Net-Zero America - Texas data

October 29, 2021 (updated January 9, 2022)

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

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Contents

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		111	0.1	0.095	0.072	0.046	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		78.4	44.6	25.6	24.5	11.3	7.6
Premature deaths from air pollution - Mobile - On-Road (deaths)		526	508	400	239	113	46.3
Premature deaths from air pollution - Gas Stations (deaths)		37.3	35.6	27.9	17.2	8.73	4.36
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		52.3	42.4	27.9	15.3	7.66	4
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.402	0.348	0.257	0.164	0.087	0.042
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		5.98	5.5	4.39	3.11	1.93	1.2
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.4	2.39	2.36	2.31	2.25	2.17
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		40.9	36.8	26.4	15.9	9.42	6.26
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		23.9	20.2	16.7	13.3	9.94	6.76
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		4.34	3.82	3.27	2.68	2.05	1.41
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		5.63	1.35	1.34	1.3	1.31	1.32
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		761	743	703	566	435	279
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		983	0.882	0.838	0.635	0.411	0.005
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		695	395	227	217	100	67.3
Monetary damages from air pollution - Mobile - On-Road (million $2019)		4,679	4,521	3,556	2,127	1,004	411
Monetary damages from air pollution - Gas Stations (million $2019)		330	315	247	152	77.3	38.6
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		464	376	247	136	67.9	35.4
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		3.56	3.09	2.28	1.45	0.767	0.374
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		53	48.8	38.9	27.5	17.1	10.6
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		21.3	21.2	20.9	20.5	19.9	19.2
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		363	326	234	141	83.4	55.4

Table 1: *E+ scenario - IMPACTS - Health (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		211	179	148	117	88	59.8
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		38.4	33.9	29	23.7	18.2	12.5
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		49.7	12	11.8	11.5	11.6	11.6
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		6,756	6,595	6,239	5,025	3,867	2,480

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		805	1,402	2,133	2,255	2,132	1,631
By economic sector - Construction (jobs)		106,785	129,714	154,498	172,879	181,688	206,695
By economic sector - Manufacturing (jobs)		124,690	134,840	148,388	132,639	109,273	109,276
By economic sector - Mining (jobs)		181,192	144,017	111,632	73,299	47,779	26,498
By economic sector - Other (jobs)		7,528	10,754	14,941	19,351	22,705	29,380
By economic sector - Pipeline (jobs)		12,107	11,629	10,239	8,242	6,545	4,759
By economic sector - Professional (jobs)		75,893	87,576	103,313	115,512	125,118	143,277
By economic sector - Trade (jobs)		83,689	83,849	86,762	84,848	84,840	91,423
By economic sector - Utilities (jobs)		68,133	83,110	103,165	124,695	135,473	164,986
By resource sector - Biomass (jobs)		2,156	3,546	5,675	6,554	7,807	7,073
By resource sector - CO2 (jobs)		3,800	7,363	3,775	4,355	6,081	7,013
By resource sector - Coal (jobs)		3,731	443	64.5	54.3	47.5	41.4
By resource sector - Grid (jobs)		74,045	112,530	163,572	206,944	234,159	297,868
By resource sector - Natural Gas (jobs)		164,883	131,138	100,627	78,324	52,576	33,973
By resource sector - Nuclear (jobs)		2,594	2,000	944	345	0.018	0.032
By resource sector - Oil (jobs)		307,881	278,453	250,309	183,956	139,185	88,861
By resource sector - Solar (jobs)		41,739	53,809	70,695	81,267	83,416	103,379
By resource sector - Wind (jobs)		59,992	97,608	139,410	171,922	192,283	239,718
By education level - All sectors - High school diploma or less (jobs)		264,872	278,680	300,876	300,978	292,584	317,784
By education level - All sectors - Associates degree or some college (jobs)		190,895	202,230	220,391	225,106	222,616	246,549
By education level - All sectors - Bachelors degree (jobs)		161,162	161,689	167,515	161,912	155,380	165,065
By education level - All sectors - Masters or professional degree (jobs)		38,318	38,602	40,282	39,690	38,916	41,973
By education level - All sectors - Doctoral degree (jobs)		5,575	5,690	6,008	6,035	6,058	6,553
Related work experience - All sectors - None (jobs)		91,274	95,645	103,068	103,783	101,747	111,213
Related work experience - All sectors - Up to 1 year (jobs)		124,022	130,684	141,731	142,526	139,386	152,674
Related work experience - All sectors - 1 to 4 years (jobs)		246,143	254,255	270,433	268,355	260,961	282,174
Related work experience - All sectors - 4 to 10 years (jobs)		155,511	161,347	172,342	172,416	168,603	183,527
Related work experience - All sectors - Over 10 years (jobs)		43,870	44,960	47,497	46,641	44,857	48,337
On-the-Job Training - All sectors - None (jobs)		37,799	38,575	40,647	40,070	38,933	42,106
On-the-Job Training - All sectors - Up to 1 year (jobs)		449,435	464,545	494,702	489,086	473,584	511,461

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)		131,019	137,810	148,992	151,301	149,171	164,141
On-the-Job Training - All sectors - 4 to 10 years (jobs)		36,082	39,213	43,530	46,177	47,086	52,917
On-the-Job Training - All sectors - Over 10 years (jobs)		6,486	6,749	7,200	7,087	6,779	7,300
On-Site or In-Plant Training - All sectors - None (jobs)		107,067	111,081	118,852	118,791	116,082	126,627
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		406,119	419,878	447,200	442,551	428,838	463,505
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		103,013	108,171	116,732	117,964	115,873	127,028
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		39,892	42,588	46,509	48,351	48,659	53,932
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		4,730	5,173	5,778	6,063	6,101	6,832
Wage income - All (million $2019)		38,985	40,223	42,702	42,347	41,371	44,806

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		953	866	729	597	492	401
Oil consumption - Cumulative (million bbls)							22,296
Oil production - Annual (million bbls)		2,881	2,891	2,887	2,287	1,859	1,237
Natural gas consumption - Annual (tcf)		3,431	2,892	2,320	1,746	1,099	762
Natural gas consumption - Cumulative (tcf)							69,865
Natural gas production - Annual (tcf)		8,345	7,888	6,870	5,809	4,607	3,578

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	2,702	2,603	2,334	2,008	1,714	1,533	1,453
Final energy use - Residential (PJ)	833	805	759	696	642	616	611
Final energy use - Commercial (PJ)	700	703	680	646	618	611	621
Final energy use - Industry (PJ)	3,891	4,374	4,672	4,814	4,969	5,063	5,241

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)		22.7	23.6	38.5	41	31.3	32.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	205	2,011	3,817	10,137	16,458	21,509	26,560
Vehicle stocks - LDV – All others (1000 units)	22,147	21,088	20,029	14,596	9,163	5,184	1,205
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		4,242	10,921	17,620	26,721	29,049	27,715
Public EV charging plugs - DC Fast (1000 units)	0.675		7.03		30.3		48.9
Public EV charging plugs - L2 (1000 units)	3.14		169		728		1,176

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 (%)	14.3	29.1	74.6	84.7	85.2	85	85
Sales of space heating units - Electric Resistance (%)	43.4	42.6	17.9	12.3	12.1	12.4	12.4
Sales of space heating units - Gas (%)	39.3	23.7	5.17	1.03	0.847	0.825	0.821
Sales of space heating units - Fossil (%)	3.05	4.67	2.39	1.88	1.84	1.81	1.8
Sales of water heating units - Electric Heat Pump (%)	0	11.9	63.1	74.6	75.1	75.1	75.1
Sales of water heating units - Electric Resistance (%)	53.8	58.4	30.1	23.6	23.3	23.4	23.4
Sales of water heating units - Gas Furnace (%)	44.2	28	5.25	0.218	0	0	0
Sales of water heating units - Other (%)	2.01	1.61	1.59	1.56	1.56	1.57	1.57
Sales of cooking units - Electric Resistance (%)	63.8	71.5	95.1	99.8	100	100	100
Sales of cooking units - Gas (%)	36.2	28.5	4.87	0.245	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		22.2	28.7				

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 (%)	6.39	26.3	76.9	91.1	92.2	92.2	92.2
Sales of space heating units - Electric Resistance (%)	5.23	4.51	4.79	6.09	6.39	6.41	6.42
Sales of space heating units - Gas Furnace (%)	88.4	69.2	18.3	2.84	1.39	1.35	1.34
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.154	10.7	56.3	66.5	66.9	66.9	66.9
Sales of water heating units - Electric Resistance (%)	4.33	8.13	26.9	31.1	31.3	31.3	31.3
Sales of water heating units - Gas Furnace (%)	93.4	79.3	15	0.631	0	0	0
Sales of water heating units - Other (%)	2.08	1.83	1.82	1.82	1.83	1.83	1.83
Sales of cooking units - Electric Resistance (%)	30.1	44.4	79.2	86.1	86.5	86.4	86.5
Sales of cooking units - Gas (%)	69.9	55.6	20.8	13.9	13.5	13.6	13.5
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		92,591	107,907				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	20,084	2,765	0	0	0	0	0
Installed thermal - Natural gas (MW)	76,283	59,528	75,855	83,366	77,071	86,706	87,053
Installed thermal - Nuclear (MW)	5,139	5,139	2,430	1,215	0.007	0.013	0.025
Installed renewables - Rooftop PV (MW)	609	1,096	1,822	2,940	4,591	6,804	9,761
Installed renewables - Solar - Base land use assumptions (MW)	6,934	24,355	44,506	70,235	97,738	125,194	159,544
Installed renewables - Wind - Base land use assumptions (MW)	36,857	49,364	72,059	95,027	130,660	155,833	174,995
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	76.2	129	221	221	255	8,930
Installed renewables - Solar - Constrained land use assumptions (MW)	7,241	34,988	58,746	83,968	105,648	137,737	177,060
Installed renewables - Wind - Constrained land use assumptions (MW)	37,952	50,913	82,251	108,688	145,187	171,203	189,068

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	8,930
Capital invested - Solar PV - Base (billion $2018)		22.9	24.1	28.4	28.6	26.9	31.8
Capital invested - Wind - Base (billion $2018)		16.8	30.2	28.5	42.1	28.2	20.3
Capital invested - Offshore Wind - Base (billion $2018)		0.216	0.126	0.189	0	0.05	10.9
Capital invested - Solar PV - Constrained (billion $2018)		51.1	28.6	29.6	27.3	30.1	37.5
Capital invested - Wind - Constrained (billion $2018)		29	40.5	35.5	44	29.7	19.1
Capital invested - Biomass power plant (billion $2018)	0	0.002	0.136	0	0.009	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0.027	0.002	0.015	0.031
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	6.41	0	0	0.016	0.258

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	18,855	60,468	108,964	168,900	231,062	292,119	369,496
Wind - Base land use assumptions (GWh)	149,083	192,289	274,698	356,368	482,279	570,294	634,757
OffshoreWind - Base land use assumptions (GWh)	0	301	508	871	871	1,004	33,643
Solar - Constrained land use assumptions (GWh)	18,650	84,307	136,045	191,587	239,205	309,500	393,736
Wind - Constrained land use assumptions (GWh)	149,083	195,933	296,153	383,373	504,669	590,257	648,515
OffshoreWind - Constrained land use assumptions (GWh)	0	301	508	871	871	1,004	33,643
Biomass power plant (GWh)	0	4.22	271	271	290	290	290
Biomass w/ccu power plant (GWh)	0	0	7,189	7,189	7,189	7,207	7,496
Biomass w/ccu allam power plant (GWh)	0	0	0	26.8	28.5	43.7	74.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	1	1	1	1	1	1
Number of facilities - Power ccu (quantity)	0	0	5	6	6	7	8
Number of facilities - Allam power w ccu (quantity)	0	0	0	1	3	5	5
Number of facilities - Beccs hydrogen (quantity)	0	0	0	6	13	25	25
Number of facilities - Diesel (quantity)	0	0	0	1	1	1	1
Number of facilities - Diesel ccu (quantity)	0	0	0	1	3	5	5
Number of facilities - Pyrolysis (quantity)	0	0	0	1	1	1	1
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	1	3	5	5
Number of facilities - Sng (quantity)	0	1	1	1	1	1	1
Number of facilities - Sng ccu (quantity)	0	0	1	1	1	2	2
Conversion capital investment - Cumulative 5-yr (million $2018)		2.44	6,027	6,686	6,128	7,284	551
Biomass purchases (million $2018/y)		0.873	298	662	997	1,394	1,420

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	10.6	27.5	42.6	56.2	64.6
Annual - BECCS (MMT)		0	7.12	15.6	23.2	32.6	33.2
Annual - NGCC (MMT)		0	0.22	8.53	12.8	16.8	17.3
Annual - Cement and lime (MMT)		0	3.24	3.35	6.64	6.84	14.1
Cumulative - All (MMT)		0	10.6	38.1	80.7	137	202
Cumulative - BECCS (MMT)		0	7.12	22.8	46	78.6	112
Cumulative - NGCC (MMT)		0	0.22	8.75	21.5	38.3	55.6
Cumulative - Cement and lime (MMT)		0	3.24	6.59	13.2	20.1	34.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		708	1,529	1,529	1,529	1,529	1,529
Spur (km)		0	496	2,197	3,696	5,528	6,279
All (km)		708	2,025	3,726	5,225	7,057	7,808
Cumulative investment - Trunk (million $2018)		3,706	9,440	9,440	9,440	9,440	9,440
Cumulative investment - Spur (million $2018)		0	430	1,491	2,610	3,772	4,329
Cumulative investment - All (million $2018)		3,706	9,870	10,931	12,050	13,213	13,770

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	28.5	93.4	169	270	363
Injection wells (wells)		0	24	97	174	290	362
Resource characterization, appraisal, permitting costs (million $2020)		157	2,677	4,202	4,202	4,202	4,202
Wells and facilities construction costs (million $2020)		0	751	2,927	5,217	8,723	10,830

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)							-4,475
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-1,120
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-5,776
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,334
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-4,376
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-1,429
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-19,303
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-2,993
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-6,540
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-47,345
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-6,703
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-3,918

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-10,406
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1,955
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-8,752
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-2,756
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-28,954
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-21,254
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-12,970
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-97,668
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-8,931
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-6,717
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-15,037
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,622
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-13,128
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-4,082
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-38,605
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-39,514
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-148,038
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-19,401
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							731
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							854
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,938
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							483
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)							204
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							1,276
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							195
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							3,891

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							10,571
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							1,096
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							882
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							5,303
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							727
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)							296
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							1,914
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							1,407
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							7,837
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							19,461
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							1,461
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							909
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							7,668
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							966
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)							388
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							2,552
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							1,123
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							6,431
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							21,498

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)							-322
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-7,102
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-307
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-7,732
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-322
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-13,586
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-615
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-14,523
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							208
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							5,592
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							499
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							6,299
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							208
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							10,684
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							999
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							11,891

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)		111	0.1	0.095	0.072	0.046	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		79.5	35.9	18.1	10.5	4.65	3.29
Premature deaths from air pollution - Mobile - On-Road (deaths)		535	559	563	524	430	304
Premature deaths from air pollution - Gas Stations (deaths)		38.1	39.7	39.7	36.8	30.3	21.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		53	49.7	45.4	38	28.2	18.6
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.411	0.411	0.403	0.372	0.314	0.249
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		6.05	6.31	6.49	6.14	5.11	3.89
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.4	2.39	2.36	2.31	2.25	2.17
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		41.4	43.6	43.7	39.6	31.7	23
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		23.9	21.6	19.6	17.6	15.6	13.6
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		4.34	4.1	3.84	3.54	3.21	2.87
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		5.35	1.37	1.39	1.38	1.32	1.16
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		759	717	650	592	543	391
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		983	0.882	0.838	0.635	0.411	0.005
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		704	318	160	92.6	41.2	29.2
Monetary damages from air pollution - Mobile - On-Road (million $2019)		4,756	4,973	5,004	4,655	3,823	2,700
Monetary damages from air pollution - Gas Stations (million $2019)		337	352	352	326	268	192
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		469	440	402	337	250	165
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		3.65	3.64	3.57	3.3	2.79	2.2
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		53.6	55.9	57.5	54.4	45.3	34.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		21.3	21.2	20.9	20.5	19.9	19.2
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		367	386	387	350	280	203
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		211	192	174	156	138	120
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		38.4	36.3	34	31.3	28.4	25.4
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		47.2	12.1	12.2	12.2	11.6	10.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		6,740	6,368	5,776	5,260	4,823	3,469

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		835	2,767	3,299	3,712	2,939	1,631
By economic sector - Construction (jobs)		109,331	133,431	145,913	170,456	203,830	241,784
By economic sector - Manufacturing (jobs)		126,494	136,697	137,868	137,869	143,393	146,934
By economic sector - Mining (jobs)		181,035	141,637	108,093	82,093	63,290	37,994
By economic sector - Other (jobs)		7,779	11,148	13,660	18,035	24,286	32,496
By economic sector - Pipeline (jobs)		12,441	11,952	10,229	9,686	9,112	7,039
By economic sector - Professional (jobs)		76,551	89,744	99,707	117,473	141,424	170,004
By economic sector - Trade (jobs)		84,039	84,452	84,380	89,079	99,122	110,131
By economic sector - Utilities (jobs)		69,490	84,958	93,859	115,447	144,596	188,380
By resource sector - Biomass (jobs)		2,202	7,165	10,250	14,962	12,514	6,837
By resource sector - CO2 (jobs)		6,454	12,430	6,427	7,573	10,428	11,888
By resource sector - Coal (jobs)		3,464	315	65.9	56.4	47.7	38.1
By resource sector - Grid (jobs)		74,281	113,951	146,201	188,350	250,331	339,165
By resource sector - Natural Gas (jobs)		164,362	122,417	85,656	65,979	48,995	37,266
By resource sector - Nuclear (jobs)		2,594	2,000	944	345	0.022	0.038
By resource sector - Oil (jobs)		308,239	280,334	255,274	228,015	200,056	130,891
By resource sector - Solar (jobs)		44,164	56,531	59,886	71,362	89,304	104,880
By resource sector - Wind (jobs)		62,238	101,643	132,304	167,208	220,314	305,428
By education level - All sectors - High school diploma or less (jobs)		268,035	283,518	285,365	305,328	341,136	382,410
By education level - All sectors - Associates degree or some college (jobs)		193,278	205,162	207,580	225,158	256,210	295,192
By education level - All sectors - Bachelors degree (jobs)		162,463	163,334	159,818	166,511	182,458	200,360
By education level - All sectors - Masters or professional degree (jobs)		38,607	39,011	38,464	40,633	45,184	50,553
By education level - All sectors - Doctoral degree (jobs)		5,613	5,761	5,781	6,221	7,004	7,878
Related work experience - All sectors - None (jobs)		92,328	97,158	97,684	104,957	117,934	133,419
Related work experience - All sectors - Up to 1 year (jobs)		125,507	133,109	134,516	144,569	162,323	183,512
Related work experience - All sectors - 1 to 4 years (jobs)		248,654	257,651	256,705	272,724	303,877	340,099
Related work experience - All sectors - 4 to 10 years (jobs)		157,193	163,423	163,196	174,318	195,438	220,807
Related work experience - All sectors - Over 10 years (jobs)		44,314	45,445	44,908	47,281	52,420	58,556
On-the-Job Training - All sectors - None (jobs)		38,175	39,101	38,708	40,920	45,416	50,678
On-the-Job Training - All sectors - Up to 1 year (jobs)		454,040	471,275	470,013	498,461	553,765	617,806
On-the-Job Training - All sectors - 1 to 4 years (jobs)		132,609	139,711	140,509	151,611	171,719	196,554
On-the-Job Training - All sectors - 4 to 10 years (jobs)		36,602	39,854	40,977	45,676	53,132	62,490
On-the-Job Training - All sectors - Over 10 years (jobs)		6,570	6,845	6,802	7,181	7,959	8,865
On-Site or In-Plant Training - All sectors - None (jobs)		108,249	112,795	112,770	120,422	134,880	152,396
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		410,302	425,852	424,683	450,615	500,999	559,498

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

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		104,237	109,678	110,217	118,567	133,809	152,341
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		40,412	43,206	43,908	48,222	55,339	64,019
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		4,797	5,256	5,430	6,024	6,964	8,139
Wage income - All (million $2019)		39,346	40,676	40,582	43,186	48,281	54,126

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	2,704	2,621	2,420	2,258	2,136	1,994	1,823
Final energy use - Residential (PJ)	833	808	795	778	738	694	660
Final energy use - Commercial (PJ)	700	704	700	693	678	663	655
Final energy use - Industry (PJ)	3,891	4,375	4,678	4,836	5,002	5,094	5,266

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)		19.1	19.6	24.1	25.1	33.9	35.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	159	689	1,220	3,677	6,134	11,573	17,012
Vehicle stocks - LDV – All others (1000 units)	22,237	22,237	22,237	21,093	19,949	15,373	10,796
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		0	695	1,441	4,884	15,313	22,329
Public EV charging plugs - DC Fast (1000 units)	0.675		2.24		11.3		31.3
Public EV charging plugs - L2 (1000 units)	3.14		54		272		753

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 (%)	14.3	20.3	25.5	40.5	63.3	78.1	83.3
Sales of space heating units - Electric Resistance (%)	43.4	47.3	44.3	36.1	23.8	16	13.2
Sales of space heating units - Gas (%)	39.3	27.2	25.2	19.3	9.88	3.69	1.58
Sales of space heating units - Fossil (%)	3.05	5.12	4.92	4.14	2.95	2.18	1.92
Sales of water heating units - Electric Heat Pump (%)	0	2.05	7.87	24.6	50.4	67.2	73
Sales of water heating units - Electric Resistance (%)	53.8	63.9	60.9	51.6	37.2	27.8	24.5
Sales of water heating units - Gas Furnace (%)	44.2	32.4	29.6	22.2	10.9	3.45	0.893
Sales of water heating units - Other (%)	2.01	1.61	1.6	1.59	1.6	1.58	1.57
Sales of cooking units - Electric Resistance (%)	63.7	64.6	68	76.7	88.9	96.4	99
Sales of cooking units - Gas (%)	36.3	35.4	32	23.3	11.1	3.58	0.964
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		21.9	27.1				

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 (%)	6.39	16.7	22.6	39.2	65.2	83.1	89.8
Sales of space heating units - Electric Resistance (%)	5.23	4.51	4.54	4.7	5.13	5.79	6.22
Sales of space heating units - Gas Furnace (%)	88.4	78.8	72.9	56.1	29.7	11.1	4.01
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.154	1.96	7.14	22.1	44.9	59.9	65.1
Sales of water heating units - Electric Resistance (%)	4.33	4.5	6.61	12.8	22.2	28.4	30.5
Sales of water heating units - Gas Furnace (%)	93.4	91.7	84.4	63.3	31	9.9	2.58
Sales of water heating units - Other (%)	2.08	1.83	1.82	1.82	1.83	1.83	1.83
Sales of cooking units - Electric Resistance (%)	30.1	34.2	39	52	70.1	81.2	85
Sales of cooking units - Gas (%)	69.9	65.8	61	48	29.9	18.8	15
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		92,535	107,526				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	20,084	3,331	0	0	0	0	0
Installed thermal - Natural gas (MW)	77,827	64,353	76,818	79,630	69,723	66,960	66,718
Installed thermal - Nuclear (MW)	5,139	5,139	2,430	1,215	0.009	0.016	0.03

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)							-4,475
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-1,120
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-5,776
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,334
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-4,376
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-1,429
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-19,303
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-2,993
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-6,540
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-47,345
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-6,703
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-3,918
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-10,406
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1,955
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-8,752

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-2,756
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-28,954
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-21,254
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-12,970
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-97,668
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-8,931
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-6,717
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-15,037
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,622
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-13,128
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-4,082
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-38,605
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-39,514
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-148,038
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-19,401
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							731
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							854
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,938
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							483
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)							204
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							1,276
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							195
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							3,891
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							10,571
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							1,096

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							882
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							5,303
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							727
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)							296
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							1,914
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							1,407
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							7,837
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							19,461
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							1,461
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							909
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							7,668
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							966
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)							388
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							2,552
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							1,123
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							6,431
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							21,498

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)							-322

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-7,102
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-307
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-7,732
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-322
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-13,586
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-615
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-14,523
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							208
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							5,592
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							499
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							6,299
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							208
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							10,684
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							999
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							11,891

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)		111	0.1	0.095	0.072	0.046	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		69.2	40.1	16.9	13.6	6.04	3.26
Premature deaths from air pollution - Mobile - On-Road (deaths)		526	508	400	239	113	46.3
Premature deaths from air pollution - Gas Stations (deaths)		37.3	35.6	27.9	17.2	8.73	4.36
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		52.3	42.4	27.9	15.3	7.66	4
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.402	0.348	0.257	0.164	0.087	0.042

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		5.98	5.5	4.39	3.11	1.93	1.2
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.4	2.39	2.36	2.31	2.25	2.17
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		40.9	36.8	26.4	15.9	9.42	6.26
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		23.9	20.2	16.7	13.3	9.94	6.76
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		4.34	3.82	3.27	2.68	2.05	1.41
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		6.35	1.36	1.34	1.3	1.3	0.964
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		749	733	659	491	313	49.7
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		983	0.882	0.838	0.635	0.411	0.005
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		613	355	150	121	53.5	28.9
Monetary damages from air pollution - Mobile - On-Road (million $2019)		4,679	4,521	3,556	2,127	1,004	411
Monetary damages from air pollution - Gas Stations (million $2019)		330	315	247	152	77.3	38.6
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		464	376	247	136	67.9	35.4
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		3.56	3.09	2.28	1.45	0.767	0.374
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		53	48.8	38.9	27.5	17.1	10.6
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		21.3	21.2	20.9	20.5	19.9	19.2
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		363	326	234	141	83.4	55.4
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		211	179	148	117	88	59.8
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		38.4	33.9	29	23.7	18.2	12.5
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		56	12	11.8	11.4	11.5	8.51
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		6,649	6,506	5,852	4,362	2,779	441

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		806	957	2,015	2,096	1,827	1,632
By economic sector - Construction (jobs)		113,294	133,513	182,457	222,464	286,514	342,081
By economic sector - Manufacturing (jobs)		129,224	146,350	174,669	168,539	180,060	177,357
By economic sector - Mining (jobs)		179,194	141,540	104,760	64,005	34,593	4,889
By economic sector - Other (jobs)		8,793	11,503	19,244	27,515	42,432	52,377
By economic sector - Pipeline (jobs)		11,493	10,733	9,331	6,832	4,554	1,018
By economic sector - Professional (jobs)		79,169	90,673	119,695	147,704	191,392	239,660
By economic sector - Trade (jobs)		85,495	85,280	94,314	100,339	120,126	139,534
By economic sector - Utilities (jobs)		70,708	84,929	122,488	159,645	211,486	287,935
By resource sector - Biomass (jobs)		2,103	2,336	5,123	6,521	6,815	7,290
By resource sector - CO2 (jobs)		0	0.003	0.003	0.004	0.004	0.003
By resource sector - Coal (jobs)		4,562	849	64.4	54.1	47.3	34.1
By resource sector - Grid (jobs)		83,077	121,522	205,285	279,686	386,224	544,300
By resource sector - Natural Gas (jobs)		160,086	127,424	88,816	62,810	37,242	15,967
By resource sector - Nuclear (jobs)		2,594	2,000	1,188	1,169	1,151	668
By resource sector - Oil (jobs)		307,891	278,178	244,130	169,555	110,198	20,005
By resource sector - Solar (jobs)		51,525	63,060	99,494	127,852	197,858	190,976
By resource sector - Wind (jobs)		66,338	110,109	184,872	251,494	333,448	467,244
By education level - All sectors - High school diploma or less (jobs)		272,559	286,538	340,617	369,625	440,828	508,205
By education level - All sectors - Associates degree or some college (jobs)		196,489	208,293	251,309	279,518	340,217	402,595
By education level - All sectors - Bachelors degree (jobs)		164,339	165,418	185,655	194,655	226,208	258,660
By education level - All sectors - Masters or professional degree (jobs)		39,089	39,422	44,716	47,997	56,888	66,617
By education level - All sectors - Doctoral degree (jobs)		5,699	5,807	6,676	7,344	8,842	10,406
Related work experience - All sectors - None (jobs)		93,735	98,149	116,417	127,317	152,913	178,407
Related work experience - All sectors - Up to 1 year (jobs)		127,927	134,834	161,584	176,963	213,179	247,710
Related work experience - All sectors - 1 to 4 years (jobs)		252,199	260,702	303,456	326,830	387,714	448,737
Related work experience - All sectors - 4 to 10 years (jobs)		159,412	165,561	194,132	211,106	252,178	294,395
Related work experience - All sectors - Over 10 years (jobs)		44,903	46,231	53,384	56,924	66,999	77,233
On-the-Job Training - All sectors - None (jobs)		38,767	39,579	45,670	49,032	58,355	67,227
On-the-Job Training - All sectors - Up to 1 year (jobs)		460,917	477,362	556,457	597,283	707,046	814,972
On-the-Job Training - All sectors - 1 to 4 years (jobs)		134,606	141,500	168,950	186,603	225,600	265,913
On-the-Job Training - All sectors - 4 to 10 years (jobs)		37,211	40,060	49,695	57,436	71,590	86,600
On-the-Job Training - All sectors - Over 10 years (jobs)		6,675	6,977	8,201	8,786	10,392	11,771
On-Site or In-Plant Training - All sectors - None (jobs)		109,977	114,280	134,556	146,520	175,730	204,633
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		416,497	431,337	503,002	540,394	640,196	738,630
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		105,827	111,088	132,183	145,183	174,806	204,973
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		40,995	43,450	52,611	59,487	72,931	87,055
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		4,879	5,323	6,621	7,555	9,321	11,192
Wage income - All (million $2019)		39,812	41,109	47,471	50,988	60,423	70,299

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	2,702	2,603	2,334	2,008	1,714	1,533	1,453
Final energy use - Residential (PJ)	833	805	759	696	642	616	611
Final energy use - Commercial (PJ)	700	703	680	646	618	611	621
Final energy use - Industry (PJ)	3,891	4,374	4,672	4,814	4,969	5,063	5,241

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)		22.7	23.6	38.5	41	31.3	32.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	205	2,011	3,817	10,137	16,458	21,509	26,560
Vehicle stocks - LDV – All others (1000 units)	22,147	21,088	20,029	14,596	9,163	5,184	1,205
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		4,242	10,921	17,620	26,721	29,049	27,715
Public EV charging plugs - DC Fast (1000 units)	0.675		7.03		30.3		48.9
Public EV charging plugs - L2 (1000 units)	3.14		169		728		1,176

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 (%)	14.3	29.1	74.6	84.7	85.2	85	85
Sales of space heating units - Electric Resistance (%)	43.4	42.6	17.9	12.3	12.1	12.4	12.4
Sales of space heating units - Gas (%)	39.3	23.7	5.17	1.03	0.847	0.825	0.821
Sales of space heating units - Fossil (%)	3.05	4.67	2.39	1.88	1.84	1.81	1.8
Sales of water heating units - Electric Heat Pump (%)	0	11.9	63.1	74.6	75.1	75.1	75.1
Sales of water heating units - Electric Resistance (%)	53.8	58.4	30.1	23.6	23.3	23.4	23.4
Sales of water heating units - Gas Furnace (%)	44.2	28	5.25	0.218	0	0	0
Sales of water heating units - Other (%)	2.01	1.61	1.59	1.56	1.56	1.57	1.57
Sales of cooking units - Electric Resistance (%)	63.8	71.5	95.1	99.8	100	100	100
Sales of cooking units - Gas (%)	36.2	28.5	4.87	0.245	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		22.2	28.7				

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 (%)	6.39	26.3	76.9	91.1	92.2	92.2	92.2
Sales of space heating units - Electric Resistance (%)	5.23	4.51	4.79	6.09	6.39	6.41	6.42
Sales of space heating units - Gas Furnace (%)	88.4	69.2	18.3	2.84	1.39	1.35	1.34
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.154	10.7	56.3	66.5	66.9	66.9	66.9
Sales of water heating units - Electric Resistance (%)	4.33	8.13	26.9	31.1	31.3	31.3	31.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	93.4	79.3	15	0.631	0	0	0
Sales of water heating units - Other (%)	2.08	1.83	1.82	1.82	1.83	1.83	1.83
Sales of cooking units - Electric Resistance (%)	30.1	44.4	79.2	86.1	86.5	86.4	86.5
Sales of cooking units - Gas (%)	69.9	55.6	20.8	13.9	13.5	13.6	13.5
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		92,591	107,907				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	20,084	5,819	0	0	0	0	0
Installed thermal - Natural gas (MW)	87,218	64,914	80,190	85,917	75,004	88,032	92,139
Installed thermal - Nuclear (MW)	5,139	5,139	2,430	2,430	2,430	2,430	0
Installed renewables - Rooftop PV (MW)	609	1,096	1,822	2,940	4,591	6,804	9,761
Installed renewables - Solar - Base land use assumptions (MW)	7,276	30,112	50,033	88,652	135,871	217,532	299,686
Installed renewables - Wind - Base land use assumptions (MW)	37,952	55,095	79,638	122,001	190,708	259,192	342,094
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	76.2	129	221	330	410	14,559
Installed renewables - Solar - Constrained land use assumptions (MW)	7,281	32,445	61,813	105,803	146,630	208,221	294,697
Installed renewables - Wind - Constrained land use assumptions (MW)	41,743	61,441	94,159	141,387	213,078	293,691	415,945
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	8,930
Capital invested - Solar PV - Base (billion $2018)		30.6	23.9	42.6	49.1	80.1	76.1
Capital invested - Wind - Base (billion $2018)		25.2	32.7	52.6	81.2	76.8	87.8
Capital invested - Offshore Wind - Base (billion $2018)		0.216	0.126	0.189	0.189	0.118	17.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	18,855	74,393	122,020	211,416	317,645	502,868	686,864
Wind - Base land use assumptions (GWh)	149,083	213,500	301,669	452,469	689,464	919,753	1,194,501
OffshoreWind - Base land use assumptions (GWh)	0	301	508	871	1,297	1,609	52,389
Solar - Constrained land use assumptions (GWh)	37,709	150,779	278,185	465,913	642,528	910,260	1,282,937
Wind - Constrained land use assumptions (GWh)	298,167	438,291	647,119	960,456	1,428,028	1,930,548	2,650,418
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	67,286

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)							-4,475
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-1,120
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-5,776
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,334

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-4,376
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-1,429
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-19,303
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-2,993
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-6,540
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-47,345
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-6,703
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-3,918
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-10,406
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1,955
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-8,752
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-2,756
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-28,954
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-21,254
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-12,970
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-97,668
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-8,931
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-6,717
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-15,037
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,622
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-13,128
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-4,082
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-38,605
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-39,514
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-148,038
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-19,401
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							731
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							854
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,938

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							483
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)							204
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							1,276
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							195
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							3,891
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							10,571
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							1,096
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							882
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							5,303
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							727
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)							296
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							1,914
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							1,407
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							7,837
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							19,461
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							1,461
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							909
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							7,668
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							966
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							388
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							2,552
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							1,123
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							6,431
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							21,498

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)							-322
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-7,102
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-307
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-7,732
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-322
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-13,586
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-615
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-14,523
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							208
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							5,592
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							499
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							6,299
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							208
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							10,684
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							999

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							11,891

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)		111	0.1	0.095	0.072	0.046	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		76	57.1	42.4	35.9	16.3	9.06
Premature deaths from air pollution - Mobile - On-Road (deaths)		526	508	400	239	113	46.3
Premature deaths from air pollution - Gas Stations (deaths)		37.3	35.6	27.9	17.2	8.73	4.36
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		52.3	42.4	27.9	15.3	7.66	4
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.402	0.348	0.257	0.164	0.087	0.042
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		5.98	5.5	4.39	3.11	1.93	1.2
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.4	2.39	2.36	2.31	2.25	2.17
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		40.9	36.8	26.4	15.9	9.42	6.26
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		23.9	20.2	16.7	13.3	9.94	6.76
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		4.34	3.82	3.27	2.68	2.05	1.41
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		4.92	1.35	1.34	1.3	1.31	0.963
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		769	772	782	680	584	447
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		983	0.882	0.838	0.635	0.411	0.005
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		674	506	376	318	145	80.3
Monetary damages from air pollution - Mobile - On-Road (million $2019)		4,679	4,521	3,556	2,127	1,004	411
Monetary damages from air pollution - Gas Stations (million $2019)		330	315	247	152	77.3	38.6
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		464	376	247	136	67.9	35.4
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		3.56	3.09	2.28	1.45	0.767	0.374
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		53	48.8	38.9	27.5	17.1	10.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		21.3	21.2	20.9	20.5	19.9	19.2
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		363	326	234	141	83.4	55.4
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		211	179	148	117	88	59.8
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		38.4	33.9	29	23.7	18.2	12.5
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		43.4	11.9	11.8	11.5	11.6	8.5
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		6,832	6,853	6,942	6,037	5,190	3,965

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		825	2,925	3,332	3,065	2,385	1,630
By economic sector - Construction (jobs)		102,633	109,511	107,823	113,054	114,584	122,102
By economic sector - Manufacturing (jobs)		117,987	111,741	105,928	96,677	81,990	64,901
By economic sector - Mining (jobs)		183,082	149,117	121,711	84,518	60,169	38,468
By economic sector - Other (jobs)		6,752	7,960	7,797	9,794	11,985	16,162
By economic sector - Pipeline (jobs)		12,692	12,628	11,319	9,770	8,473	7,034
By economic sector - Professional (jobs)		73,182	76,675	77,779	79,176	79,270	80,056
By economic sector - Trade (jobs)		82,349	78,274	73,845	66,166	61,502	58,639
By economic sector - Utilities (jobs)		65,652	68,035	72,970	84,016	84,502	94,249
By resource sector - Biomass (jobs)		2,116	7,307	10,648	10,970	9,359	6,882
By resource sector - CO2 (jobs)		7,281	14,098	7,320	8,495	11,700	13,396
By resource sector - Coal (jobs)		3,205	192	64.4	54.2	47.5	34
By resource sector - Grid (jobs)		67,221	78,964	100,532	119,652	125,971	146,256
By resource sector - Natural Gas (jobs)		167,651	139,476	124,197	110,286	87,223	69,374
By resource sector - Nuclear (jobs)		2,594	2,000	944	345	0.159	0.622
By resource sector - Oil (jobs)		307,871	278,453	250,308	183,950	142,253	99,731
By resource sector - Solar (jobs)		35,664	37,655	27,881	33,050	40,915	59,228
By resource sector - Wind (jobs)		51,551	58,720	60,609	79,434	87,394	88,338
By education level - All sectors - High school diploma or less (jobs)		258,089	249,276	236,459	223,023	206,465	198,290
By education level - All sectors - Associates degree or some college (jobs)		185,825	178,980	170,151	163,578	153,538	150,248
By education level - All sectors - Bachelors degree (jobs)		158,146	147,998	137,838	124,791	112,872	104,569
By education level - All sectors - Masters or professional degree (jobs)		37,623	35,379	33,113	30,281	27,735	26,111
By education level - All sectors - Doctoral degree (jobs)		5,471	5,233	4,942	4,562	4,252	4,023
Related work experience - All sectors - None (jobs)		89,084	85,791	81,440	77,105	71,681	69,289
Related work experience - All sectors - Up to 1 year (jobs)		120,547	116,085	109,725	103,714	96,330	92,915
Related work experience - All sectors - 1 to 4 years (jobs)		240,674	229,590	216,626	201,823	185,860	176,900
Related work experience - All sectors - 4 to 10 years (jobs)		151,972	144,953	136,798	128,481	118,915	113,961

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

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - All sectors - Over 10 years (jobs)		42,878	40,447	37,914	35,113	32,074	30,174
On-the-Job Training - All sectors - None (jobs)		36,952	34,849	32,455	29,899	27,454	26,138
On-the-Job Training - All sectors - Up to 1 year (jobs)		438,834	418,479	394,607	366,920	336,877	319,126
On-the-Job Training - All sectors - 1 to 4 years (jobs)		127,849	122,830	116,428	111,092	103,844	101,140
On-the-Job Training - All sectors - 4 to 10 years (jobs)		35,210	34,727	33,460	33,147	31,936	32,344
On-the-Job Training - All sectors - Over 10 years (jobs)		6,310	5,980	5,553	5,177	4,751	4,492
On-Site or In-Plant Training - All sectors - None (jobs)		104,415	99,480	93,400	87,540	80,975	77,576
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		396,599	378,170	356,660	331,912	304,960	289,398
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		100,519	96,557	91,512	86,938	81,025	78,575
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		39,024	38,116	36,517	35,476	33,728	33,531
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		4,598	4,542	4,414	4,369	4,174	4,160
Wage income - All (million $2019)		38,234	36,703	34,940	32,564	30,109	28,661

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	2,702	2,603	2,334	2,008	1,714	1,533	1,453
Final energy use - Residential (PJ)	833	805	759	696	642	616	611
Final energy use - Commercial (PJ)	700	703	680	646	618	611	621
Final energy use - Industry (PJ)	3,891	4,374	4,672	4,814	4,969	5,063	5,241

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)		22.7	23.6	38.5	41	31.3	32.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	205	2,011	3,817	10,137	16,458	21,509	26,560
Vehicle stocks - LDV – All others (1000 units)	22,147	21,088	20,029	14,596	9,163	5,184	1,205
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		4,242	10,921	17,620	26,721	29,049	27,715
Public EV charging plugs - DC Fast (1000 units)	0.675		7.03		30.3		48.9
Public EV charging plugs - L2 (1000 units)	3.14		169		728		1,176

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 (%)	14.3	29.1	74.6	84.7	85.2	85	85
Sales of space heating units - Electric Resistance (%)	43.4	42.6	17.9	12.3	12.1	12.4	12.4
Sales of space heating units - Gas (%)	39.3	23.7	5.17	1.03	0.847	0.825	0.821
Sales of space heating units - Fossil (%)	3.05	4.67	2.39	1.88	1.84	1.81	1.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Electric Heat Pump (%)	0	11.9	63.1	74.6	75.1	75.1	75.1
Sales of water heating units - Electric Resistance (%)	53.8	58.4	30.1	23.6	23.3	23.4	23.4
Sales of water heating units - Gas Furnace (%)	44.2	28	5.25	0.218	0	0	0
Sales of water heating units - Other (%)	2.01	1.61	1.59	1.56	1.56	1.57	1.57
Sales of cooking units - Electric Resistance (%)	63.8	71.5	95.1	99.8	100	100	100
Sales of cooking units - Gas (%)	36.2	28.5	4.87	0.245	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		22.2	28.7				

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 (%)	6.39	26.3	76.9	91.1	92.2	92.2	92.2
Sales of space heating units - Electric Resistance (%)	5.23	4.51	4.79	6.09	6.39	6.41	6.42
Sales of space heating units - Gas Furnace (%)	88.4	69.2	18.3	2.84	1.39	1.35	1.34
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.154	10.7	56.3	66.5	66.9	66.9	66.9
Sales of water heating units - Electric Resistance (%)	4.33	8.13	26.9	31.1	31.3	31.3	31.3
Sales of water heating units - Gas Furnace (%)	93.4	79.3	15	0.631	0	0	0
Sales of water heating units - Other (%)	2.08	1.83	1.82	1.82	1.83	1.83	1.83
Sales of cooking units - Electric Resistance (%)	30.1	44.4	79.2	86.1	86.5	86.4	86.5
Sales of cooking units - Gas (%)	69.9	55.6	20.8	13.9	13.5	13.6	13.5
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		92,591	107,907				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	20,084	879	0	0	0	0	0
Installed thermal - Natural gas (MW)	74,095	55,322	52,932	63,429	62,644	66,636	71,355
Installed thermal - Nuclear (MW)	5,139	5,139	2,430	1,215	0.02	0.085	0.341
Installed renewables - Rooftop PV (MW)	609	1,096	1,822	2,940	4,591	6,804	9,761
Installed renewables - Solar - Base land use assumptions (MW)	7,276	24,105	40,148	43,222	50,890	65,845	90,428
Installed renewables - Wind - Base land use assumptions (MW)	37,952	42,785	49,721	53,569	68,374	77,997	86,070
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	76.2	76.2	129	129	129	129
Installed renewables - Solar - Constrained land use assumptions (MW)	7,281	34,490	61,888	69,125	76,292	90,636	111,348
Installed renewables - Wind - Constrained land use assumptions (MW)	37,952	42,860	51,183	63,086	80,764	91,347	98,532
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion $2018)		25.2	19.9	3.81	7.97	14.7	23.2
Capital invested - Wind - Base (billion $2018)		7.11	9.23	4.77	17.5	10.8	8.55

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Offshore Wind - Base (billion $2018)		0.216	0	0.107	0	0	0
Capital invested - Solar PV - Constrained (billion $2018)		36.4	32.8	7.97	7.44	14.1	19.2
Capital invested - Wind - Constrained (billion $2018)		7.22	11.1	14.8	20.9	11.9	7.61

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	18,855	64,740	104,775	112,953	130,682	165,164	222,995
Wind - Base land use assumptions (GWh)	149,083	167,638	193,628	207,268	260,631	294,820	322,744
OffshoreWind - Base land use assumptions (GWh)	0	301	301	508	508	508	508
Solar - Constrained land use assumptions (GWh)	18,855	81,042	140,947	157,020	173,102	204,785	249,159
Wind - Constrained land use assumptions (GWh)	149,083	167,831	197,061	227,982	286,208	322,408	346,549
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)							-4,475
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-1,120
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-5,776
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,334
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-4,376
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-1,429
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-19,303
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-2,993
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-6,540
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-47,345
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-6,703
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-3,918
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-10,406
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1,955
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-8,752
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-2,756
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-28,954
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-21,254

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-12,970
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-97,668
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-8,931
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-6,717
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-15,037
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,622
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-13,128
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-4,082
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-38,605
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-39,514
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-148,038
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-19,401
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							731
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							854
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,938
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							483
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)							204
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							1,276
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							195
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							3,891
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							10,571
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							1,096
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							882
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							5,303

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							727
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)							296
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							1,914
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							1,407
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							7,837
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							19,461
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							1,461
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							909
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							7,668
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							966
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)							388
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							2,552
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							1,123
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							6,431
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							21,498

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)							-322
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-7,102
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-307
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-7,732

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-322
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-13,586
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-615
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-14,523
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							208
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							5,592
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							499
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							6,299
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							208
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							10,684
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							999
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							11,891

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)		111	0.1	0.095	0.072	0.046	0.001
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		72.8	37.1	23.3	20.3	9.81	6.41
Premature deaths from air pollution - Mobile - On-Road (deaths)		535	559	563	524	430	304
Premature deaths from air pollution - Gas Stations (deaths)		38.1	39.7	39.7	36.8	30.3	21.7
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		53	49.7	45.4	38	28.2	18.6
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.411	0.411	0.403	0.372	0.314	0.249
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		6.05	6.31	6.49	6.14	5.11	3.89
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.4	2.39	2.36	2.31	2.25	2.17
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		41.4	43.6	43.7	39.6	31.7	23

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		23.9	21.6	19.6	17.6	15.6	13.6
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		4.34	4.1	3.84	3.54	3.21	2.87
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		5.6	1.36	1.39	1.38	1.39	1.36
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		759	717	650	592	543	391
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		983	0.882	0.838	0.635	0.411	0.005
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		645	328	206	180	86.9	56.8
Monetary damages from air pollution - Mobile - On-Road (million $2019)		4,756	4,973	5,004	4,655	3,823	2,700
Monetary damages from air pollution - Gas Stations (million $2019)		337	352	352	326	268	192
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		469	440	402	337	250	165
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		3.65	3.64	3.57	3.3	2.79	2.2
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		53.6	55.9	57.5	54.4	45.3	34.5
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		21.3	21.2	20.9	20.5	19.9	19.2
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		367	386	387	350	280	203
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		211	192	174	156	138	120
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		38.4	36.3	34	31.3	28.4	25.4
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		49.4	12	12.2	12.2	12.3	12
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		6,740	6,368	5,776	5,260	4,823	3,469

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		821	2,485	6,546	6,255	6,047	5,878
By economic sector - Construction (jobs)		109,509	134,344	142,027	148,718	168,103	197,985
By economic sector - Manufacturing (jobs)		127,014	137,396	132,202	115,254	118,643	124,111
By economic sector - Mining (jobs)		180,421	141,321	108,733	83,140	63,742	36,551
By economic sector - Other (jobs)		7,770	11,183	12,888	14,830	18,665	26,560
By economic sector - Pipeline (jobs)		12,405	11,971	10,301	9,794	9,124	6,840
By economic sector - Professional (jobs)		76,740	90,157	101,343	107,423	121,833	141,864

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Trade (jobs)		84,122	84,681	84,055	82,758	86,581	91,638
By economic sector - Utilities (jobs)		69,892	85,928	91,439	98,918	119,201	153,631
By resource sector - Biomass (jobs)		2,176	6,411	21,411	25,605	27,958	27,834
By resource sector - CO2 (jobs)		6,621	12,548	6,484	7,884	10,792	11,997
By resource sector - Coal (jobs)		3,877	519	66	56.6	49.4	42.4
By resource sector - Grid (jobs)		74,748	115,150	142,288	157,553	201,609	273,402
By resource sector - Natural Gas (jobs)		162,969	122,062	86,329	67,202	49,514	35,787
By resource sector - Nuclear (jobs)		2,594	2,000	700	0.009	0.019	0.038
By resource sector - Oil (jobs)		308,243	280,335	255,275	228,738	201,017	126,425
By resource sector - Solar (jobs)		43,519	55,806	52,856	54,317	63,700	95,746
By resource sector - Wind (jobs)		63,950	104,636	124,125	125,734	157,300	213,825
By education level - All sectors - High school diploma or less (jobs)		268,359	284,530	282,774	273,798	292,556	322,826
By education level - All sectors - Associates degree or some college (jobs)		193,544	206,149	203,998	199,224	215,957	244,689
By education level - All sectors - Bachelors degree (jobs)		162,556	163,872	158,604	151,283	158,150	168,490
By education level - All sectors - Masters or professional degree (jobs)		38,622	39,137	38,343	37,047	39,160	42,417
By education level - All sectors - Doctoral degree (jobs)		5,614	5,777	5,816	5,738	6,117	6,636
Related work experience - All sectors - None (jobs)		92,426	97,529	96,767	94,185	101,008	112,162
Related work experience - All sectors - Up to 1 year (jobs)		125,682	133,594	133,433	129,339	138,832	154,892
Related work experience - All sectors - 1 to 4 years (jobs)		248,887	258,603	254,086	245,350	260,746	285,132
Related work experience - All sectors - 4 to 10 years (jobs)		157,350	164,112	161,020	155,986	166,638	184,017
Related work experience - All sectors - Over 10 years (jobs)		44,352	45,628	44,229	42,231	44,716	48,855
On-the-Job Training - All sectors - None (jobs)		38,204	39,236	38,350	36,894	39,039	42,655
On-the-Job Training - All sectors - Up to 1 year (jobs)		454,516	472,923	466,063	448,715	476,380	520,593
On-the-Job Training - All sectors - 1 to 4 years (jobs)		132,756	140,360	138,174	134,645	145,177	162,954
On-the-Job Training - All sectors - 4 to 10 years (jobs)		36,643	40,071	40,289	40,502	44,635	51,483
On-the-Job Training - All sectors - Over 10 years (jobs)		6,577	6,876	6,658	6,335	6,709	7,373
On-Site or In-Plant Training - All sectors - None (jobs)		108,365	113,228	111,648	107,803	115,095	127,583
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		410,727	427,368	420,810	405,400	430,656	471,076
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		104,352	110,166	108,489	105,514	113,451	126,658
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		40,447	43,420	43,252	43,051	46,872	52,998
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		4,805	5,285	5,336	5,325	5,865	6,743
Wage income - All (million $2019)		39,367	40,812	40,245	39,117	41,730	45,535

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	2,704	2,621	2,420	2,258	2,136	1,994	1,823
Final energy use - Residential (PJ)	833	808	795	778	738	694	660
Final energy use - Commercial (PJ)	700	704	700	693	678	663	655
Final energy use - Industry (PJ)	3,891	4,375	4,678	4,836	5,002	5,094	5,266

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)		19.1	19.6	24.1	25.1	33.9	35.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	159	689	1,220	3,677	6,134	11,573	17,012
Vehicle stocks - LDV – All others (1000 units)	22,237	22,237	22,237	21,093	19,949	15,373	10,796
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million $2018)		0	695	1,441	4,884	15,313	22,329
Public EV charging plugs - DC Fast (1000 units)	0.675		2.24		11.3		31.3
Public EV charging plugs - L2 (1000 units)	3.14		54		272		753

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 (%)	14.3	20.3	25.5	40.5	63.3	78.1	83.3
Sales of space heating units - Electric Resistance (%)	43.4	47.3	44.3	36.1	23.8	16	13.2
Sales of space heating units - Gas (%)	39.3	27.2	25.2	19.3	9.88	3.69	1.58
Sales of space heating units - Fossil (%)	3.05	5.12	4.92	4.14	2.95	2.18	1.92
Sales of water heating units - Electric Heat Pump (%)	0	2.05	7.87	24.6	50.4	67.2	73
Sales of water heating units - Electric Resistance (%)	53.8	63.9	60.9	51.6	37.2	27.8	24.5
Sales of water heating units - Gas Furnace (%)	44.2	32.4	29.6	22.2	10.9	3.45	0.893
Sales of water heating units - Other (%)	2.01	1.61	1.6	1.59	1.6	1.58	1.57
Sales of cooking units - Electric Resistance (%)	63.7	64.6	68	76.7	88.9	96.4	99
Sales of cooking units - Gas (%)	36.3	35.4	32	23.3	11.1	3.58	0.964
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		21.9	27.1				

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 (%)	6.39	16.7	22.6	39.2	65.2	83.1	89.8
Sales of space heating units - Electric Resistance (%)	5.23	4.51	4.54	4.7	5.13	5.79	6.22
Sales of space heating units - Gas Furnace (%)	88.4	78.8	72.9	56.1	29.7	11.1	4.01
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.154	1.96	7.14	22.1	44.9	59.9	65.1
Sales of water heating units - Electric Resistance (%)	4.33	4.5	6.61	12.8	22.2	28.4	30.5
Sales of water heating units - Gas Furnace (%)	93.4	91.7	84.4	63.3	31	9.9	2.58
Sales of water heating units - Other (%)	2.08	1.83	1.82	1.82	1.83	1.83	1.83
Sales of cooking units - Electric Resistance (%)	30.1	34.2	39	52	70.1	81.2	85
Sales of cooking units - Gas (%)	69.9	65.8	61	48	29.9	18.8	15
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		92,535	107,526				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	20,084	1,795	0	0	0	0	0
Installed thermal - Natural gas (MW)	79,060	62,903	77,484	76,825	63,353	68,186	67,433
Installed thermal - Nuclear (MW)	5,139	5,139	2,430	0.005	0.008	0.015	0.028
Capital invested - Biomass power plant (billion $2018)	0	0.003	0.009	0	0.014	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0.038	0.015	0.013	0.05
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	15.1	11.6	27.2	1	9.41

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	5	22.5	22.5	51.8	51.8	51.8
Biomass w/ccu power plant (GWh)	0	0	16,905	29,918	60,456	61,582	72,147
Biomass w/ccu allam power plant (GWh)	0	0	0	38.2	53.4	66.8	116

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	1	1	1	2	2	2
Number of facilities - Power ccu (quantity)	0	0	14	24	48	49	58
Number of facilities - Allam power w ccu (quantity)	0	0	0	1	3	4	5
Number of facilities - Beccs hydrogen (quantity)	0	0	0	44	50	65	70
Number of facilities - Diesel (quantity)	0	0	0	1	2	2	2
Number of facilities - Diesel ccu (quantity)	0	0	0	1	3	4	4
Number of facilities - Pyrolysis (quantity)	0	0	0	1	2	2	2
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	1	2	3
Number of facilities - Sng (quantity)	0	1	1	1	1	1	1
Number of facilities - Sng ccu (quantity)	0	0	1	1	1	1	1
Conversion capital investment - Cumulative 5-yr (million $2018)		2.92	13,826	48,977	30,237	15,040	13,128
Biomass purchases (million $2018/y)		3.03	1,085	5,343	7,752	9,088	10,150

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	20	82.3	123	145	171
Annual - BECCS (MMT)		0	16.7	78.8	116	135	151
Annual - NGCC (MMT)		0	0.01	0.15	0.12	2.93	6.25
Annual - Cement and lime (MMT)		0	3.24	3.35	6.64	6.84	14.1
Cumulative - All (MMT)		0	20	102	225	370	541
Cumulative - BECCS (MMT)		0	16.7	95.6	211	346	497
Cumulative - NGCC (MMT)		0	0.01	0.16	0.28	3.21	9.46
Cumulative - Cement and lime (MMT)		0	3.24	6.59	13.2	20.1	34.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		708	1,529	2,070	2,350	2,350	2,350
Spur (km)		0	857	3,162	5,051	7,043	8,625
All (km)		708	2,386	5,232	7,401	9,393	10,975

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

Item	2020	2025	2030	2035	2040	2045	2050
Cumulative investment - Trunk (million $2018)		3,706	9,698	13,077	15,200	15,200	15,200
Cumulative investment - Spur (million $2018)		0	773	3,345	5,344	7,146	8,819
Cumulative investment - All (million $2018)		3,706	10,471	16,421	20,544	22,345	24,019

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual (MMT)		0	39.7	179	356	492	519
Injection wells (wells)		0	38	148	264	442	549
Resource characterization, appraisal, permitting costs (million $2020)		157	4,112	6,534	6,534	6,534	6,534
Wells and facilities construction costs (million $2020)		0	1,143	4,456	7,942	13,279	16,486

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)							-4,475
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-1,120
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-5,776
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,334
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-4,376
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-1,429
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-19,303
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-2,993
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-6,540
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-47,345
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-6,703
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-3,918
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-10,406
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1,955
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-8,752
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-2,756
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-28,954
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-21,254
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-12,970
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-97,668

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-8,931
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-6,717
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-15,037
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,622
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-13,128
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-4,082
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-38,605
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-39,514
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-148,038
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-19,401
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							731
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							854
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,938
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							483
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)							204
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							1,276
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							195
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							3,891
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							10,571
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							1,096
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							882
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							5,303
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							727

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							296
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							1,914
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							1,407
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							7,837
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							19,461
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							1,461
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							909
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							7,668
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							966
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)							388
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							2,552
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							1,123
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							6,431
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							21,498

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)							-1,972
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-6,549
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-271
Carbon sink potential - Moderate deployment - Cropland to woody energy crops (1000 tCO2e/y)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Pasture to energy crops (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-8,793
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-1,972
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-12,539
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-543
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)							-15,055
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							1,265
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							5,049
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							442
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							203
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							5,475
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							12,434
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							1,265
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							23,841
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							885
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							203
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							5,475
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							31,668

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)		587	219	126	98.7	88.7	78.8
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		93	109	120	98.2	82.6	91.8
Premature deaths from air pollution - Mobile - On-Road (deaths)		534	566	599	635	671	709
Premature deaths from air pollution - Gas Stations (deaths)		37.9	40.1	42.1	44.5	46.8	49.1
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		51.9	48.8	46.3	45.3	46	47.2
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		0.41	0.381	0.31	0.232	0.168	0.131
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		5.71	5.83	6.1	6.48	6.91	7.33
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		2.51	2.61	2.71	2.79	2.86	2.92
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		41.3	41.2	38.6	36.3	36.9	40.8
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		24.9	25.6	26.6	27.5	28.5	29.6
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		4.53	4.87	5.22	5.57	5.94	6.34
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		13.9	9.51	7.64	7.37	7.21	6.83
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		763	829	876	867	887	852
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million $2019)		5,202	1,940	1,113	875	786	699
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million $2019)		824	962	1,064	870	732	813
Monetary damages from air pollution - Mobile - On-Road (million $2019)		4,751	5,037	5,328	5,647	5,969	6,300
Monetary damages from air pollution - Gas Stations (million $2019)		336	355	373	394	415	435
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million $2019)		460	432	410	401	408	418
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million $2019)		3.63	3.37	2.75	2.06	1.49	1.16
Monetary damages from air pollution - Fuel Comb - Residential - Other (million $2019)		50.6	51.6	54	57.5	61.2	65
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million $2019)		22.2	23.1	24	24.7	25.4	25.9
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million $2019)		366	365	342	321	327	361

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million $2019)		221	227	235	243	253	262
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million $2019)		40.1	43.1	46.2	49.3	52.6	56.1
Monetary damages from air pollution - Industrial Processes - Coal Mining (million $2019)		122	83.9	67.4	65	63.6	60.3
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million $2019)		6,775	7,364	7,781	7,703	7,881	7,567

Table 65: *REF scenario - IMPACTS - Jobs*

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		813	798	796	772	772	781
By economic sector - Construction (jobs)		79,448	86,871	93,013	101,978	106,673	111,860
By economic sector - Manufacturing (jobs)		95,118	101,741	104,124	105,877	100,377	92,645
By economic sector - Mining (jobs)		183,755	157,589	132,965	106,949	88,762	69,225
By economic sector - Other (jobs)		3,069	4,097	4,866	6,594	7,725	10,819
By economic sector - Pipeline (jobs)		11,788	12,184	12,358	11,918	11,905	11,226
By economic sector - Professional (jobs)		64,426	65,930	66,753	70,306	72,096	73,664
By economic sector - Trade (jobs)		78,369	74,768	71,432	69,309	67,734	65,819
By economic sector - Utilities (jobs)		63,562	67,054	72,401	78,958	81,502	81,545
By resource sector - Biomass (jobs)		2,127	2,047	1,970	1,883	1,861	1,840
By resource sector - CO2 (jobs)		0	0.229	0.292	0.314	0.347	0.369
By resource sector - Coal (jobs)		7,625	4,797	2,531	821	190	156
By resource sector - Grid (jobs)		67,824	75,454	88,865	100,323	106,499	110,868
By resource sector - Natural Gas (jobs)		169,657	168,120	161,460	149,075	142,562	131,977
By resource sector - Nuclear (jobs)		2,594	2,552	2,240	1,821	1,529	668
By resource sector - Oil (jobs)		308,679	281,364	257,444	232,941	213,006	179,814
By resource sector - Solar (jobs)			8,321	12,085	16,953	20,317	37,733
By resource sector - Wind (jobs)		21,844	28,377	32,112	48,844	51,582	54,529
By education level - All sectors - High school diploma or less (jobs)		229,840	228,336	225,472	224,797	219,732	212,709
By education level - All sectors - Associates degree or some college (jobs)		164,874	164,246	162,561	163,137	160,086	156,151
By education level - All sectors - Bachelors degree (jobs)		145,813	140,218	134,138	129,385	123,736	116,439
By education level - All sectors - Masters or professional degree (jobs)		34,800	33,388	31,897	30,821	29,601	28,062
By education level - All sectors - Doctoral degree (jobs)		5,022	4,844	4,640	4,521	4,392	4,223
Related work experience - All sectors - None (jobs)		79,911	79,143	77,964	77,652	75,957	73,645
Related work experience - All sectors - Up to 1 year (jobs)		106,449	105,193	103,261	102,850	100,192	97,170
Related work experience - All sectors - 1 to 4 years (jobs)		218,195	214,034	208,888	205,806	199,862	191,725
Related work experience - All sectors - 4 to 10 years (jobs)		137,062	134,758	131,757	130,262	126,721	121,900
Related work experience - All sectors - Over 10 years (jobs)		38,730	37,904	36,839	36,092	34,814	33,144
On-the-Job Training - All sectors - None (jobs)		33,330	32,244	31,024	30,259	29,129	27,880
On-the-Job Training - All sectors - Up to 1 year (jobs)		396,287	388,696	379,063	373,311	361,780	346,618

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

Item	2020	2025	2030	2035	2040	2045	2050
On-the-Job Training - All sectors - 1 to 4 years (jobs)		114,163	113,259	111,727	111,548	109,244	106,048
On-the-Job Training - All sectors - 4 to 10 years (jobs)		31,080	31,408	31,598	32,302	32,334	32,182
On-the-Job Training - All sectors - Over 10 years (jobs)		5,489	5,425	5,295	5,241	5,060	4,856
On-Site or In-Plant Training - All sectors - None (jobs)		93,276	91,350	88,859	87,695	84,977	81,822
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		358,260	351,477	342,930	337,839	327,578	314,024
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		89,892	89,124	87,865	87,599	85,696	83,041
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		34,874	34,945	34,861	35,223	34,994	34,436
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		4,046	4,135	4,193	4,305	4,302	4,261
Wage income - All (million $2019)		35,012	34,611	34,029	33,650	32,955	31,769

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	2,703	2,633	2,461	2,363	2,377	2,448	2,536
Final energy use - Residential (PJ)	833	811	817	837	865	900	933
Final energy use - Commercial (PJ)	699	714	723	730	744	773	820
Final energy use - Industry (PJ)	3,891	4,400	4,708	4,872	5,055	5,192	5,374

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)		24.3	25.5	38.5	41	32.8	34.1

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 (%)	11.8	38.1	39.3	41.3	43.1	45.6	49.3
Sales of space heating units - Electric Resistance (%)	44.8	37.5	36.8	35.9	34.6	32.3	28.5
Sales of space heating units - Gas (%)	40.4	21.1	20.5	19.5	19	18.8	18.9
Sales of space heating units - Fossil (%)	3.12	3.34	3.39	3.37	3.32	3.31	3.33
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	53.8	65.1	65.3	65.3	65.2	65.2	65.2
Sales of water heating units - Gas Furnace (%)	44.2	33.3	33.1	33.1	33.2	33.2	33.2
Sales of water heating units - Other (%)	2.01	1.61	1.6	1.6	1.61	1.61	1.61
Sales of cooking units - Electric Resistance (%)	63.4	63.4	63.4	63.4	63.4	63.4	63.4
Sales of cooking units - Gas (%)	36.6	36.6	36.6	36.6	36.6	36.6	36.6
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		21.4	22.1				

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 (%)	6.39	29	70.5	79	79.5	79.5	79.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Resistance (%)	5.23	6.36	12.1	15.9	18.7	19.1	19.1
Sales of space heating units - Gas Furnace (%)	88.4	64.7	17.4	5.08	1.83	1.39	1.34
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Heat Pump (%)	0.154	0.132	0.129	0.132	0.131	0.13	0.129
Sales of water heating units - Electric Resistance (%)	4.33	3.75	3.72	3.73	3.75	3.74	3.75
Sales of water heating units - Gas Furnace (%)	93.4	94.3	94.3	94.3	94.3	94.3	94.3
Sales of water heating units - Other (%)	2.08	1.83	1.82	1.82	1.83	1.83	1.83
Sales of cooking units - Electric Resistance (%)	30.1	32.3	32.2	32.3	32.3	32.2	32.3
Sales of cooking units - Gas (%)	69.9	67.7	67.8	67.7	67.7	67.8	67.7
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		90,575	95,067				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	20,084	16,194	9,325	4,653	0	0	0
Installed thermal - Natural gas (MW)	83,702	72,516	96,638	99,872	102,947	119,338	117,278
Installed thermal - Nuclear (MW)	5,139	5,139	5,139	3,784	3,784	2,430	0.016
Installed renewables - Rooftop PV (MW)	609	1,096	1,822	2,940	4,591	6,804	9,761
Installed renewables - Solar - Base land use assumptions (MW)	6,891	6,891	6,891	6,891	10,854	14,771	26,589
Installed renewables - Wind - Base land use assumptions (MW)	37,314	37,314	37,314	37,522	44,186	61,742	66,094
Installed renewables - Offshore Wind - Base land use assumptions (MW)	0	76.2	76.2	129	221	221	330
Installed renewables - Solar - Constrained land use assumptions (MW)	384	384	384	384	384	384	384
Installed renewables - Wind - Constrained land use assumptions (MW)	638	638	638	638	638	638	638

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	18,855	18,855	18,855	18,855	28,508	38,058	69,422
Wind - Base land use assumptions (GWh)	149,083	149,083	149,083	149,749	174,888	239,795	255,001
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)	-14.2		-31.5				-25.5
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-3.57		-5.96				-6.27
Business-as-usual carbon sink - Total (Mt CO2e/y)	-17.8		-37.5				-31.8

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)							-4,475

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-1,120
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-5,776
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,334
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-4,376
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-1,429
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-19,303
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-2,993
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-6,540
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-47,345
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-6,703
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-3,918
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-10,406
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1,955
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-8,752
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-2,756
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-28,954
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-21,254
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-12,970
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-97,668
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-8,931
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-6,717
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-15,037
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,622
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-13,128
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-4,082
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-38,605
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-39,514
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-148,038
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-19,401
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							731

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							854
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,938
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							483
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)							204
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							1,276
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							195
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							3,891
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							10,571
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							1,096
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							882
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							5,303
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							727
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)							296
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							1,914
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							1,407
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							7,837
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							19,461
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							1,461
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							909
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							7,668

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							966
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)							388
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							2,552
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							1,123
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							6,431
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							21,498