10,616	10,466	10,875	9,715	10,165	11,233
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		4,583	4,319	4,662	4,160	4,271	4,687
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		552	548	583	522	545	605
Wage income - All (million $2019)		3,528	3,527	3,652	3,325	3,509	3,937

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	710	666	609	562	524	480	428
Final energy use - Residential (PJ)	313	297	288	278	263	239	221
Final energy use - Commercial (PJ)	246	247	244	240	233	227	224
Final energy use - Industry (PJ)	381	403	413	422	433	437	443

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)		4.07	4.08	5.45	5.62	6.97	7.29

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	47.4	229	411	1,255	2,098	3,965	5,831
Vehicle stocks - LDV – All others (1000 units)	7,622	7,622	7,622	7,230	6,838	5,269	3,701
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		0	237	495	1,674	5,255	7,661
Public EV charging plugs - DC Fast (1000 units)	0.39		0.815		4.16		11.6
Public EV charging plugs - L2 (1000 units)	1.37		19.6		99.8		277

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 (%)	25.4	35.1	39.3	51.3	69.7	81.7	85.8
Sales of space heating units - Electric Resistance (%)	18.4	20.5	19.2	15.6	10.3	6.88	5.68
Sales of space heating units - Gas (%)	44.1	26.9	24.9	19.4	10.9	5.32	3.37
Sales of space heating units - Fossil (%)	12.1	17.5	16.6	13.7	9.14	6.15	5.13
Sales of water heating units - Electric Heat Pump (%)	0	1.51	5.8	18.2	37.1	49.5	53.8
Sales of water heating units - Electric Resistance (%)	50.1	65.3	63.5	58.2	50.1	44.9	43.1
Sales of water heating units - Gas Furnace (%)	45.5	30.1	27.7	20.8	10.2	3.27	0.852
Sales of water heating units - Other (%)	4.39	3.08	3.01	2.82	2.52	2.32	2.25
Sales of cooking units - Electric Resistance (%)	70.4	71.2	73.9	81	91	97.1	99.2
Sales of cooking units - Gas (%)	29.6	28.8	26.1	19	9.05	2.92	0.786
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		6.4	6.15				

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 (%)	4.92	20.4	25.2	39.1	61.2	76.9	82.9
Sales of space heating units - Electric Resistance (%)	4.71	8.04	8.28	9.07	10.5	11.9	12.7
Sales of space heating units - Gas Furnace (%)	82.5	66.9	62.2	48.4	26.6	10.7	4.34
Sales of space heating units - Fossil (%)	7.87	4.72	4.38	3.33	1.64	0.517	0.135
Sales of water heating units - Electric Heat Pump (%)	0.167	2.04	7.05	21.5	43.6	58.1	63.1
Sales of water heating units - Electric Resistance (%)	4.19	7.46	9.4	15.2	24	29.7	31.8

Table 55: *E-B+ scenario - PILLAR 1: Efficiency/Electrification - Commercial (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	91.5	86.1	79.2	59.5	29.1	9.3	2.42
Sales of water heating units - Other (%)	4.17	4.38	4.34	3.87	3.3	2.91	2.76
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)		31,112	34,614				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	2,617	1,889	0	0	0	0	0
Installed thermal - Natural gas (MW)	11,565	15,378	14,626	14,269	13,534	11,583	11,166
Installed thermal - Nuclear (MW)	1,959	1,959	1,959	1,959	1,959	1,959	980
Capital invested - Biomass power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	0	0	0

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	5
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment - Cumulative 5-yr (million $2018)		0	1,031	30.8	0.343	0	4,523
Biomass purchases (million $2018/y)		0	512	515	515	515	900

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	3.35	3.32	3.42	3.53
Annual - BECCS (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	3.35	3.32	3.42	3.53
Cumulative - All (MMT)		0	0	3.35	6.67	10.1	13.6
Cumulative - BECCS (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Cumulative - Cement and lime (MMT)		0	0	3.35	6.67	10.1	13.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	0	353	353	353	353
Spur (km)		0	0	153	153	153	190
All (km)		0	0	506	506	506	543
Cumulative investment - Trunk (million $2018)		0	0	2,104	2,104	2,104	2,104
Cumulative investment - Spur (million $2018)		0	0	155	154	157	188
Cumulative investment - All (million $2018)		0	0	2,258	2,257	2,260	2,292

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	0	0	0	0	0
Injection wells (wells)		0	0	0	0	0	0
Resource characterization, appraisal, permitting costs (million $2020)		0	0	0	0	0	0
Wells and facilities construction costs (million $2020)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-127
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-358
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,605
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,153
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,187
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-246
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-150
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-469
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,130
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-10,423
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-190
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,254
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,494
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1,689
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-6,373
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-474

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-225
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,327
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,240
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-22,267
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-254
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,149
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-9,384
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,265
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-9,560
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-702
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-300
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-6,186
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-34,151
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,351
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							20.8
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							273
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,833
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							417
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)							35.1
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							9.91
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							30.5
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							672
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,292
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							31.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							282
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,309
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							628
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)							50.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							14.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							220
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,354
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,890
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							41.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							291
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,785
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							835
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)							66.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							19.8
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							176
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,111
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,325

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)							-204

Table 63: *E-B+ 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)							-911
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-30.4
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)							-1,145
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-204
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,727
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-60.7
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)							-1,993
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							117
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							537
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							55.2
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							23.6
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							297
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,030
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							117
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							2,514
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							110
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							23.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							297
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							3,063

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)		267	167	153	146	143	132
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		17.6	18.8	21.4	23.7	22.2	22.2
Premature deaths from air pollution - Mobile - On-Road (deaths)		107	110	113	116	119	122
Premature deaths from air pollution - Gas Stations (deaths)		12.1	12.4	12.6	12.9	13.1	13.3
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		14.1	13.1	12.4	12.1	12.1	12
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		6.14	5.12	3.63	2.35	1.44	0.935
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		2.51	2.47	2.47	2.51	2.56	2.6
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.44	2.42	2.39	2.36	2.33	2.28
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		13.1	13	12.3	11.3	11	11.4
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		3.48	3.27	3	2.69	2.51	2.42
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.99	2.09	2.2	2.29	2.38	2.48
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		3.76	2.73	2.26	2.09	1.97	1.81
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		43.3	46.2	47.5	45	44.8	42.8
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		2,365	1,483	1,352	1,298	1,268	1,170
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		156	167	189	210	197	196
Monetary damages from air pollution - Mobile - On-Road (million $2019)		954	979	1,004	1,032	1,058	1,084
Monetary damages from air pollution - Gas Stations (million $2019)		107	109	111	114	116	118
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		125	116	110	107	107	107
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		54.4	45.4	32.2	20.8	12.7	8.28

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		22.2	21.9	21.9	22.3	22.7	23.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		21.6	21.4	21.2	20.9	20.6	20.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		116	115	109	100	97.3	101
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		30.8	28.9	26.6	23.8	22.2	21.4
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		17.7	18.5	19.4	20.3	21.1	21.9
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		33.2	24.1	20	18.4	17.4	16
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		385	410	422	399	398	380

Table 65: *REF scenario - IMPACTS - Jobs*

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		438	403	399	344	344	364
By economic sector - Construction (jobs)		5,382	5,988	6,749	7,077	7,222	7,842
By economic sector - Manufacturing (jobs)		2,848	3,088	3,211	3,413	3,290	5,096
By economic sector - Mining (jobs)		4,452	3,499	2,837	2,265	1,919	1,591
By economic sector - Other (jobs)		241	347	430	496	536	698
By economic sector - Pipeline (jobs)		653	678	687	650	659	655
By economic sector - Professional (jobs)		3,433	3,395	3,515	3,538	3,491	3,636
By economic sector - Trade (jobs)		2,936	2,703	2,624	2,529	2,473	2,552
By economic sector - Utilities (jobs)		8,407	8,416	9,415	9,829	9,838	10,077
By resource sector - Biomass (jobs)		1,533	1,443	1,351	1,226	1,245	1,257
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		2,999	2,230	1,881	1,415	1,127	873
By resource sector - Grid (jobs)		9,518	9,736	11,615	12,100	11,894	12,848
By resource sector - Natural Gas (jobs)		7,830	7,754	7,913	8,151	8,463	8,035
By resource sector - Nuclear (jobs)		989	973	958	943	928	914
By resource sector - Oil (jobs)		5,848	5,011	4,425	4,114	3,932	3,808
By resource sector - Solar (jobs)			1,099	1,482	1,950	2,160	3,612
By resource sector - Wind (jobs)		72.2	271	244	243	21.9	1,163
By education level - All sectors - High school diploma or less (jobs)		12,195	12,089	12,686	12,793	12,662	13,925
By education level - All sectors - Associates degree or some college (jobs)		8,788	8,808	9,344	9,515	9,431	10,328
By education level - All sectors - Bachelors degree (jobs)		6,117	5,974	6,144	6,142	6,019	6,498
By education level - All sectors - Masters or professional degree (jobs)		1,487	1,451	1,495	1,494	1,465	1,557
By education level - All sectors - Doctoral degree (jobs)		202	197	200	198	194	203
Related work experience - All sectors - None (jobs)		4,135	4,119	4,344	4,400	4,361	4,758
Related work experience - All sectors - Up to 1 year (jobs)		5,627	5,574	5,822	5,862	5,789	6,410
Related work experience - All sectors - 1 to 4 years (jobs)		10,588	10,433	10,892	10,966	10,818	11,756

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

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - All sectors - 4 to 10 years (jobs)		6,671	6,635	6,973	7,057	6,974	7,575
Related work experience - All sectors - Over 10 years (jobs)		1,769	1,756	1,837	1,857	1,828	2,013
On-the-Job Training - All sectors - None (jobs)		1,523	1,505	1,559	1,564	1,541	1,682
On-the-Job Training - All sectors - Up to 1 year (jobs)		19,215	18,916	19,687	19,791	19,502	21,383
On-the-Job Training - All sectors - 1 to 4 years (jobs)		5,958	5,967	6,331	6,439	6,384	6,938
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,847	1,879	2,028	2,078	2,078	2,208
On-the-Job Training - All sectors - Over 10 years (jobs)		247	251	264	268	266	300
On-Site or In-Plant Training - All sectors - None (jobs)		4,498	4,475	4,679	4,723	4,660	5,118
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		17,496	17,222	17,938	18,038	17,781	19,468
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		4,642	4,639	4,911	4,988	4,942	5,383
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,920	1,942	2,082	2,127	2,122	2,254
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		234	239	258	266	266	289
Wage income - All (million $2019)		1,660	1,655	1,749	1,783	1,781	1,948

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	709	670	623	596	599	617	640
Final energy use - Residential (PJ)	313	298	294	293	296	303	311
Final energy use - Commercial (PJ)	246	251	253	255	257	265	279
Final energy use - Industry (PJ)	381	412	434	451	473	490	511

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)		4.39	4.43	6.57	6.87	7.03	7.31

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 (%)	23.5	46.8	47.7	48.9	49.9	51	52.7
Sales of space heating units - Electric Resistance (%)	18.9	17	16.7	16.1	15.6	14.6	12.7
Sales of space heating units - Gas (%)	45.2	22.7	26.7	28	27.8	27.7	27.8
Sales of space heating units - Fossil (%)	12.4	13.6	8.94	6.9	6.71	6.67	6.75
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	50.1	65.9	65.9	65.8	65.8	65.7	65.7
Sales of water heating units - Gas Furnace (%)	45.5	31	31	31	31.1	31.1	31.2
Sales of water heating units - Other (%)	4.39	3.1	3.11	3.12	3.13	3.14	3.15
Sales of cooking units - Electric Resistance (%)	70.1	70.1	70.1	70.1	70.1	70.1	70.1
Sales of cooking units - Gas (%)	29.9	29.9	29.9	29.9	29.9	29.9	29.9

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		6.34	5.72				

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 (%)	4.92	24.3	48.6	68.6	71.8	72.2	72.2
Sales of space heating units - Electric Resistance (%)	4.71	8.77	12.8	20	25.1	25.8	25.9
Sales of space heating units - Gas Furnace (%)	82.5	62.3	35.2	9.95	2.88	1.94	1.88
Sales of space heating units - Fossil (%)	7.87	4.59	3.39	1.45	0.212	0.017	0
Sales of water heating units - Electric Heat Pump (%)	0.167	0.273	0.269	0.271	0.272	0.27	0.272
Sales of water heating units - Electric Resistance (%)	4.19	6.76	6.69	6.7	6.72	6.7	6.71
Sales of water heating units - Gas Furnace (%)	91.5	88.5	88.5	88.6	88.5	88.5	88.6
Sales of water heating units - Other (%)	4.17	4.42	4.53	4.44	4.48	4.5	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)		30,680	31,883				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	2,617	1,923	1,923	1,923	668	668	0
Installed thermal - Natural gas (MW)	11,565	15,140	15,094	15,973	16,798	18,588	21,708
Installed thermal - Nuclear (MW)	1,959	1,959	1,959	1,959	1,959	1,959	1,959
Installed renewables - Rooftop PV (MW)	130	209	296	422	598	827	1,120
Installed renewables - Solar - Base land use assumptions (MW)	1,097	1,097	1,097	1,097	1,097	1,097	1,097
Installed renewables - Wind - Base land use assumptions (MW)	72	72	1,058	1,538	2,991	3,025	3,214
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	55.5	135	135	195	331	356
Installed renewables - Solar - Constrained land use assumptions (MW)	297	297	297	297	297	297	297

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	3,137	3,137	3,137	3,137	3,137	3,137	3,137
Wind - Base land use assumptions (GWh)	269	269	3,755	5,453	10,484	10,595	11,234
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)	-41.9		-12.3				-10
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-2.6		-4.34				-4.57
Business-as-usual carbon sink - Total (Mt CO2e/y)	-44.5		-16.7				-14.6

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)							-127
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-358
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,605
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,153
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,187
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-246
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-150
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-469
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,130
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-10,423
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-190
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,254
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,494
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1,689
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-6,373
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-474
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-225
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,327
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,240
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-22,267
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-254
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,149
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-9,384
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,265
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-9,560
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-702
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-300
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-6,186
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-34,151

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,351
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							20.8
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							273
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,833
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							417
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)							35.1
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							9.91
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							30.5
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							672
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,292
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							31.1
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							282
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,309
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							628
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)							50.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							14.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							220
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,354
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,890
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							41.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							291
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,785
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							835
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)							66.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							19.8
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							176
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,111
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,325