Net-Zero America - Mississippi data

October 29, 2021 (updated November 17, 2023)

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		24.9	0.026	0.024	0.016	0.01	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		9.43	6.67	3.71	3.05	1.39	0.533
Premature deaths from air pollution - Mobile - On-Road (deaths)		48.3	44.8	33.9	19.4	8.78	3.42
Premature deaths from air pollution - Gas Stations (deaths)		6.53	5.98	4.49	2.65	1.3	0.621
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		4.69	3.79	2.53	1.42	0.718	0.359
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.212	0.172	0.118	0.069	0.032	0.012
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.09	0.957	0.716	0.457	0.234	0.103
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.942	0.898	0.85	0.798	0.747	0.692
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.35	2.92	2.12	1.33	0.813	0.526
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.589	0.488	0.384	0.283	0.195	0.125
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.293	0.245	0.199	0.154	0.113	0.074
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.54	0.215	0.209	0.202	0.201	0.196
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		29.8	27.8	25.1	19.4	14.3	8.78
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		221	0.234	0.211	0.138	0.085	0.005
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		83.6	59.1	32.9	27	12.3	4.72
Monetary damages from air pollution - Mobile - On-Road (million $2019)		429	398	301	173	78.1	30.4
Monetary damages from air pollution - Gas Stations (million $2019)		57.9	52.9	39.8	23.5	11.5	5.5
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		41.6	33.6	22.4	12.6	6.36	3.18
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		1.88	1.52	1.05	0.615	0.283	0.109
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		9.62	8.48	6.35	4.05	2.07	0.912
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		8.34	7.95	7.52	7.07	6.61	6.13
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		29.7	25.8	18.8	11.8	7.2	4.66

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)		5.21	4.32	3.4	2.5	1.73	1.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		2.6	2.17	1.76	1.37	0.997	0.653
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		4.76	1.89	1.85	1.78	1.77	1.73
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		264	247	223	172	127	77.9

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		189	485	978	1,218	1,526	1,173
By economic sector - Construction (jobs)		5,089	6,103	10,097	12,506	13,891	16,716
By economic sector - Manufacturing (jobs)		4,317	4,716	5,643	5,421	5,176	5,396
By economic sector - Mining (jobs)		4,845	4,039	3,230	2,135	1,564	986
By economic sector - Other (jobs)		373	424	1,165	2,143	2,559	3,447
By economic sector - Pipeline (jobs)		557	829	869	478	423	430
By economic sector - Professional (jobs)		2,889	3,019	4,871	6,557	7,933	8,893
By economic sector - Trade (jobs)		2,565	2,391	3,199	4,106	4,699	5,563
By economic sector - Utilities (jobs)		5,919	6,795	9,694	10,175	11,827	13,892
By resource sector - Biomass (jobs)		633	1,293	2,731	3,634	5,568	5,022
By resource sector - CO2 (jobs)		12.8	3,162	4,290	1,772	2,278	2,838
By resource sector - Coal (jobs)		218	0	0	0	0	0
By resource sector - Grid (jobs)		6,087	6,222	11,291	14,484	17,970	23,263
By resource sector - Natural Gas (jobs)		6,086	4,934	4,471	4,263	3,622	2,101
By resource sector - Nuclear (jobs)		727	715	704	693	682	672
By resource sector - Oil (jobs)		10,204	8,953	7,700	5,576	4,129	2,634
By resource sector - Solar (jobs)		2,064	2,510	7,235	13,070	14,420	18,692
By resource sector - Wind (jobs)		710	1,013	1,326	1,246	929	1,274
By education level - All sectors - High school diploma or less (jobs)		10,901	12,015	16,944	19,188	21,276	24,217
By education level - All sectors - Associates degree or some college (jobs)		8,042	8,777	12,318	13,926	15,456	17,895
By education level - All sectors - Bachelors degree (jobs)		6,132	6,305	8,212	9,037	9,958	11,131
By education level - All sectors - Masters or professional degree (jobs)		1,467	1,502	1,995	2,253	2,525	2,829
By education level - All sectors - Doctoral degree (jobs)		200	202	278	334	383	424
Related work experience - All sectors - None (jobs)		3,781	4,133	5,787	6,548	7,299	8,337
Related work experience - All sectors - Up to 1 year (jobs)		5,048	5,521	7,874	9,093	10,163	11,595
Related work experience - All sectors - 1 to 4 years (jobs)		9,868	10,554	14,410	16,123	17,826	20,239
Related work experience - All sectors - 4 to 10 years (jobs)		6,313	6,761	9,231	10,288	11,367	12,978
Related work experience - All sectors - Over 10 years (jobs)		1,733	1,832	2,446	2,687	2,943	3,347
On-the-Job Training - All sectors - None (jobs)		1,466	1,541	2,117	2,430	2,706	3,094
On-the-Job Training - All sectors - Up to 1 year (jobs)		17,877	19,151	26,246	29,511	32,732	37,026

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)		5,516	6,008	8,352	9,340	10,312	11,889
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,628	1,826	2,654	3,035	3,393	3,967
On-the-Job Training - All sectors - Over 10 years (jobs)		256	276	378	421	454	520
On-Site or In-Plant Training - All sectors - None (jobs)		4,283	4,600	6,380	7,256	8,054	9,150
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		16,206	17,363	23,800	26,743	29,654	33,627
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		4,303	4,679	6,496	7,271	8,026	9,237
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,739	1,923	2,732	3,085	3,434	3,981
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		212	237	339	384	430	500
Wage income - All (million $2019)		1,368	1,474	2,008	2,246	2,514	2,872

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		75.7	66.7	53.5	41	31.1	23.1
Oil consumption - Cumulative (million bbls)							1,650
Oil production - Annual (million bbls)		30.3	30.5	30.4	24.1	19.6	13
Natural gas consumption - Annual (tcf)		446	376	302	227	143	99.1
Natural gas consumption - Cumulative (tcf)							9,085
Natural gas production - Annual (tcf)		43.4	41	35.7	30.2	24	18.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	350	323	285	238	196	170	160
Final energy use - Residential (PJ)	99.2	92.9	85.6	76.5	69.1	64.8	63
Final energy use - Commercial (PJ)	70.6	70.6	68.1	64.4	61.3	60.1	60.4
Final energy use - Industry (PJ)	201	206	208	206	206	204	203

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		2.03	2.09	3.69	3.94	2.98	3.07

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	3.71	173	342	935	1,528	2,001	2,475
Vehicle stocks - LDV – All others (1000 units)	2,064	1,965	1,866	1,360	854	483	112
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		398	1,016	1,653	2,501	2,725	2,596
Public EV charging plugs - DC Fast (1000 units)	0.053		0.878		3.92		6.35
Public EV charging plugs - L2 (1000 units)	0.175		21.1		94.3		153

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 (%)	29.5	45.1	80.4	88.3	88.7	88.6	88.6
Sales of space heating units - Electric Resistance (%)	28.6	27.1	11.4	7.85	7.68	7.79	7.8
Sales of space heating units - Gas (%)	30.2	16.4	4.98	2.47	2.38	2.36	2.35
Sales of space heating units - Fossil (%)	11.7	11.3	3.21	1.36	1.27	1.25	1.25
Sales of water heating units - Electric Heat Pump (%)	0	12.1	64	75.6	76.1	76.1	76.1
Sales of water heating units - Electric Resistance (%)	67.2	69.3	30.5	21.8	21.4	21.4	21.4
Sales of water heating units - Gas Furnace (%)	29.2	16.1	3.02	0.128	0	0	0
Sales of water heating units - Other (%)	3.59	2.49	2.46	2.47	2.48	2.48	2.49
Sales of cooking units - Electric Resistance (%)	75.8	81	96.7	99.8	100	100	100
Sales of cooking units - Gas (%)	24.2	19	3.26	0.164	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		2.27	2.78				

Table 8: *E+ scenario - PILLAR 1: Efficiency/Electrification - Commercial*

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	9.46	29.3	77	90.8	91.9	92	92
Sales of space heating units - Electric Resistance (%)	4.72	4.61	4.92	6.26	6.57	6.57	6.55
Sales of space heating units - Gas (%)	85.8	63.2	17.5	2.95	1.48	1.43	1.43
Sales of space heating units - Fossil (%)	0	2.89	0.56	0.024	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.153	10.6	55.7	65.7	66.1	66.2	66.2
Sales of water heating units - Electric Resistance (%)	5.64	9.97	28	32.1	32.3	32.3	32.3
Sales of water heating units - Gas (%)	92.7	77.8	14.7	0.62	0	0	0
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric Resistance (%)	43.5	55.3	83.4	88.9	89.2	89.2	89.1
Sales of cooking units - Gas (%)	56.5	44.7	16.6	11.1	10.8	10.8	10.9
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		8,123	9,222				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,610	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	11,309	10,201	9,310	11,906	9,082	9,043	10,101
Installed thermal - Nuclear (MW)	1,440	1,440	1,440	1,440	1,440	1,440	1,440
Installed renewables - Rooftop PV (MW)	16.9	27.3	38.6	55	78.1	108	146
Installed renewables - Solar - Base land use assumptions (MW)	49.1	1,116	2,278	7,216	16,315	25,778	37,471
Installed renewables - Wind - Base land use assumptions (MW)	0	0	0	0	0	472	1,550
Installed renewables - Solar - Constrained land use assumptions (MW)	44.8	890	2,802	11,209	18,136	28,224	39,263
Installed renewables - Wind - Constrained land use assumptions (MW)	0	0	0	0	13,281	13,281	13,281
Capital invested - Solar PV - Base (billion $2018)		1.43	1.39	5.45	9.46	9.29	10.8
Capital invested - Wind - Base (billion $2018)		0	0	0	0	0.529	1.14

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Constrained (billion $2018)		0.876	2.23	4.75	5.05	7.97	9.84
Capital invested - Wind - Constrained (billion $2018)		0	0	0	15.8	0	0
Capital invested - Biomass power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0	0.002	0	0
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	2.86	0	0	2.52	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	112	2,150	4,376	13,814	31,219	49,326	71,640
Wind - Base land use assumptions (GWh)	0	0	0	0	0	1,363	4,502
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	103	1,718	5,358	21,445	34,720	53,997	75,091
Wind - Constrained land use assumptions (GWh)	0	0	0	0	33,276	33,276	33,276
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	3,205	3,205	3,205	6,036	6,036
Biomass w/ccu allam power plant (GWh)	0	0	0	0	2.37	2.37	2.37

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	2	2	2	4	4
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	1	1	1
Number of facilities - Beccs hydrogen (quantity)	0	0	0	4	7	14	14
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	1	1	1
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	1	1	1
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	1	1	1	1	1
Conversion capital investment - Cumulative 5-yr (million $2018)		0	2,620	4,363	3,928	8,452	0
Biomass purchases (million $2018/y)		0	125	365	581	1,029	1,029

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	3.17	13.7	18.5	30.9	31.4
Annual - BECCS (MMT)		0	3.17	8.78	13.7	24.3	24.3
Annual - NGCC (MMT)		0	0	4.93	4.83	6.52	7.04
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	3.17	16.9	35.4	66.3	97.6
Cumulative - BECCS (MMT)		0	3.17	11.9	25.7	50	74.3
Cumulative - NGCC (MMT)		0	0	4.93	9.76	16.3	23.3
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	487	973	973	973	973
Spur (km)		0	103	1,060	1,633	2,269	2,604
All (km)		0	589	2,034	2,607	3,243	3,577
Cumulative investment - Trunk (million $2018)		0	2,854	5,707	5,707	5,707	5,707
Cumulative investment - Spur (million $2018)		0	84.9	787	1,278	1,895	2,084
Cumulative investment - All (million $2018)		0	2,939	6,495	6,986	7,602	7,791

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	6.58	21.1	37.9	60.2	80.1
Injection wells (wells)		0	6	24	42	70	86
Resource characterization, appraisal, permitting costs (million $2020)		32.8	590	935	935	935	935
Wells and facilities construction costs (million $2020)		0	181	705	1,257	2,102	2,610

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)							-374
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-213
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,218
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,599
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,234
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-283
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,261
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-497
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,692
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-17,371
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-560
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-746
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,798
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-3,809
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-10,469
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-546
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4,891

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,528
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,356
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-33,702
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-746
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,278
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-8,378
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-5,109
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-15,703
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-809
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-6,522
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-6,558
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-50,122
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-5,019
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							61.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							162
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,637
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							941
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)							40.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							216
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							32.3
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,007
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							4,096
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							91.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							168

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,954
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,416
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)							58.6
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							323
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							234
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,027
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							7,273
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							122
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							173
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,272
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,882
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)							76.8
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							431
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							186
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,664
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,807

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)							-172
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-3,250

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-34.3
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-3,456
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-172
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-6,293
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-68.6
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-6,534
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							69.5
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							939
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							62.4
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,070
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							69.5
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,815
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							125
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							2,009

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)		24.9	0.026	0.024	0.016	0.01	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		8.9	5.33	2.31	0.888	0.335	0.23
Premature deaths from air pollution - Mobile - On-Road (deaths)		49	49.2	47.7	42.8	33.9	23.1
Premature deaths from air pollution - Gas Stations (deaths)		6.67	6.69	6.42	5.73	4.53	3.13
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		4.73	4.24	3.71	3.04	2.27	1.53
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.217	0.205	0.193	0.17	0.132	0.093
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.1	1.08	1.05	0.945	0.741	0.521

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.942	0.898	0.85	0.798	0.747	0.692
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.38	3.32	3.15	2.77	2.21	1.64
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.59	0.535	0.482	0.417	0.346	0.278
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.293	0.263	0.233	0.204	0.176	0.15
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.519	0.215	0.212	0.207	0.201	0.186
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		29.7	26.7	23	19.9	17.5	12.2
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		221	0.234	0.211	0.138	0.085	0.005
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		78.8	47.2	20.4	7.86	2.97	2.04
Monetary damages from air pollution - Mobile - On-Road (million $2019)		436	438	424	380	301	205
Monetary damages from air pollution - Gas Stations (million $2019)		59.1	59.2	56.9	50.7	40.2	27.7
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		41.9	37.6	32.9	26.9	20.1	13.6
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		1.92	1.82	1.71	1.51	1.17	0.828
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		9.75	9.61	9.33	8.38	6.57	4.62
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		8.34	7.95	7.52	7.07	6.61	6.13
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		29.9	29.4	27.9	24.5	19.6	14.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		5.23	4.73	4.27	3.69	3.06	2.46
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		2.6	2.33	2.06	1.81	1.56	1.33
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		4.58	1.9	1.87	1.82	1.77	1.64
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		264	237	204	177	155	108

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		211	1,055	1,662	2,103	2,116	1,172
By economic sector - Construction (jobs)		5,095	7,025	10,501	12,868	16,198	17,771

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Manufacturing (jobs)		4,381	5,041	5,748	6,514	7,091	6,628
By economic sector - Mining (jobs)		4,885	4,172	3,476	2,726	2,332	1,509
By economic sector - Other (jobs)		381	447	1,015	1,947	2,802	3,490
By economic sector - Pipeline (jobs)		558	1,061	1,197	638	655	702
By economic sector - Professional (jobs)		2,905	3,679	5,634	8,599	10,215	9,126
By economic sector - Trade (jobs)		2,604	2,550	3,409	4,852	5,837	5,833
By economic sector - Utilities (jobs)		5,823	7,767	10,426	10,981	13,807	14,759
By resource sector - Biomass (jobs)		665	2,798	5,421	8,754	9,011	4,853
By resource sector - CO2 (jobs)		15.2	5,385	7,345	3,063	3,906	4,835
By resource sector - Coal (jobs)		352	68.2	0	0	0	0
By resource sector - Grid (jobs)		5,910	6,515	9,877	15,188	20,451	23,456
By resource sector - Natural Gas (jobs)		5,993	4,484	4,411	3,965	3,942	2,212
By resource sector - Nuclear (jobs)		727	715	704	693	682	672
By resource sector - Oil (jobs)		10,239	9,126	8,155	7,121	6,084	3,958
By resource sector - Solar (jobs)		2,191	2,646	5,979	11,230	15,606	18,991
By resource sector - Wind (jobs)		750	1,061	1,176	1,213	1,370	2,015
By education level - All sectors - High school diploma or less (jobs)		10,960	13,861	18,473	21,940	26,134	26,150
By education level - All sectors - Associates degree or some college (jobs)		8,060	9,940	13,177	15,505	18,784	19,315
By education level - All sectors - Bachelors degree (jobs)		6,151	7,067	8,924	10,671	12,482	12,051
By education level - All sectors - Masters or professional degree (jobs)		1,471	1,698	2,182	2,692	3,164	3,028
By education level - All sectors - Doctoral degree (jobs)		201	233	313	419	489	447
Related work experience - All sectors - None (jobs)		3,794	4,748	6,314	7,494	8,965	8,988
Related work experience - All sectors - Up to 1 year (jobs)		5,080	6,384	8,609	10,548	12,562	12,452
Related work experience - All sectors - 1 to 4 years (jobs)		9,904	11,982	15,588	18,447	21,937	21,872
Related work experience - All sectors - 4 to 10 years (jobs)		6,328	7,636	9,942	11,678	13,956	14,039
Related work experience - All sectors - Over 10 years (jobs)		1,737	2,048	2,615	3,060	3,634	3,639
On-the-Job Training - All sectors - None (jobs)		1,473	1,744	2,296	2,818	3,351	3,323
On-the-Job Training - All sectors - Up to 1 year (jobs)		17,962	21,859	28,592	34,287	40,580	39,988
On-the-Job Training - All sectors - 1 to 4 years (jobs)		5,525	6,797	8,931	10,353	12,505	12,856
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,627	2,089	2,847	3,301	4,060	4,257
On-the-Job Training - All sectors - Over 10 years (jobs)		257	309	401	468	557	568
On-Site or In-Plant Training - All sectors - None (jobs)		4,302	5,262	6,941	8,355	9,933	9,857
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		16,280	19,780	25,868	30,950	36,702	36,320
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		4,312	5,296	6,953	8,097	9,756	9,990
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,738	2,191	2,940	3,397	4,140	4,286
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		211	270	365	427	522	539
Wage income - All (million $2019)		1,371	1,672	2,181	2,592	3,107	3,109

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	351	326	298	275	258	238	214
Final energy use - Residential (PJ)	99.2	93.3	89.2	84.7	79.1	73.1	68.2
Final energy use - Commercial (PJ)	70.6	70.8	69.9	68.7	66.7	64.8	63.6
Final energy use - Industry (PJ)	201	207	209	208	209	207	206

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)		1.69	1.71	2.12	2.18	3.13	3.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	2.87	52.7	102	333	564	1,075	1,585
Vehicle stocks - LDV – All others (1000 units)	2,072	2,072	2,072	1,966	1,859	1,433	1,006
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		0	63.7	135	456	1,438	2,094
Public EV charging plugs - DC Fast (1000 units)	0.053		0.263		1.45		4.06
Public EV charging plugs - L2 (1000 units)	0.175		6.32		34.8		97.8

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 (%)	29.5	38.3	42.3	54.1	71.8	83.3	87.2
Sales of space heating units - Electric Resistance (%)	28.6	30.1	28.3	23	15.1	10.1	8.37
Sales of space heating units - Gas (%)	30.2	18.6	17.3	13.8	8.07	4.19	2.84
Sales of space heating units - Fossil (%)	11.7	12.9	12.1	9.17	5.03	2.44	1.57
Sales of water heating units - Electric Heat Pump (%)	0	2.08	7.99	25	51.1	68.1	74
Sales of water heating units - Electric Resistance (%)	67.2	76.8	72.5	59.6	40.1	27.4	23
Sales of water heating units - Gas Furnace (%)	29.2	18.6	17	12.9	6.35	2.02	0.528
Sales of water heating units - Other (%)	3.59	2.49	2.47	2.49	2.51	2.49	2.49
Sales of cooking units - Electric Resistance (%)	75.7	76.4	78.6	84.4	92.6	97.6	99.4
Sales of cooking units - Gas (%)	24.3	23.6	21.4	15.6	7.42	2.39	0.644
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		2.25	2.65				

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	9.46	20.2	25.6	41.4	66.1	83.2	89.6
Sales of space heating units - Electric Resistance (%)	4.72	4.61	4.65	4.77	5.23	5.91	6.33
Sales of space heating units - Gas (%)	85.8	71.8	66.6	51.4	27.5	10.5	3.93
Sales of space heating units - Fossil (%)	0	3.34	3.16	2.39	1.19	0.387	0.102
Sales of water heating units - Electric Heat Pump (%)	0.153	1.96	7.08	21.8	44.4	59.2	64.3
Sales of water heating units - Electric Resistance (%)	5.64	6.47	8.38	14.4	23.5	29.5	31.6
Sales of water heating units - Gas (%)	92.7	90	83	62.2	30.5	9.74	2.53
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of cooking units - Electric Resistance (%)	43.5	47.1	51.3	61.6	76.1	85	88
Sales of cooking units - Gas (%)	56.5	52.9	48.7	38.4	23.9	15	12
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		8,119	9,209				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,610	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	11,309	9,884	9,801	9,472	9,379	9,241	8,716
Installed thermal - Nuclear (MW)	1,440	1,440	1,440	1,440	1,440	1,440	1,440

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)							-374
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-213
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,218
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,599
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,234
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-283
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,261
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-497
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,692
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-17,371
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-560
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-746
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,798
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-3,809
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-10,469
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-546
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4,891
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,528
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,356
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-33,702
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-746
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,278

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-8,378
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-5,109
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-15,703
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-809
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-6,522
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-6,558
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-50,122
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-5,019
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							61.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							162
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,637
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							941
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)							40.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							216
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							32.3
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,007
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							4,096
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							91.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							168
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,954
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,416
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)							58.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							323
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							234
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,027
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							7,273
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							122
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							173
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,272
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,882
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)							76.8
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							431
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							186
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,664
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,807

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)							-172
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-3,250
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-34.3
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-3,456
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-172
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-6,293

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-68.6
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-6,534
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							69.5
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							939
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							62.4
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,070
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							69.5
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,815
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							125
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							2,009

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)		24.9	0.026	0.024	0.016	0.01	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		10.1	7.01	3.73	2.37	0.648	0.267
Premature deaths from air pollution - Mobile - On-Road (deaths)		48.3	44.8	33.9	19.4	8.78	3.42
Premature deaths from air pollution - Gas Stations (deaths)		6.53	5.98	4.49	2.65	1.3	0.621
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		4.69	3.79	2.53	1.42	0.718	0.359
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.212	0.172	0.118	0.069	0.032	0.012
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.09	0.957	0.716	0.457	0.234	0.103
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.942	0.898	0.85	0.798	0.747	0.692
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.35	2.92	2.12	1.33	0.813	0.526
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.589	0.488	0.384	0.283	0.195	0.125
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.293	0.245	0.199	0.154	0.113	0.074

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.593	0.215	0.209	0.201	0.2	0.174
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		29.3	27.4	23.4	16.7	10.1	1.47
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		221	0.234	0.211	0.138	0.085	0.005
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		89.4	62.1	33.1	21	5.74	2.37
Monetary damages from air pollution - Mobile - On-Road (million $2019)		429	398	301	173	78.1	30.4
Monetary damages from air pollution - Gas Stations (million $2019)		57.9	52.9	39.8	23.5	11.5	5.5
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		41.6	33.6	22.4	12.6	6.36	3.18
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		1.88	1.52	1.05	0.615	0.283	0.109
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		9.62	8.48	6.35	4.05	2.07	0.912
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		8.34	7.95	7.52	7.07	6.61	6.13
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		29.7	25.8	18.8	11.8	7.2	4.66
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		5.21	4.32	3.4	2.5	1.73	1.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		2.6	2.17	1.76	1.37	0.997	0.653
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		5.23	1.89	1.84	1.78	1.77	1.54
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		260	243	208	149	90.1	13.1

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		190	295	909	1,120	1,303	1,173
By economic sector - Construction (jobs)		6,147	7,558	10,605	19,997	27,931	38,149
By economic sector - Manufacturing (jobs)		4,553	5,177	6,555	7,029	8,263	9,975
By economic sector - Mining (jobs)		4,809	3,803	2,843	1,734	973	167
By economic sector - Other (jobs)		561	940	1,641	4,170	6,517	8,511
By economic sector - Pipeline (jobs)		542	464	344	233	143	51.9
By economic sector - Professional (jobs)		3,276	3,734	5,508	9,903	14,042	18,493
By economic sector - Trade (jobs)		2,797	2,950	3,641	6,429	9,221	12,234
By economic sector - Utilities (jobs)		6,540	6,630	8,819	13,013	18,089	31,071
By resource sector - Biomass (jobs)		597	783	2,404	3,611	4,844	5,179
By resource sector - CO2 (jobs)		0	0.001	0.001	0.001	0.001	0.001
By resource sector - Coal (jobs)		218	0	0	0	0	0
By resource sector - Grid (jobs)		7,169	8,709	13,514	21,865	33,151	61,983

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

Item	2020	2025	2030	2035	2040	2045	2050
By resource sector - Natural Gas (jobs)		6,196	4,797	4,048	3,787	3,212	2,360
By resource sector - Nuclear (jobs)		727	715	704	693	402	0
By resource sector - Oil (jobs)		10,205	8,924	7,495	5,102	3,220	503
By resource sector - Solar (jobs)		3,492	6,441	10,842	26,608	39,430	45,812
By resource sector - Wind (jobs)		811	1,182	1,858	1,962	2,223	3,987
By education level - All sectors - High school diploma or less (jobs)		12,065	13,203	17,442	27,334	37,142	51,413
By education level - All sectors - Associates degree or some college (jobs)		8,920	9,652	12,610	20,076	27,576	38,763
By education level - All sectors - Bachelors degree (jobs)		6,621	6,826	8,450	12,572	16,825	22,940
By education level - All sectors - Masters or professional degree (jobs)		1,589	1,641	2,066	3,162	4,281	5,854
By education level - All sectors - Doctoral degree (jobs)		219	230	298	483	659	855
Related work experience - All sectors - None (jobs)		4,174	4,506	5,909	9,309	12,726	17,723
Related work experience - All sectors - Up to 1 year (jobs)		5,603	6,176	8,248	13,130	17,935	24,594
Related work experience - All sectors - 1 to 4 years (jobs)		10,814	11,509	14,782	22,799	30,905	42,827
Related work experience - All sectors - 4 to 10 years (jobs)		6,934	7,365	9,413	14,606	19,827	27,609
Related work experience - All sectors - Over 10 years (jobs)		1,890	1,994	2,513	3,783	5,088	7,072
On-the-Job Training - All sectors - None (jobs)		1,612	1,724	2,216	3,526	4,814	6,538
On-the-Job Training - All sectors - Up to 1 year (jobs)		19,581	20,959	27,134	41,687	56,455	77,796
On-the-Job Training - All sectors - 1 to 4 years (jobs)		6,105	6,556	8,475	13,371	18,253	25,677
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,834	2,003	2,648	4,429	6,138	8,715
On-the-Job Training - All sectors - Over 10 years (jobs)		283	308	393	614	823	1,099
On-Site or In-Plant Training - All sectors - None (jobs)		4,719	5,074	6,614	10,397	14,142	19,327
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		17,762	19,009	24,573	37,829	51,277	70,866
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		4,757	5,116	6,616	10,401	14,183	19,904
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,941	2,093	2,721	4,449	6,118	8,640
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		236	258	341	551	761	1,088
Wage income - All (million $2019)		1,491	1,588	2,039	3,127	4,265	6,004

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	350	323	285	238	196	170	160
Final energy use - Residential (PJ)	99.2	92.9	85.6	76.5	69.1	64.8	63
Final energy use - Commercial (PJ)	70.6	70.6	68.1	64.4	61.3	60.1	60.4
Final energy use - Industry (PJ)	201	206	208	206	206	204	203

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		2.03	2.09	3.69	3.94	2.98	3.07

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	3.71	173	342	935	1,528	2,001	2,475
Vehicle stocks - LDV – All others (1000 units)	2,064	1,965	1,866	1,360	854	483	112
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		398	1,016	1,653	2,501	2,725	2,596
Public EV charging plugs - DC Fast (1000 units)	0.053		0.878		3.92		6.35
Public EV charging plugs - L2 (1000 units)	0.175		21.1		94.3		153

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 (%)	29.5	45.1	80.4	88.3	88.7	88.6	88.6
Sales of space heating units - Electric Resistance (%)	28.6	27.1	11.4	7.85	7.68	7.79	7.8
Sales of space heating units - Gas (%)	30.2	16.4	4.98	2.47	2.38	2.36	2.35
Sales of space heating units - Fossil (%)	11.7	11.3	3.21	1.36	1.27	1.25	1.25
Sales of water heating units - Electric Heat Pump (%)	0	12.1	64	75.6	76.1	76.1	76.1
Sales of water heating units - Electric Resistance (%)	67.2	69.3	30.5	21.8	21.4	21.4	21.4
Sales of water heating units - Gas Furnace (%)	29.2	16.1	3.02	0.128	0	0	0
Sales of water heating units - Other (%)	3.59	2.49	2.46	2.47	2.48	2.48	2.49
Sales of cooking units - Electric Resistance (%)	75.8	81	96.7	99.8	100	100	100
Sales of cooking units - Gas (%)	24.2	19	3.26	0.164	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		2.27	2.78				

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	9.46	29.3	77	90.8	91.9	92	92
Sales of space heating units - Electric Resistance (%)	4.72	4.61	4.92	6.26	6.57	6.57	6.55
Sales of space heating units - Gas (%)	85.8	63.2	17.5	2.95	1.48	1.43	1.43
Sales of space heating units - Fossil (%)	0	2.89	0.56	0.024	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.153	10.6	55.7	65.7	66.1	66.2	66.2
Sales of water heating units - Electric Resistance (%)	5.64	9.97	28	32.1	32.3	32.3	32.3
Sales of water heating units - Gas (%)	92.7	77.8	14.7	0.62	0	0	0
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric Resistance (%)	43.5	55.3	83.4	88.9	89.2	89.2	89.1
Sales of cooking units - Gas (%)	56.5	44.7	16.6	11.1	10.8	10.8	10.9
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		8,123	9,222				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,610	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	11,309	11,833	11,809	11,975	9,573	9,533	13,831

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Nuclear (MW)	1,440	1,440	1,440	1,440	1,440	0	0
Installed renewables - Rooftop PV (MW)	16.9	27.3	38.6	55	78.1	108	146
Installed renewables - Solar - Base land use assumptions (MW)	49.1	2,076	5,698	12,500	31,216	56,368	90,754
Installed renewables - Wind - Base land use assumptions (MW)	0	0	0	0	205	1,597	33,504
Installed renewables - Solar - Constrained land use assumptions (MW)	49.1	2,280	5,511	14,111	35,911	67,096	101,794
Installed renewables - Wind - Constrained land use assumptions (MW)	0	0	0	3,031	13,398	13,398	14,643
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion $2018)		2.71	4.34	7.5	19.5	24.7	31.9
Capital invested - Wind - Base (billion $2018)		0	0	0	0.242	1.56	33.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	112	3,996	10,932	23,931	59,775	107,942	173,782
Wind - Base land use assumptions (GWh)	0	0	0	0	582	4,639	85,097
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	225	8,761	21,079	53,942	137,442	256,617	389,257
Wind - Constrained land use assumptions (GWh)	0	0	0	15,051	67,125	67,125	74,355
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-374
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-213
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,218
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,599
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,234
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-283
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,261
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-497
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,692
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-17,371
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-560
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-746
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,798

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-3,809
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-10,469
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-546
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4,891
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,528
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,356
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-33,702
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-746
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,278
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-8,378
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-5,109
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-15,703
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-809
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-6,522
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-6,558
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-50,122
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-5,019
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							61.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							162
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,637
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							941
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)							40.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							216
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							32.3
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,007

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							4,096
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							91.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							168
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,954
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,416
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)							58.6
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							323
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							234
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,027
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							7,273
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							122
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							173
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,272
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,882
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)							76.8
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							431
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							186
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,664
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,807

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)							-172
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-3,250
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-34.3
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-3,456
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-172
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-6,293
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-68.6
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-6,534
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							69.5
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							939
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							62.4
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,070
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							69.5
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,815
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							125
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							2,009

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)		24.9	0.026	0.024	0.016	0.01	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		9.59	6.13	5.65	4.53	1.69	0.525
Premature deaths from air pollution - Mobile - On-Road (deaths)		48.3	44.8	33.9	19.4	8.78	3.42
Premature deaths from air pollution - Gas Stations (deaths)		6.53	5.98	4.49	2.65	1.3	0.621

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		4.69	3.79	2.53	1.42	0.718	0.359
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.212	0.172	0.118	0.069	0.032	0.012
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.09	0.957	0.716	0.457	0.234	0.103
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.942	0.898	0.85	0.798	0.747	0.692
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.35	2.92	2.12	1.33	0.813	0.526
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.589	0.488	0.384	0.283	0.195	0.125
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.293	0.245	0.199	0.154	0.113	0.074
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.487	0.214	0.209	0.202	0.201	0.174
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		30.1	29	28.2	23.8	19.7	14.5
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		221	0.234	0.211	0.138	0.085	0.005
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		84.9	54.3	50.1	40.1	15	4.65
Monetary damages from air pollution - Mobile - On-Road (million $2019)		429	398	301	173	78.1	30.4
Monetary damages from air pollution - Gas Stations (million $2019)		57.9	52.9	39.8	23.5	11.5	5.5
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		41.6	33.6	22.4	12.6	6.36	3.18
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		1.88	1.52	1.05	0.615	0.283	0.109
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		9.62	8.48	6.35	4.05	2.07	0.912
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		8.34	7.95	7.52	7.07	6.61	6.13
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		29.7	25.8	18.8	11.8	7.2	4.66
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		5.21	4.32	3.4	2.5	1.73	1.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		2.6	2.17	1.76	1.37	0.997	0.653
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		4.3	1.89	1.85	1.78	1.77	1.54

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		268	257	250	211	175	129

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		203	1,126	1,680	1,709	1,711	1,172
By economic sector - Construction (jobs)		4,623	6,691	9,255	8,798	9,851	8,631
By economic sector - Manufacturing (jobs)		4,061	4,150	4,531	4,499	4,242	3,459
By economic sector - Mining (jobs)		4,876	4,260	3,575	2,448	1,979	1,393
By economic sector - Other (jobs)		276	302	521	857	1,169	701
By economic sector - Pipeline (jobs)		571	1,181	1,384	746	745	818
By economic sector - Professional (jobs)		2,692	3,478	4,977	5,786	6,352	4,798
By economic sector - Trade (jobs)		2,440	2,374	2,860	3,109	3,342	2,450
By economic sector - Utilities (jobs)		5,789	8,152	10,944	10,102	10,841	11,560
By resource sector - Biomass (jobs)		605	2,859	5,653	6,323	6,703	4,884
By resource sector - CO2 (jobs)		16.2	6,099	8,313	3,446	4,394	5,455
By resource sector - Coal (jobs)		218	0	0	0	0	0
By resource sector - Grid (jobs)		5,800	5,549	9,976	12,223	13,044	13,117
By resource sector - Natural Gas (jobs)		6,181	5,814	5,005	5,420	5,273	4,225
By resource sector - Nuclear (jobs)		727	715	704	693	682	1,580
By resource sector - Oil (jobs)		10,204	8,953	7,700	5,576	4,230	2,977
By resource sector - Solar (jobs)		1,235	1,308	2,076	3,890	5,511	2,465
By resource sector - Wind (jobs)		547	416	299	483	393	279
By education level - All sectors - High school diploma or less (jobs)		10,374	13,360	17,002	16,264	17,195	14,921
By education level - All sectors - Associates degree or some college (jobs)		7,652	9,633	12,151	11,568	12,355	10,916
By education level - All sectors - Bachelors degree (jobs)		5,902	6,844	8,264	7,937	8,274	7,114
By education level - All sectors - Masters or professional degree (jobs)		1,412	1,652	2,026	1,990	2,092	1,781
By education level - All sectors - Doctoral degree (jobs)		191	225	283	294	314	251
Related work experience - All sectors - None (jobs)		3,608	4,613	5,850	5,594	5,937	5,167
Related work experience - All sectors - Up to 1 year (jobs)		4,784	6,091	7,819	7,653	8,127	6,948
Related work experience - All sectors - 1 to 4 years (jobs)		9,444	11,617	14,424	13,769	14,508	12,614
Related work experience - All sectors - 4 to 10 years (jobs)		6,037	7,419	9,219	8,747	9,253	8,131
Related work experience - All sectors - Over 10 years (jobs)		1,659	1,973	2,414	2,292	2,405	2,122
On-the-Job Training - All sectors - None (jobs)		1,396	1,670	2,082	2,029	2,152	1,836
On-the-Job Training - All sectors - Up to 1 year (jobs)		17,086	21,056	26,316	25,391	26,714	23,020
On-the-Job Training - All sectors - 1 to 4 years (jobs)		5,262	6,625	8,298	7,800	8,301	7,387
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,546	2,069	2,673	2,497	2,706	2,429
On-the-Job Training - All sectors - Over 10 years (jobs)		242	294	359	337	356	310
On-Site or In-Plant Training - All sectors - None (jobs)		4,080	5,067	6,343	6,126	6,487	5,571
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		15,489	19,065	23,830	22,948	24,165	20,899

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

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		4,105	5,148	6,445	6,079	6,457	5,720
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,657	2,169	2,766	2,577	2,773	2,481
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		201	264	342	324	349	312
Wage income - All (million $2019)		1,314	1,631	2,040	1,961	2,087	1,856

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	350	323	285	238	196	170	160
Final energy use - Residential (PJ)	99.2	92.9	85.6	76.5	69.1	64.8	63
Final energy use - Commercial (PJ)	70.6	70.6	68.1	64.4	61.3	60.1	60.4
Final energy use - Industry (PJ)	201	206	208	206	206	204	203

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		2.03	2.09	3.69	3.94	2.98	3.07

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	3.71	173	342	935	1,528	2,001	2,475
Vehicle stocks - LDV – All others (1000 units)	2,064	1,965	1,866	1,360	854	483	112
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		398	1,016	1,653	2,501	2,725	2,596
Public EV charging plugs - DC Fast (1000 units)	0.053		0.878		3.92		6.35
Public EV charging plugs - L2 (1000 units)	0.175		21.1		94.3		153

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 (%)	29.5	45.1	80.4	88.3	88.7	88.6	88.6
Sales of space heating units - Electric Resistance (%)	28.6	27.1	11.4	7.85	7.68	7.79	7.8
Sales of space heating units - Gas (%)	30.2	16.4	4.98	2.47	2.38	2.36	2.35
Sales of space heating units - Fossil (%)	11.7	11.3	3.21	1.36	1.27	1.25	1.25
Sales of water heating units - Electric Heat Pump (%)	0	12.1	64	75.6	76.1	76.1	76.1
Sales of water heating units - Electric Resistance (%)	67.2	69.3	30.5	21.8	21.4	21.4	21.4
Sales of water heating units - Gas Furnace (%)	29.2	16.1	3.02	0.128	0	0	0
Sales of water heating units - Other (%)	3.59	2.49	2.46	2.47	2.48	2.48	2.49
Sales of cooking units - Electric Resistance (%)	75.8	81	96.7	99.8	100	100	100
Sales of cooking units - Gas (%)	24.2	19	3.26	0.164	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		2.27	2.78				

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	9.46	29.3	77	90.8	91.9	92	92
Sales of space heating units - Electric Resistance (%)	4.72	4.61	4.92	6.26	6.57	6.57	6.55
Sales of space heating units - Gas (%)	85.8	63.2	17.5	2.95	1.48	1.43	1.43
Sales of space heating units - Fossil (%)	0	2.89	0.56	0.024	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.153	10.6	55.7	65.7	66.1	66.2	66.2
Sales of water heating units - Electric Resistance (%)	5.64	9.97	28	32.1	32.3	32.3	32.3
Sales of water heating units - Gas (%)	92.7	77.8	14.7	0.62	0	0	0
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric Resistance (%)	43.5	55.3	83.4	88.9	89.2	89.2	89.1
Sales of cooking units - Gas (%)	56.5	44.7	16.6	11.1	10.8	10.8	10.9
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		8,123	9,222				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,610	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	11,309	9,801	8,049	10,629	12,114	12,194	14,760
Installed thermal - Nuclear (MW)	1,440	1,440	1,440	1,440	1,440	1,440	1,840
Installed renewables - Rooftop PV (MW)	16.9	27.3	38.6	55	78.1	108	146
Installed renewables - Solar - Base land use assumptions (MW)	49.1	2,182	2,854	4,094	7,495	12,385	12,385
Installed renewables - Solar - Constrained land use assumptions (MW)	49.1	2,357	4,482	6,491	12,991	15,897	15,993
Installed renewables - Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	420
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion $2018)		0.952	0.805	1.37	3.54	4.8	0
Capital invested - Solar PV - Constrained (billion $2018)		3.09	2.54	2.21	6.75	2.85	0.089
Capital invested - Wind - Constrained (billion $2018)		0	0	0	0	0	0.445

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	112	1,477	2,771	5,143	11,643	20,968	20,968
Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	112	4,533	8,599	12,450	24,940	30,501	30,686
Wind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	1,052
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-374

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-213
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,218
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,599
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,234
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-283
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,261
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-497
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,692
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-17,371
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-560
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-746
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,798
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-3,809
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-10,469
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-546
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4,891
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,528
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,356
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-33,702
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-746
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,278
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-8,378
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-5,109
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-15,703
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-809
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-6,522
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-6,558
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-50,122
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-5,019
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							61.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							162
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,637
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							941
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)							40.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							216
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							32.3
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,007
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							4,096
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							91.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							168
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,954
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,416
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)							58.6
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							323
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							234
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,027
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							7,273
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							122
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							173
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,272

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,882
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)							76.8
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							431
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							186
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,664
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,807

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)							-172
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-3,250
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-34.3
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-3,456
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-172
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-6,293
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-68.6
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-6,534
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							69.5
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							939
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							62.4
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,070
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							69.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,815
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							125
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							2,009

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)		24.9	0.026	0.024	0.016	0.01	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		10.3	6.12	3.09	1.95	0.99	0.438
Premature deaths from air pollution - Mobile - On-Road (deaths)		49	49.2	47.7	42.8	33.9	23.1
Premature deaths from air pollution - Gas Stations (deaths)		6.67	6.69	6.42	5.73	4.53	3.13
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		4.73	4.24	3.71	3.04	2.27	1.53
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.217	0.205	0.193	0.17	0.132	0.093
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.1	1.08	1.05	0.945	0.741	0.521
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.942	0.898	0.85	0.798	0.747	0.692
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.38	3.32	3.15	2.77	2.21	1.64
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.59	0.535	0.482	0.417	0.346	0.278
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.293	0.263	0.233	0.204	0.176	0.15
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.537	0.215	0.212	0.207	0.206	0.199
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		29.7	26.7	23	19.9	17.5	12.2
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		221	0.234	0.211	0.138	0.085	0.005
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		91.1	54.2	27.4	17.2	8.77	3.88
Monetary damages from air pollution - Mobile - On-Road (million $2019)		436	438	424	380	301	205
Monetary damages from air pollution - Gas Stations (million $2019)		59.1	59.2	56.9	50.7	40.2	27.7
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		41.9	37.6	32.9	26.9	20.1	13.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		1.92	1.82	1.71	1.51	1.17	0.828
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		9.75	9.61	9.33	8.38	6.57	4.62
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		8.34	7.95	7.52	7.07	6.61	6.13
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		29.9	29.4	27.9	24.5	19.6	14.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		5.23	4.73	4.27	3.69	3.06	2.46
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		2.6	2.33	2.06	1.81	1.56	1.33
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		4.74	1.9	1.87	1.83	1.81	1.75
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		264	237	204	177	155	108

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		201	1,320	1,223	1,792	1,805	1,598
By economic sector - Construction (jobs)		5,228	7,252	9,825	10,499	12,251	16,027
By economic sector - Manufacturing (jobs)		4,440	5,199	5,241	5,370	5,769	6,038
By economic sector - Mining (jobs)		4,846	4,151	3,480	2,774	2,361	1,450
By economic sector - Other (jobs)		391	459	885	1,444	1,927	3,104
By economic sector - Pipeline (jobs)		553	1,076	1,223	653	659	705
By economic sector - Professional (jobs)		2,967	4,043	4,809	7,185	8,347	9,438
By economic sector - Trade (jobs)		2,608	2,628	3,120	4,126	4,683	5,580
By economic sector - Utilities (jobs)		6,131	8,185	9,858	9,491	10,811	12,998
By resource sector - Biomass (jobs)		647	3,513	4,036	7,433	8,350	7,554
By resource sector - CO2 (jobs)		15.2	5,481	7,513	3,169	4,030	4,915
By resource sector - Coal (jobs)		218	0	0	0	0	0
By resource sector - Grid (jobs)		6,357	6,937	9,079	12,372	15,061	19,978
By resource sector - Natural Gas (jobs)		6,223	4,835	3,987	3,798	3,149	1,775
By resource sector - Nuclear (jobs)		727	715	704	693	682	672
By resource sector - Oil (jobs)		10,239	9,126	8,155	7,198	6,115	3,811
By resource sector - Solar (jobs)		2,158	2,610	5,170	8,040	10,421	16,910
By resource sector - Wind (jobs)		780	1,096	1,018	631	806	1,323
By education level - All sectors - High school diploma or less (jobs)		11,163	14,546	16,950	18,494	20,720	24,394
By education level - All sectors - Associates degree or some college (jobs)		8,244	10,364	12,213	13,043	14,780	17,749
By education level - All sectors - Bachelors degree (jobs)		6,254	7,373	8,226	9,140	10,141	11,439
By education level - All sectors - Masters or professional degree (jobs)		1,497	1,782	1,994	2,301	2,572	2,908
By education level - All sectors - Doctoral degree (jobs)		204	247	279	357	402	448
Related work experience - All sectors - None (jobs)		3,873	4,979	5,806	6,333	7,120	8,389

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

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - All sectors - Up to 1 year (jobs)		5,170	6,718	7,842	8,852	9,975	11,757
Related work experience - All sectors - 1 to 4 years (jobs)		10,091	12,528	14,376	15,649	17,499	20,386
Related work experience - All sectors - 4 to 10 years (jobs)		6,459	7,960	9,212	9,901	11,114	13,032
Related work experience - All sectors - Over 10 years (jobs)		1,771	2,129	2,428	2,599	2,906	3,375
On-the-Job Training - All sectors - None (jobs)		1,497	1,821	2,108	2,380	2,678	3,139
On-the-Job Training - All sectors - Up to 1 year (jobs)		18,284	22,918	26,219	29,045	32,473	37,612
On-the-Job Training - All sectors - 1 to 4 years (jobs)		5,650	7,077	8,306	8,740	9,854	11,780
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,670	2,177	2,656	2,777	3,169	3,884
On-the-Job Training - All sectors - Over 10 years (jobs)		261	320	373	392	440	523
On-Site or In-Plant Training - All sectors - None (jobs)		4,383	5,518	6,359	7,045	7,905	9,256
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		16,576	20,716	23,763	26,220	29,341	34,081
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		4,406	5,517	6,458	6,837	7,699	9,174
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,781	2,280	2,745	2,873	3,259	3,932
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		217	282	339	360	411	496
Wage income - All (million $2019)		1,397	1,747	2,015	2,212	2,497	2,910

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	351	326	298	275	258	238	214
Final energy use - Residential (PJ)	99.2	93.3	89.2	84.7	79.1	73.1	68.2
Final energy use - Commercial (PJ)	70.6	70.8	69.9	68.7	66.7	64.8	63.6
Final energy use - Industry (PJ)	201	207	209	208	209	207	206

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)		1.69	1.71	2.12	2.18	3.13	3.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	2.87	52.7	102	333	564	1,075	1,585
Vehicle stocks - LDV – All others (1000 units)	2,072	2,072	2,072	1,966	1,859	1,433	1,006
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		0	63.7	135	456	1,438	2,094
Public EV charging plugs - DC Fast (1000 units)	0.053		0.263		1.45		4.06
Public EV charging plugs - L2 (1000 units)	0.175		6.32		34.8		97.8

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 (%)	29.5	38.3	42.3	54.1	71.8	83.3	87.2
Sales of space heating units - Electric Resistance (%)	28.6	30.1	28.3	23	15.1	10.1	8.37
Sales of space heating units - Gas (%)	30.2	18.6	17.3	13.8	8.07	4.19	2.84
Sales of space heating units - Fossil (%)	11.7	12.9	12.1	9.17	5.03	2.44	1.57
Sales of water heating units - Electric Heat Pump (%)	0	2.08	7.99	25	51.1	68.1	74
Sales of water heating units - Electric Resistance (%)	67.2	76.8	72.5	59.6	40.1	27.4	23
Sales of water heating units - Gas Furnace (%)	29.2	18.6	17	12.9	6.35	2.02	0.528
Sales of water heating units - Other (%)	3.59	2.49	2.47	2.49	2.51	2.49	2.49
Sales of cooking units - Electric Resistance (%)	75.7	76.4	78.6	84.4	92.6	97.6	99.4
Sales of cooking units - Gas (%)	24.3	23.6	21.4	15.6	7.42	2.39	0.644
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		2.25	2.65				

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	9.46	20.2	25.6	41.4	66.1	83.2	89.6
Sales of space heating units - Electric Resistance (%)	4.72	4.61	4.65	4.77	5.23	5.91	6.33
Sales of space heating units - Gas (%)	85.8	71.8	66.6	51.4	27.5	10.5	3.93
Sales of space heating units - Fossil (%)	0	3.34	3.16	2.39	1.19	0.387	0.102
Sales of water heating units - Electric Heat Pump (%)	0.153	1.96	7.08	21.8	44.4	59.2	64.3
Sales of water heating units - Electric Resistance (%)	5.64	6.47	8.38	14.4	23.5	29.5	31.6
Sales of water heating units - Gas (%)	92.7	90	83	62.2	30.5	9.74	2.53
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric Resistance (%)	43.5	47.1	51.3	61.6	76.1	85	88
Sales of cooking units - Gas (%)	56.5	52.9	48.7	38.4	23.9	15	12
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		8,119	9,209				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,610	514	0	0	0	0	0
Installed thermal - Natural gas (MW)	11,309	11,425	10,510	9,315	7,770	4,599	5,086
Installed thermal - Nuclear (MW)	1,440	1,440	1,440	1,440	1,440	1,440	1,440
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	10.1	11.5	24	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	11,378	24,305	51,189	51,189	51,189
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	9	19	40	40	40
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	5	5
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment - Cumulative 5-yr (million $2018)		0	9,299	10,565	21,971	4,675	0
Biomass purchases (million $2018/y)		0	701	1,498	3,156	3,563	3,563

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	11.3	24.1	50.7	56.7	57
Annual - BECCS (MMT)		0	11.3	24	50.6	56.7	56.5
Annual - NGCC (MMT)		0	0	0.1	0.08	0.07	0.56
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	11.3	35.4	86.1	143	200
Cumulative - BECCS (MMT)		0	11.3	35.3	86	143	199
Cumulative - NGCC (MMT)		0	0	0.1	0.18	0.25	0.81
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	487	973	1,214	1,214	1,214
Spur (km)		0	350	822	1,958	2,566	2,471
All (km)		0	837	1,795	3,172	3,780	3,685
Cumulative investment - Trunk (million $2018)		0	3,096	6,192	8,002	8,002	8,002
Cumulative investment - Spur (million $2018)		0	434	909	2,297	2,923	2,787
Cumulative investment - All (million $2018)		0	3,530	7,100	10,298	10,924	10,789

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	7.39	36.4	71.3	98.5	104
Injection wells (wells)		0	8	34	60	100	124
Resource characterization, appraisal, permitting costs (million $2020)		32.8	810	1,299	1,299	1,299	1,299
Wells and facilities construction costs (million $2020)		0	257	1,000	1,782	2,980	3,700

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)							-374
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-213
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,218
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,599
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,234
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-283
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,261
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-497
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,692
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-17,371
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-560
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-746
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,798
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-3,809
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-10,469
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-546
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4,891
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,528
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,356
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-33,702
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-746
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,278
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-8,378
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-5,109
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-15,703
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-809
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-6,522
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-6,558
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-50,122
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-5,019

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							61.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							162
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,637
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							941
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)							40.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							216
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							32.3
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,007
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							4,096
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							91.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							168
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,954
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,416
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)							58.6
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							323
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							234
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,027
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							7,273
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							122
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							173

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,272
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,882
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)							76.8
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							431
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							186
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,664
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,807

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)							-637
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-2,929
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-29.1
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)							-3,594
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-637
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-5,685
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-58.1
Carbon sink potential - Aggressive deployment - Cropland to woody energy crops (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Pasture to energy crops (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-6,380

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							257
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							848
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							52.9
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							119
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							265
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,542
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							257
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							4,057
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							106
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							119
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							265
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							4,803

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)		107	71.4	48.7	39.3	35.9	35.6
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		10.7	11.3	11.9	11.4	11.6	12
Premature deaths from air pollution - Mobile - On-Road (deaths)		49	49.9	50.9	52	53.2	54.3
Premature deaths from air pollution - Gas Stations (deaths)		6.65	6.75	6.82	6.94	7.04	7.12
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		4.65	4.16	3.73	3.46	3.33	3.23
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.212	0.181	0.134	0.09	0.057	0.038
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.03	0.978	0.946	0.933	0.923	0.907
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.984	0.983	0.975	0.964	0.951	0.933

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		3.39	3.26	2.96	2.65	2.52	2.58
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		0.613	0.611	0.598	0.574	0.554	0.543
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		0.307	0.312	0.317	0.322	0.326	0.331
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		1.15	0.795	0.641	0.602	0.576	0.534
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		29.9	31.4	31.9	30.4	30	28
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		950	633	432	349	318	316
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		94.8	100	105	101	103	106
Monetary damages from air pollution - Mobile - On-Road (million $2019)		436	444	452	463	473	483
Monetary damages from air pollution - Gas Stations (million $2019)		58.8	59.7	60.4	61.5	62.4	63.1
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		41.2	36.9	33.1	30.6	29.5	28.6
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		1.88	1.6	1.19	0.8	0.503	0.333
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		9.13	8.67	8.38	8.27	8.18	8.04
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		8.71	8.7	8.64	8.54	8.42	8.26
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		30	28.9	26.2	23.4	22.3	22.8
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		5.43	5.4	5.29	5.08	4.9	4.81
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		2.71	2.76	2.81	2.85	2.89	2.93
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		10.1	7.02	5.65	5.31	5.08	4.72
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		265	278	284	270	267	248

Table 65: *REF scenario - IMPACTS - Jobs*

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		195	184	183	166	166	173
By economic sector - Construction (jobs)		4,454	4,695	5,105	5,618	6,498	6,754
By economic sector - Manufacturing (jobs)		3,348	3,517	3,595	3,679	3,602	3,544
By economic sector - Mining (jobs)		4,911	4,120	3,436	2,774	2,300	1,790

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		192	204	248	413	587	491
By economic sector - Pipeline (jobs)		569	598	610	577	582	570
By economic sector - Professional (jobs)		2,731	2,610	2,631	2,794	3,082	2,941
By economic sector - Trade (jobs)		2,465	2,280	2,192	2,223	2,373	2,196
By economic sector - Utilities (jobs)		6,477	6,539	6,941	7,105	7,961	8,941
By resource sector - Biomass (jobs)		613	581	550	508	511	512
By resource sector - CO2 (jobs)		0	0.053	0.068	0.073	0.08	0.086
By resource sector - Coal (jobs)		352	192	182	65.7	0	0
By resource sector - Grid (jobs)		6,864	7,292	7,969	7,561	8,740	11,447
By resource sector - Natural Gas (jobs)		6,475	6,398	6,525	7,054	7,639	7,053
By resource sector - Nuclear (jobs)		727	715	704	693	682	672
By resource sector - Oil (jobs)		10,286	9,235	8,375	7,608	7,012	6,111
By resource sector - Solar (jobs)			183	450	1,479	2,328	1,441
By resource sector - Wind (jobs)		25.6	152	187	380	239	163
By education level - All sectors - High school diploma or less (jobs)		10,231	10,108	10,284	10,506	11,328	11,558
By education level - All sectors - Associates degree or some college (jobs)		7,609	7,497	7,638	7,852	8,509	8,661
By education level - All sectors - Bachelors degree (jobs)		5,889	5,617	5,522	5,496	5,745	5,648
By education level - All sectors - Masters or professional degree (jobs)		1,421	1,348	1,323	1,318	1,384	1,358
By education level - All sectors - Doctoral degree (jobs)		191	179	175	176	185	175
Related work experience - All sectors - None (jobs)		3,591	3,525	3,576	3,656	3,946	4,007
Related work experience - All sectors - Up to 1 year (jobs)		4,683	4,600	4,658	4,765	5,132	5,198
Related work experience - All sectors - 1 to 4 years (jobs)		9,408	9,159	9,202	9,316	9,946	10,009
Related work experience - All sectors - 4 to 10 years (jobs)		6,019	5,868	5,908	6,001	6,423	6,472
Related work experience - All sectors - Over 10 years (jobs)		1,641	1,596	1,598	1,610	1,704	1,713
On-the-Job Training - All sectors - None (jobs)		1,376	1,324	1,316	1,333	1,420	1,406
On-the-Job Training - All sectors - Up to 1 year (jobs)		16,916	16,472	16,532	16,727	17,817	17,923
On-the-Job Training - All sectors - 1 to 4 years (jobs)		5,252	5,165	5,252	5,374	5,808	5,912
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,567	1,559	1,612	1,679	1,857	1,910
On-the-Job Training - All sectors - Over 10 years (jobs)		232	228	229	235	251	248
On-Site or In-Plant Training - All sectors - None (jobs)		4,022	3,904	3,916	3,987	4,261	4,256
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		15,352	14,961	15,028	15,210	16,219	16,344
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		4,090	4,022	4,086	4,175	4,505	4,583
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		1,676	1,659	1,703	1,759	1,927	1,970
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		202	202	210	218	239	247
Wage income - All (million $2019)		1,314	1,293	1,312	1,338	1,441	1,469

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	350	326	299	283	283	291	302

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Residential (PJ)	99.2	93.5	91	89.7	89.7	90.9	92.4
Final energy use - Commercial (PJ)	70.6	71.9	72.2	72.2	72.8	74.9	78.5
Final energy use - Industry (PJ)	201	210	218	222	228	232	238

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		2.32	2.41	3.75	3.99	3.1	3.21

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 (%)	26.6	55.5	56.3	57.6	58.8	60.4	62.7
Sales of space heating units - Electric Resistance (%)	29.8	23.9	23.5	22.8	21.8	20.4	18
Sales of space heating units - Gas (%)	31.4	13.8	13.3	12.9	12.8	12.7	12.7
Sales of space heating units - Fossil (%)	12.2	6.81	6.91	6.74	6.58	6.52	6.54
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	67.2	78.4	78.5	78.3	78.1	78.1	78
Sales of water heating units - Gas Furnace (%)	29.2	19.2	19	19.2	19.4	19.4	19.5
Sales of water heating units - Other (%)	3.59	2.49	2.47	2.49	2.52	2.51	2.52
Sales of cooking units - Electric Resistance (%)	75.5	75.5	75.5	75.5	75.5	75.5	75.5
Sales of cooking units - Gas (%)	24.5	24.5	24.5	24.5	24.5	24.5	24.5
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		2.2	2.3				

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	9.46	31.9	71.2	79	79.3	79.4	79.4
Sales of space heating units - Electric Resistance (%)	4.72	6.4	12	15.8	18.7	19.2	19.2
Sales of space heating units - Gas (%)	85.8	59	16.4	5.24	1.95	1.48	1.43
Sales of space heating units - Fossil (%)	0	2.67	0.47	0.024	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.153	0.153	0.147	0.149	0.149	0.145	0.148
Sales of water heating units - Electric Resistance (%)	5.64	5.74	5.58	5.66	5.62	5.55	5.6
Sales of water heating units - Gas (%)	92.7	92.5	92.7	92.6	92.7	92.7	92.7
Sales of water heating units - Other (%)	1.56	1.58	1.58	1.58	1.58	1.57	1.56
Sales of cooking units - Electric Resistance (%)	43.5	45.6	45.9	45.7	46	45.9	45.7
Sales of cooking units - Gas (%)	56.5	54.4	54.1	54.3	54	54.1	54.3
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		7,974	8,300				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	1,610	514	514	514	0	0	0
Installed thermal - Natural gas (MW)	11,309	11,833	12,981	12,256	11,003	15,039	21,477
Installed thermal - Nuclear (MW)	1,440	1,440	1,440	1,440	1,440	1,440	1,440
Installed renewables - Rooftop PV (MW)	16.9	27.3	38.6	55	78.1	108	146

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed renewables - Solar - Base land use assumptions (MW)	49.1	49.1	49.1	347	1,971	4,007	4,940

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	112	112	112	315	3,278	7,193	8,028
Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0

Table 72: *REF scenario - PILLAR 6: Land sinks - Forests - REF only*

Item	2020	2025	2030	2035	2040	2045	2050
Business-as-usual carbon sink - Natural uptake (Mt CO2e/y)	-32.9		-14.9				-12.1
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-4.27		-7.13				-7.5
Business-as-usual carbon sink - Total (Mt CO2e/y)	-37.1		-22				-19.6

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)							-374
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-213
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,218
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,599
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,234
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-283
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,261
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-497
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,692
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-17,371
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-560
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-746
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,798
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-3,809
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-10,469
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-546
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4,891
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,528

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,356
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-33,702
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-746
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,278
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-8,378
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-5,109
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-15,703
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-809
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-6,522
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-6,558
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-50,122
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-5,019
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							61.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							162
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,637
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							941
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)							40.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							216
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							32.3
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,007
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							4,096
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							91.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							168
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,954

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,416
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)							58.6
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							323
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							234
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,027
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							7,273
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							122
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							173
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,272
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,882
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)							76.8
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							431
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							186
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,664
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,807