



Net-Zero America - New Hampshire data

October 29, 2021 (updated November 17, 2023)

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Electric Generation - Coal (deaths)		14.4	0.017	0.017	0.016	0.01	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		5.02	2.9	2	1.85	1.17	0.522
Premature deaths from air pollution - Mobile - On-Road (deaths)		26.6	25	19	11	4.91	1.78
Premature deaths from air pollution - Gas Stations (deaths)		1.23	1.13	0.848	0.494	0.229	0.095
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		5.44	4.67	3.29	1.88	0.906	0.349
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		18	14.1	9.21	5.04	2.1	0.618
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.76	1.61	1.24	0.791	0.41	0.181
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.299	0.288	0.275	0.262	0.248	0.232
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		4.73	4.3	3.45	2.44	1.57	0.881
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		12.2	9.78	6.59	3.82	2.47	1.85
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.23	1.04	0.857	0.671	0.493	0.323
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.1	0.05	0.05	0.049	0.05	0.05
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		7.54	6.95	6.1	4.75	3.4	2.04
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		128	0.148	0.148	0.141	0.084	0.004
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		44.4	25.7	17.7	16.4	10.4	4.62
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		237	222	169	97.6	43.6	15.8
Monetary damages from air pollution - Gas Stations (million \$2019)		10.9	10	7.51	4.38	2.02	0.837
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		48.2	41.4	29.2	16.6	8.03	3.09
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		159	125	81.6	44.7	18.6	5.48
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		15.6	14.3	11	7.01	3.63	1.61
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		2.65	2.55	2.44	2.32	2.19	2.06
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		41.9	38.1	30.6	21.6	13.9	7.79

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)		108	86.6	58.4	33.8	21.9	16.3
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		10.9	9.24	7.58	5.94	4.36	2.86
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		0.878	0.443	0.441	0.436	0.442	0.44
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		67	61.7	54.2	42.2	30.2	18.2

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		86.2	175	66.9	51.9	38.1	128
By economic sector - Construction (jobs)		1,491	1,414	2,364	1,904	4,477	13,041
By economic sector - Manufacturing (jobs)		702	860	953	841	1,166	2,865
By economic sector - Mining (jobs)		522	395	278	191	130	91.3
By economic sector - Other (jobs)		163	125	348	241	866	2,278
By economic sector - Pipeline (jobs)		86	89	63.9	51.5	40.1	56.1
By economic sector - Professional (jobs)		927	943	1,238	1,124	2,284	5,860
By economic sector - Trade (jobs)		661	598	821	702	1,505	3,845
By economic sector - Utilities (jobs)		1,515	1,704	2,105	2,099	3,772	13,516
By resource sector - Biomass (jobs)		370	483	191	156	139	547
By resource sector - CO2 (jobs)		0	101	0	0	0	196
By resource sector - Coal (jobs)		62.1	0	0	0	0	0
By resource sector - Grid (jobs)		1,615	2,024	2,967	2,887	6,432	27,087
By resource sector - Natural Gas (jobs)		517	450	385	438	335	68.9
By resource sector - Nuclear (jobs)		627	617	607	598	588	579
By resource sector - Oil (jobs)		1,464	1,230	963	743	581	463
By resource sector - Solar (jobs)		1,155	671	2,005	1,116	4,726	10,749
By resource sector - Wind (jobs)		343	728	1,119	1,269	1,476	1,990
By education level - All sectors - High school diploma or less (jobs)		2,542	2,637	3,462	2,985	6,004	17,808
By education level - All sectors - Associates degree or some college (jobs)		1,847	1,897	2,575	2,262	4,585	13,577
By education level - All sectors - Bachelors degree (jobs)		1,372	1,376	1,709	1,518	2,851	7,986
By education level - All sectors - Masters or professional degree (jobs)		340	342	427	383	728	2,031
By education level - All sectors - Doctoral degree (jobs)		52	51.1	64.3	57.1	110	278
Related work experience - All sectors - None (jobs)		873	902	1,185	1,035	2,080	6,153
Related work experience - All sectors - Up to 1 year (jobs)		1,223	1,262	1,660	1,429	2,881	8,363
Related work experience - All sectors - 1 to 4 years (jobs)		2,241	2,291	2,969	2,605	5,129	14,962
Related work experience - All sectors - 4 to 10 years (jobs)		1,432	1,457	1,917	1,689	3,328	9,706
Related work experience - All sectors - Over 10 years (jobs)		383	391	506	448	860	2,497
On-the-Job Training - All sectors - None (jobs)		351	349	458	395	788	2,214
On-the-Job Training - All sectors - Up to 1 year (jobs)		4,106	4,225	5,412	4,736	9,266	26,905

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)		1,250	1,279	1,730	1,519	3,060	9,092
On-the-Job Training - All sectors - 4 to 10 years (jobs)		386	391	558	488	1,029	3,100
On-the-Job Training - All sectors - Over 10 years (jobs)		58.9	58.8	79.8	68	135	370
On-Site or In-Plant Training - All sectors - None (jobs)		1,012	1,032	1,346	1,173	2,320	6,604
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		3,715	3,816	4,913	4,299	8,437	24,589
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		974	998	1,342	1,176	2,366	7,026
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		402	407	567	497	1,028	3,075
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		48.1	50.1	69.5	61.6	127	386
Wage income - All (million \$2019)		356	369	480	430	847	2,517

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

Item	2020	2025	2030	2035	2040	2045	2050
Oil consumption - Annual (million bbls)		32.9	30.2	25.6	21.2	17.8	15.1
Oil consumption - Cumulative (million bbls)							783
Oil production - Annual (million bbls)		0	0	0	0	0	0
Natural gas consumption - Annual (tcf)		38.6	32.6	26.1	19.7	12.4	8.58
Natural gas consumption - Cumulative (tcf)							787
Natural gas production - Annual (tcf)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	93.6	86.6	75.2	60.9	47.9	39.6	35.8
Final energy use - Residential (PJ)	67.8	61.4	54.8	46.6	38.7	33	29.6
Final energy use - Commercial (PJ)	39.2	36.8	35.1	32.8	30.3	28.7	27.8
Final energy use - Industry (PJ)	21.1	20.7	20.2	19.9	19.6	19.6	19.5

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)		0.537	0.548	1.07	1.14	1.01	1.05

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	9.27	119	229	613	998	1,305	1,612
Vehicle stocks - LDV – All others (1000 units)	1,344	1,280	1,215	886	556	315	73.1
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		258	662	1,071	1,624	1,766	1,685
Public EV charging plugs - DC Fast (1000 units)	0.06		0.528		2.3		3.72
Public EV charging plugs - L2 (1000 units)	0.188		12.7		55.3		89.3

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 (%)	4.02	11.4	55.4	81.6	85.2	85.5	85.5
Sales of space heating units - Electric Resistance (%)	2.1	2.36	1.9	0.854	0.641	0.637	0.692
Sales of space heating units - Gas (%)	18.7	10	7.16	1.21	0.152	0.086	0.084
Sales of space heating units - Fossil (%)	75.2	76.2	35.5	16.4	14	13.8	13.7
Sales of water heating units - Electric Heat Pump (%)	0	1.91	15.5	34.6	37.8	38	38.1
Sales of water heating units - Electric Resistance (%)	25.3	41.2	50.4	60.2	61.8	61.9	61.8
Sales of water heating units - Gas Furnace (%)	51.5	43.4	31.5	5.04	0.297	0	0
Sales of water heating units - Other (%)	23.2	13.5	2.63	0.195	0.089	0.089	0.089
Sales of cooking units - Electric Resistance (%)	55.6	65	94	99.7	100	100	100
Sales of cooking units - Gas (%)	44.4	35	5.98	0.301	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		1.15	1.23				

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 (%)	3.23	11	39.6	72.4	77.7	77.9	78
Sales of space heating units - Electric Resistance (%)	1.65	4.4	16.6	21.3	22	22.1	22
Sales of space heating units - Gas (%)	37.7	52.7	37.7	6.03	0.358	0	0
Sales of space heating units - Fossil (%)	57.4	32	6.13	0.259	0	0	0
Sales of water heating units - Electric Heat Pump (%)	2.6	3.52	16	41.1	45.6	45.9	45.9
Sales of water heating units - Electric Resistance (%)	12.8	12.4	24	48	52.3	52.5	52.5
Sales of water heating units - Gas (%)	77.2	79.9	58.1	9.27	0.548	0	0
Sales of water heating units - Other (%)	7.43	4.15	1.94	1.59	1.57	1.57	1.59
Sales of cooking units - Electric Resistance (%)	36.9	49.9	81.2	87.4	87.7	87.7	87.7
Sales of cooking units - Gas (%)	63.1	50.1	18.8	12.6	12.3	12.3	12.3
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		2,680	2,926				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	459	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	1,400	1,396	1,396	1,396	800	10	10
Installed thermal - Nuclear (MW)	1,242	1,242	1,242	1,242	1,242	1,242	1,242
Installed renewables - Rooftop PV (MW)	169	294	345	403	470	544	627
Installed renewables - Solar - Base land use assumptions (MW)	0	0	0	1,191	1,268	4,823	12,874
Installed renewables - Wind - Base land use assumptions (MW)	214	356	1,604	1,807	2,141	2,211	2,623
Installed renewables - Solar - Constrained land use assumptions (MW)	0	0	0	0	480	3,074	11,126
Installed renewables - Wind - Constrained land use assumptions (MW)	214	356	1,801	2,259	2,589	2,708	2,911
Capital invested - Solar PV - Base (billion \$2018)		0	0	1.31	0.08	3.49	7.46
Capital invested - Wind - Base (billion \$2018)		0.375	2.99	0.454	0.711	0.14	0.786

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Constrained (billion \$2018)		0	0.656	2.35	0	1.97	6.03
Capital invested - Wind - Constrained (billion \$2018)		0.184	3.52	1.13	0.606	0.256	0.389
Capital invested - Biomass power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0	0.021
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	0	0	0.027

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	0	0	0	2,117	2,253	8,516	22,536
Wind - Base land use assumptions (GWh)	912	1,484	6,279	7,050	8,294	8,554	10,103
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	0	0	0	0	848	5,395	19,487
Wind - Constrained land use assumptions (GWh)	912	1,484	6,986	8,712	9,954	10,392	11,130
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	30
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	20.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	1
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	1
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	2
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	1
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	1
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	1
Conversion capital investment - Cumulative 5-yr (million \$2018)		0	0	0	0	0	1,591
Biomass purchases (million \$2018/y)		0	0	0	0	0	69.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	0	0	1.88
Annual - BECCS (MMT)		0	0	0	0	0	1.88
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	0	0	1.88
Cumulative - BECCS (MMT)		0	0	0	0	0	1.88
Cumulative - NGCC (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	55.8	55.8	55.8	55.8	55.8
Spur (km)		0	0	0	0	0	180
All (km)		0	55.8	55.8	55.8	55.8	236
Cumulative investment - Trunk (million \$2018)		0	101	101	101	101	101
Cumulative investment - Spur (million \$2018)		0	0	0	0	0	122
Cumulative investment - All (million \$2018)		0	101	101	101	101	223

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-17.4
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-78.4
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-1,184
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-7.66
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-716
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-31.2
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-16
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-292
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-2,342
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-26
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-2,133
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-11.2
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-1,431
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-60.2
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest pasture (1000 tCO ₂ e/y)							-114
Carbon sink potential - Mid - Restore productivity (1000 tCO ₂ e/y)							-579
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO ₂ e/y)							-4,629
Carbon sink potential - High - Accelerate regeneration (1000 tCO ₂ e/y)							-34.7
Carbon sink potential - High - Avoid deforestation (1000 tCO ₂ e/y)							-471
Carbon sink potential - High - Extend rotation length (1000 tCO ₂ e/y)							-3,082
Carbon sink potential - High - Improve plantations (1000 tCO ₂ e/y)							-15
Carbon sink potential - High - Increase retention of HWP (1000 tCO ₂ e/y)							-2,147
Carbon sink potential - High - Increase trees outside forests (1000 tCO ₂ e/y)							-89.2
Carbon sink potential - High - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO ₂ e/y)							-211
Carbon sink potential - High - All (not counting overlap) (1000 tCO ₂ e/y)							-6,916
Carbon sink potential - High - Restore productivity (1000 tCO ₂ e/y)							-866
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							2.84
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							59.8
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							602
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							2.77
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)							4.46
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.04
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							174
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							847
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							4.26
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							61.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							1,087
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							4.17
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)							6.47
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.52
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							350
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,521
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							5.68
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							63.7
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,572
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							5.54
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)							8.48
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							287
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,948

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-36.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-1.18
Carbon sink potential - Moderate deployment - Total (1000 tCO ₂ e/y)							-37.5
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO ₂ e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO ₂ e/y)							-68.9
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-2.36
Carbon sink potential - Aggressive deployment - Total (1000 tCO ₂ e/y)							-71.3
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							20.8
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							2.14
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							22.9
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							39.5
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							4.28
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							43.7

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)		14.4	0.017	0.017	0.016	0.01	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		4.9	2.35	0.944	0.403	0.124	0.137
Premature deaths from air pollution - Mobile - On-Road (deaths)		27.1	27.5	26.8	24.1	19.2	13.2
Premature deaths from air pollution - Gas Stations (deaths)		1.26	1.27	1.23	1.1	0.87	0.594
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		5.47	5.07	4.54	3.79	2.89	1.95
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		18.2	16.7	15.3	13.1	9.92	6.68
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.77	1.74	1.68	1.53	1.24	0.91

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.299	0.288	0.275	0.262	0.248	0.232
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		4.75	4.69	4.56	4.21	3.63	2.93
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		12.3	10.8	9.27	7.52	6.26	5.16
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.23	1.12	1	0.888	0.772	0.659
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.096	0.05	0.05	0.05	0.05	0.048
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		7.51	6.59	5.38	4.46	3.8	2.73
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		128	0.148	0.148	0.141	0.084	0.004
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		43.4	20.8	8.37	3.57	1.1	1.21
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		241	245	239	215	171	117
Monetary damages from air pollution - Gas Stations (million \$2019)		11.1	11.3	10.9	9.74	7.7	5.26
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		48.5	44.9	40.2	33.6	25.6	17.3
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		161	148	136	116	87.9	59.2
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		15.7	15.4	14.9	13.5	11	8.07
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		2.65	2.55	2.44	2.32	2.19	2.06
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		42	41.5	40.3	37.3	32.2	25.9
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		109	95.9	82	66.6	55.4	45.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		10.9	9.91	8.89	7.86	6.83	5.83
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		0.851	0.444	0.445	0.443	0.443	0.426
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		66.7	58.5	47.8	39.6	33.7	24.3

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		105	135	51.4	33	29.9	128
By economic sector - Construction (jobs)		1,477	1,393	2,048	1,762	5,033	15,294

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Manufacturing (jobs)		712	862	874	820	1,432	3,621
By economic sector - Mining (jobs)		526	412	321	245	181	124
By economic sector - Other (jobs)		162	122	299	223	957	2,452
By economic sector - Pipeline (jobs)		86.5	98.7	69.2	62.3	54.7	84.9
By economic sector - Professional (jobs)		929	875	1,102	1,051	2,534	6,710
By economic sector - Trade (jobs)		660	599	775	702	1,697	4,363
By economic sector - Utilities (jobs)		1,481	1,645	1,727	1,794	4,224	16,767
By resource sector - Biomass (jobs)		398	362	171	139	127	530
By resource sector - CO2 (jobs)		0	174	0	0	0	337
By resource sector - Coal (jobs)		62.1	0	0	0	0	0
By resource sector - Grid (jobs)		1,542	1,709	2,275	2,453	7,346	33,808
By resource sector - Natural Gas (jobs)		517	544	288	249	361	97.7
By resource sector - Nuclear (jobs)		627	617	607	598	588	579
By resource sector - Oil (jobs)		1,476	1,297	1,138	974	810	628
By resource sector - Solar (jobs)		1,162	681	1,729	1,046	5,216	10,982
By resource sector - Wind (jobs)		353	758	1,059	1,234	1,693	2,583
By education level - All sectors - High school diploma or less (jobs)		2,542	2,562	3,044	2,770	6,800	21,198
By education level - All sectors - Associates degree or some college (jobs)		1,837	1,857	2,246	2,078	5,182	16,166
By education level - All sectors - Bachelors degree (jobs)		1,369	1,343	1,536	1,432	3,220	9,464
By education level - All sectors - Masters or professional degree (jobs)		339	331	382	359	818	2,396
By education level - All sectors - Doctoral degree (jobs)		52.1	49	58.4	54.4	122	321
Related work experience - All sectors - None (jobs)		872	878	1,040	956	2,351	7,316
Related work experience - All sectors - Up to 1 year (jobs)		1,224	1,222	1,465	1,331	3,256	9,901
Related work experience - All sectors - 1 to 4 years (jobs)		2,235	2,232	2,623	2,423	5,799	17,793
Related work experience - All sectors - 4 to 10 years (jobs)		1,426	1,426	1,689	1,566	3,761	11,554
Related work experience - All sectors - Over 10 years (jobs)		382	383	448	417	975	2,980
On-the-Job Training - All sectors - None (jobs)		351	341	410	372	889	2,605
On-the-Job Training - All sectors - Up to 1 year (jobs)		4,104	4,105	4,795	4,418	10,485	31,972
On-the-Job Training - All sectors - 1 to 4 years (jobs)		1,243	1,253	1,509	1,396	3,458	10,842
On-the-Job Training - All sectors - 4 to 10 years (jobs)		383	384	481	443	1,158	3,688
On-the-Job Training - All sectors - Over 10 years (jobs)		58.8	58.3	71.1	63.9	152	437
On-Site or In-Plant Training - All sectors - None (jobs)		1,011	1,005	1,191	1,092	2,618	7,809
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		3,711	3,712	4,349	4,008	9,547	29,236
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		970	976	1,173	1,083	2,675	8,377
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		399	399	493	454	1,159	3,661
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		47.7	49	59.9	55.9	143	462
Wage income - All (million \$2019)		355	359	424	399	957	2,999

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	93.7	87.4	79.2	72.1	66.4	59.8	52
Final energy use - Residential (PJ)	67.8	61.6	57.1	53.2	48.5	43.3	38.2
Final energy use - Commercial (PJ)	39.2	36.9	35.8	34.9	33.7	32.5	31.4
Final energy use - Industry (PJ)	21.1	20.7	20.4	20.3	20.3	20.2	20

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)		0.401	0.397	0.601	0.621	0.904	0.955

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	7.18	39.4	71.7	221	371	701	1,032
Vehicle stocks - LDV – All others (1000 units)	1,349	1,349	1,349	1,280	1,211	933	655
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	41.9	87.7	296	932	1,358
Public EV charging plugs - DC Fast (1000 units)	0.06		0.165		0.854		2.38
Public EV charging plugs - L2 (1000 units)	0.188		3.97		20.5		57.2

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 (%)	4.02	3.88	8.07	20.5	41.9	60	68.2
Sales of space heating units - Electric Resistance (%)	2.1	2.38	2.37	2.3	1.88	1.38	1.1
Sales of space heating units - Gas (%)	18.7	10.2	9.97	9.04	6.81	4.15	2.55
Sales of space heating units - Fossil (%)	75.2	83.5	79.6	68.2	49.4	34.5	28.2
Sales of water heating units - Electric Heat Pump (%)	0	0.469	1.77	5.89	14.5	24.1	29.3
Sales of water heating units - Electric Resistance (%)	25.3	39.9	40.7	43.4	48.7	54	56.8
Sales of water heating units - Gas Furnace (%)	51.5	43.9	42.9	39.1	29.7	17.8	10.8
Sales of water heating units - Other (%)	23.2	15.7	14.7	11.6	7.09	4.11	3.08
Sales of cooking units - Electric Resistance (%)	55.4	56.6	60.7	71.4	86.4	95.6	98.8
Sales of cooking units - Gas (%)	44.6	43.4	39.3	28.6	13.6	4.4	1.18
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		1.15	1.3				

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 (%)	3.23	7.44	10.2	18.5	35	52.2	61.5
Sales of space heating units - Electric Resistance (%)	1.65	2.12	3.22	6.62	12.2	16.4	17.9
Sales of space heating units - Gas (%)	37.7	53.3	51.4	46.8	35.8	21.6	13.2
Sales of space heating units - Fossil (%)	57.4	37.1	35.2	28.1	17	9.78	7.36
Sales of water heating units - Electric Heat Pump (%)	2.6	2.83	4	7.92	17.2	28.8	35.5
Sales of water heating units - Electric Resistance (%)	12.8	11.7	12.6	16.6	25.4	36.2	42.6
Sales of water heating units - Gas (%)	77.2	80.9	79.2	71.8	54.5	32.8	19.8
Sales of water heating units - Other (%)	7.43	4.56	4.2	3.64	2.86	2.25	2.09

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of cooking units - Electric Resistance (%)	36.9	40.7	44.7	56.5	72.7	82.9	86.4
Sales of cooking units - Gas (%)	63.1	59.3	55.3	43.5	27.3	17.1	13.6
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		2,680	2,929				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	459	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	1,400	1,396	790	790	790	0	5
Installed thermal - Nuclear (MW)	1,242	1,242	1,242	1,242	1,242	1,242	1,242

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO ₂ e/y)							-17.4
Carbon sink potential - Low - Avoid deforestation (1000 tCO ₂ e/y)							-78.4
Carbon sink potential - Low - Extend rotation length (1000 tCO ₂ e/y)							-1,184
Carbon sink potential - Low - Improve plantations (1000 tCO ₂ e/y)							-7.66
Carbon sink potential - Low - Increase retention of HWP (1000 tCO ₂ e/y)							-716
Carbon sink potential - Low - Increase trees outside forests (1000 tCO ₂ e/y)							-31.2
Carbon sink potential - Low - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO ₂ e/y)							-16
Carbon sink potential - Low - Restore productivity (1000 tCO ₂ e/y)							-292
Carbon sink potential - Low - All (not counting overlap) (1000 tCO ₂ e/y)							-2,342
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO ₂ e/y)							-26
Carbon sink potential - Mid - Avoid deforestation (1000 tCO ₂ e/y)							-274
Carbon sink potential - Mid - Extend rotation length (1000 tCO ₂ e/y)							-2,133
Carbon sink potential - Mid - Improve plantations (1000 tCO ₂ e/y)							-11.2
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO ₂ e/y)							-1,431
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO ₂ e/y)							-60.2
Carbon sink potential - Mid - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO ₂ e/y)							-114
Carbon sink potential - Mid - Restore productivity (1000 tCO ₂ e/y)							-579
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO ₂ e/y)							-4,629
Carbon sink potential - High - Accelerate regeneration (1000 tCO ₂ e/y)							-34.7
Carbon sink potential - High - Avoid deforestation (1000 tCO ₂ e/y)							-471

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-3,082
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-15
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-2,147
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-89.2
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-211
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-6,916
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-866
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							2.84
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							59.8
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							602
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							2.77
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)							4.46
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.04
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							174
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							847
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							4.26
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							61.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							1,087
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							4.17
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)							6.47

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.52
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							350
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,521
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							5.68
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							63.7
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,572
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							5.54
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)							8.48
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							287
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,948

Table 26: E- scenario - PILLAR 6: Land sinks - Agriculture

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-36.3
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-1.18
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-37.5
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-68.9

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-2.36
Carbon sink potential - Aggressive deployment - Total (1000 tCO ₂ e/y)							-71.3
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							20.8
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							2.14
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							22.9
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							39.5
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							4.28
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							43.7

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)		14.4	0.017	0.017	0.016	0.01	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		4.67	2.59	1.46	1.17	0.417	0.144
Premature deaths from air pollution - Mobile - On-Road (deaths)		26.6	25	19	11	4.91	1.78
Premature deaths from air pollution - Gas Stations (deaths)		1.23	1.13	0.848	0.494	0.229	0.095
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		5.44	4.67	3.29	1.88	0.906	0.349
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		18	14.1	9.21	5.04	2.1	0.618
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.76	1.61	1.24	0.791	0.41	0.181
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.299	0.288	0.275	0.262	0.248	0.232
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		4.73	4.3	3.45	2.44	1.57	0.881
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		12.2	9.78	6.59	3.82	2.47	1.85
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.23	1.04	0.857	0.671	0.493	0.323

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.108	0.05	0.05	0.049	0.05	0.046
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		7.37	6.81	5.59	3.98	2.28	0.239
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		128	0.148	0.148	0.141	0.084	0.004
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		41.4	22.9	12.9	10.4	3.69	1.27
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		237	222	169	97.6	43.6	15.8
Monetary damages from air pollution - Gas Stations (million \$2019)		10.9	10	7.51	4.38	2.02	0.837
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		48.2	41.4	29.2	16.6	8.03	3.09
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		159	125	81.6	44.7	18.6	5.48
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		15.6	14.3	11	7.01	3.63	1.61
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		2.65	2.55	2.44	2.32	2.19	2.06
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		41.9	38.1	30.6	21.6	13.9	7.79
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		108	86.6	58.4	33.8	21.9	16.3
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		10.9	9.24	7.58	5.94	4.36	2.86
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		0.95	0.443	0.441	0.435	0.442	0.409
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		65.4	60.4	49.6	35.3	20.2	2.12

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		86.7	180	66.5	42.4	34.2	125
By economic sector - Construction (jobs)		1,500	2,007	3,391	2,582	9,144	14,749
By economic sector - Manufacturing (jobs)		720	940	1,305	1,064	2,073	3,579
By economic sector - Mining (jobs)		520	391	268	175	108	2.74
By economic sector - Other (jobs)		164	258	562	343	1,646	2,118
By economic sector - Pipeline (jobs)		84.8	74.8	58.8	44.4	31.6	3.88
By economic sector - Professional (jobs)		918	1,209	1,686	1,491	4,331	6,628
By economic sector - Trade (jobs)		654	758	1,103	906	2,794	4,100
By economic sector - Utilities (jobs)		1,518	1,839	2,592	2,711	8,450	17,279
By resource sector - Biomass (jobs)		337	508	179	138	127	551
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		62.1	0	0	0	0	0
By resource sector - Grid (jobs)		1,628	2,386	3,959	4,155	16,204	35,597

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

Item	2020	2025	2030	2035	2040	2045	2050
By resource sector - Natural Gas (jobs)		504	434	341	386	298	41.1
By resource sector - Nuclear (jobs)		627	617	607	598	588	341
By resource sector - Oil (jobs)		1,464	1,221	943	696	488	0.005
By resource sector - Solar (jobs)		1,182	1,707	3,501	1,623	8,497	8,450
By resource sector - Wind (jobs)		361	785	1,502	1,762	2,410	3,604
By education level - All sectors - High school diploma or less (jobs)		2,550	3,224	4,665	3,882	12,122	20,741
By education level - All sectors - Associates degree or some college (jobs)		1,853	2,329	3,483	2,969	9,296	15,900
By education level - All sectors - Bachelors degree (jobs)		1,371	1,633	2,239	1,943	5,568	9,277
By education level - All sectors - Masters or professional degree (jobs)		340	409	560	492	1,421	2,355
By education level - All sectors - Doctoral degree (jobs)		51.7	62.9	85.1	73.2	205	311
Related work experience - All sectors - None (jobs)		875	1,098	1,591	1,346	4,195	7,169
Related work experience - All sectors - Up to 1 year (jobs)		1,225	1,554	2,246	1,859	5,749	9,663
Related work experience - All sectors - 1 to 4 years (jobs)		2,245	2,769	3,959	3,377	10,269	17,457
Related work experience - All sectors - 4 to 10 years (jobs)		1,435	1,767	2,562	2,197	6,680	11,362
Related work experience - All sectors - Over 10 years (jobs)		384	469	673	579	1,719	2,934
On-the-Job Training - All sectors - None (jobs)		351	429	614	510	1,544	2,524
On-the-Job Training - All sectors - Up to 1 year (jobs)		4,113	5,095	7,218	6,124	18,470	31,332
On-the-Job Training - All sectors - 1 to 4 years (jobs)		1,255	1,567	2,330	1,990	6,218	10,675
On-the-Job Training - All sectors - 4 to 10 years (jobs)		387	493	761	647	2,118	3,632
On-the-Job Training - All sectors - Over 10 years (jobs)		59.2	73.2	109	88.1	262	422
On-Site or In-Plant Training - All sectors - None (jobs)		1,014	1,260	1,807	1,520	4,588	7,626
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		3,721	4,607	6,555	5,564	16,856	28,659
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		978	1,221	1,807	1,538	4,802	8,239
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		404	507	768	655	2,104	3,603
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		48.3	61.8	94.5	81.6	262	458
Wage income - All (million \$2019)		356	443	636	556	1,700	2,952

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	93.6	86.6	75.2	60.9	47.9	39.6	35.8
Final energy use - Residential (PJ)	67.8	61.4	54.8	46.6	38.7	33	29.6
Final energy use - Commercial (PJ)	39.2	36.8	35.1	32.8	30.3	28.7	27.8
Final energy use - Industry (PJ)	21.1	20.7	20.2	19.9	19.6	19.6	19.5

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)		0.537	0.548	1.07	1.14	1.01	1.05

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	9.27	119	229	613	998	1,305	1,612
Vehicle stocks - LDV – All others (1000 units)	1,344	1,280	1,215	886	556	315	73.1
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		258	662	1,071	1,624	1,766	1,685
Public EV charging plugs - DC Fast (1000 units)	0.06		0.528		2.3		3.72
Public EV charging plugs - L2 (1000 units)	0.188		12.7		55.3		89.3

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 (%)	4.02	11.4	55.4	81.6	85.2	85.5	85.5
Sales of space heating units - Electric Resistance (%)	2.1	2.36	1.9	0.854	0.641	0.637	0.692
Sales of space heating units - Gas (%)	18.7	10	7.16	1.21	0.152	0.086	0.084
Sales of space heating units - Fossil (%)	75.2	76.2	35.5	16.4	14	13.8	13.7
Sales of water heating units - Electric Heat Pump (%)	0	1.91	15.5	34.6	37.8	38	38.1
Sales of water heating units - Electric Resistance (%)	25.3	41.2	50.4	60.2	61.8	61.9	61.8
Sales of water heating units - Gas Furnace (%)	51.5	43.4	31.5	5.04	0.297	0	0
Sales of water heating units - Other (%)	23.2	13.5	2.63	0.195	0.089	0.089	0.089
Sales of cooking units - Electric Resistance (%)	55.6	65	94	99.7	100	100	100
Sales of cooking units - Gas (%)	44.4	35	5.98	0.301	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		1.15	1.23				

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 (%)	3.23	11	39.6	72.4	77.7	77.9	78
Sales of space heating units - Electric Resistance (%)	1.65	4.4	16.6	21.3	22	22.1	22
Sales of space heating units - Gas (%)	37.7	52.7	37.7	6.03	0.358	0	0
Sales of space heating units - Fossil (%)	57.4	32	6.13	0.259	0	0	0
Sales of water heating units - Electric Heat Pump (%)	2.6	3.52	16	41.1	45.6	45.9	45.9
Sales of water heating units - Electric Resistance (%)	12.8	12.4	24	48	52.3	52.5	52.5
Sales of water heating units - Gas (%)	77.2	79.9	58.1	9.27	0.548	0	0
Sales of water heating units - Other (%)	7.43	4.15	1.94	1.59	1.57	1.57	1.59
Sales of cooking units - Electric Resistance (%)	36.9	49.9	81.2	87.4	87.7	87.7	87.7
Sales of cooking units - Gas (%)	63.1	50.1	18.8	12.6	12.3	12.3	12.3
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		2,680	2,926				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	459	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	1,400	1,396	1,396	1,396	800	10	10

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Nuclear (MW)	1,242	1,242	1,242	1,242	1,242	1,242	0
Installed renewables - Rooftop PV (MW)	169	294	345	403	470	544	627
Installed renewables - Solar - Base land use assumptions (MW)	0	0	721	2,901	2,901	8,772	14,113
Installed renewables - Wind - Base land use assumptions (MW)	214	356	1,604	1,807	2,141	2,211	2,660
Installed renewables - Solar - Constrained land use assumptions (MW)	0	0	0	981	1,394	9,663	17,327
Installed renewables - Wind - Constrained land use assumptions (MW)	241	383	1,828	2,286	2,616	2,735	3,022
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion \$2018)		0	0.863	2.4	0	5.76	4.95
Capital invested - Wind - Base (billion \$2018)		0.375	2.99	0.454	0.711	0.14	0.856

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	0	0	1,284	5,181	5,181	15,450	24,705
Wind - Base land use assumptions (GWh)	912	1,484	6,279	7,050	8,294	8,554	10,237
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	0	0	0	3,477	4,932	33,814	60,293
Wind - Constrained land use assumptions (GWh)	1,824	2,969	13,972	17,425	19,907	20,785	22,875
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-17.4
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-78.4
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-1,184
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-7.66
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-716
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-31.2
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-16
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-292
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-2,342
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-26
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-2,133

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Improve plantations (1000 tCO ₂ e/y)							-11.2
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO ₂ e/y)							-1,431
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO ₂ e/y)							-60.2
Carbon sink potential - Mid - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO ₂ e/y)							-114
Carbon sink potential - Mid - Restore productivity (1000 tCO ₂ e/y)							-579
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO ₂ e/y)							-4,629
Carbon sink potential - High - Accelerate regeneration (1000 tCO ₂ e/y)							-34.7
Carbon sink potential - High - Avoid deforestation (1000 tCO ₂ e/y)							-471
Carbon sink potential - High - Extend rotation length (1000 tCO ₂ e/y)							-3,082
Carbon sink potential - High - Improve plantations (1000 tCO ₂ e/y)							-15
Carbon sink potential - High - Increase retention of HWP (1000 tCO ₂ e/y)							-2,147
Carbon sink potential - High - Increase trees outside forests (1000 tCO ₂ e/y)							-89.2
Carbon sink potential - High - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO ₂ e/y)							-211
Carbon sink potential - High - All (not counting overlap) (1000 tCO ₂ e/y)							-6,916
Carbon sink potential - High - Restore productivity (1000 tCO ₂ e/y)							-866
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							2.84
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							59.8
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							602
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							2.77
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)							4.46
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.04
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							174

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							847
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							4.26
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							61.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							1,087
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							4.17
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)							6.47
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.52
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							350
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,521
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							5.68
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							63.7
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,572
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							5.54
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)							8.48
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							287
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,948

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 tCO ₂ e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO ₂ e/y)							-36.3
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-1.18
Carbon sink potential - Moderate deployment - Total (1000 tCO ₂ e/y)							-37.5
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO ₂ e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO ₂ e/y)							-68.9
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-2.36
Carbon sink potential - Aggressive deployment - Total (1000 tCO ₂ e/y)							-71.3
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							20.8
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							2.14
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							22.9
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							39.5
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							4.28
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							43.7

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)		14.4	0.017	0.017	0.016	0.01	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		4.94	2.85	3.16	2.44	1.23	0.279
Premature deaths from air pollution - Mobile - On-Road (deaths)		26.6	25	19	11	4.91	1.78
Premature deaths from air pollution - Gas Stations (deaths)		1.23	1.13	0.848	0.494	0.229	0.095

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		5.44	4.67	3.29	1.88	0.906	0.349
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		18	14.1	9.21	5.04	2.1	0.618
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.76	1.61	1.24	0.791	0.41	0.181
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.299	0.288	0.275	0.262	0.248	0.232
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		4.73	4.3	3.45	2.44	1.57	0.881
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		12.2	9.78	6.59	3.82	2.47	1.85
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.23	1.04	0.857	0.671	0.493	0.323
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.092	0.05	0.05	0.049	0.05	0.046
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		7.66	7.36	7.19	6.28	5.29	3.98
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		128	0.148	0.148	0.141	0.084	0.004
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		43.7	25.2	28	21.7	10.9	2.47
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		237	222	169	97.6	43.6	15.8
Monetary damages from air pollution - Gas Stations (million \$2019)		10.9	10	7.51	4.38	2.02	0.837
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		48.2	41.4	29.2	16.6	8.03	3.09
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		159	125	81.6	44.7	18.6	5.48
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		15.6	14.3	11	7.01	3.63	1.61
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		2.65	2.55	2.44	2.32	2.19	2.06
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		41.9	38.1	30.6	21.6	13.9	7.79
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		108	86.6	58.4	33.8	21.9	16.3
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		10.9	9.24	7.58	5.94	4.36	2.86
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		0.808	0.442	0.441	0.435	0.442	0.409

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		68.1	65.3	63.8	55.8	47	35.4

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		98.6	141	47.2	38.9	35.9	131
By economic sector - Construction (jobs)		1,523	1,329	1,555	1,512	1,383	2,248
By economic sector - Manufacturing (jobs)		824	656	692	583	466	853
By economic sector - Mining (jobs)		543	414	299	210	150	105
By economic sector - Other (jobs)		165	114	188	162	169	385
By economic sector - Pipeline (jobs)		87.3	103	70.1	60.3	50.6	89.5
By economic sector - Professional (jobs)		929	821	873	1,014	863	1,534
By economic sector - Trade (jobs)		674	574	608	604	542	868
By economic sector - Utilities (jobs)		1,603	1,699	1,939	2,980	2,019	3,714
By resource sector - Biomass (jobs)		345	362	162	146	140	542
By resource sector - CO2 (jobs)		0	196	0	0	0	380
By resource sector - Coal (jobs)		152	129	122	116	111	42.6
By resource sector - Grid (jobs)		1,746	1,693	2,192	2,511	2,172	2,804
By resource sector - Natural Gas (jobs)		531	590	381	347	439	166
By resource sector - Nuclear (jobs)		627	617	878	2,071	929	2,709
By resource sector - Oil (jobs)		1,463	1,230	963	742	591	500
By resource sector - Solar (jobs)		1,114	513	975	656	665	2,083
By resource sector - Wind (jobs)		468	520	597	575	632	698
By education level - All sectors - High school diploma or less (jobs)		2,679	2,444	2,599	2,868	2,316	4,011
By education level - All sectors - Associates degree or some college (jobs)		1,942	1,770	1,928	2,177	1,765	3,026
By education level - All sectors - Bachelors degree (jobs)		1,423	1,275	1,356	1,639	1,236	2,225
By education level - All sectors - Masters or professional degree (jobs)		350	316	338	419	315	575
By education level - All sectors - Doctoral degree (jobs)		52.5	46.4	49.7	62.4	47	88.9
Related work experience - All sectors - None (jobs)		916	841	895	1,006	812	1,404
Related work experience - All sectors - Up to 1 year (jobs)		1,284	1,157	1,242	1,390	1,109	1,976
Related work experience - All sectors - 1 to 4 years (jobs)		2,347	2,132	2,276	2,615	2,064	3,595
Related work experience - All sectors - 4 to 10 years (jobs)		1,497	1,360	1,465	1,690	1,337	2,319
Related work experience - All sectors - Over 10 years (jobs)		402	362	393	463	356	631
On-the-Job Training - All sectors - None (jobs)		365	324	351	411	316	576
On-the-Job Training - All sectors - Up to 1 year (jobs)		4,307	3,902	4,148	4,746	3,734	6,578
On-the-Job Training - All sectors - 1 to 4 years (jobs)		1,311	1,199	1,303	1,486	1,194	2,045
On-the-Job Training - All sectors - 4 to 10 years (jobs)		402	373	409	455	382	633
On-the-Job Training - All sectors - Over 10 years (jobs)		61.7	54.1	59.7	67.7	52.5	95.4
On-Site or In-Plant Training - All sectors - None (jobs)		1,057	953	1,021	1,179	924	1,654
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		3,897	3,532	3,765	4,309	3,393	5,961

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

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		1,023	933	1,012	1,147	922	1,580
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		418	388	421	474	392	653
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		50.5	47	51	55.7	47.4	77.6
Wage income - All (million \$2019)		372	344	373	444	351	626

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	93.6	86.6	75.2	60.9	47.9	39.6	35.8
Final energy use - Residential (PJ)	67.8	61.4	54.8	46.6	38.7	33	29.6
Final energy use - Commercial (PJ)	39.2	36.8	35.1	32.8	30.3	28.7	27.8
Final energy use - Industry (PJ)	21.1	20.7	20.2	19.9	19.6	19.6	19.5

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)		0.537	0.548	1.07	1.14	1.01	1.05

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	9.27	119	229	613	998	1,305	1,612
Vehicle stocks - LDV – All others (1000 units)	1,344	1,280	1,215	886	556	315	73.1
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		258	662	1,071	1,624	1,766	1,685
Public EV charging plugs - DC Fast (1000 units)	0.06		0.528		2.3		3.72
Public EV charging plugs - L2 (1000 units)	0.188		12.7		55.3		89.3

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 (%)	4.02	11.4	55.4	81.6	85.2	85.5	85.5
Sales of space heating units - Electric Resistance (%)	2.1	2.36	1.9	0.854	0.641	0.637	0.692
Sales of space heating units - Gas (%)	18.7	10	7.16	1.21	0.152	0.086	0.084
Sales of space heating units - Fossil (%)	75.2	76.2	35.5	16.4	14	13.8	13.7
Sales of water heating units - Electric Heat Pump (%)	0	1.91	15.5	34.6	37.8	38	38.1
Sales of water heating units - Electric Resistance (%)	25.3	41.2	50.4	60.2	61.8	61.9	61.8
Sales of water heating units - Gas Furnace (%)	51.5	43.4	31.5	5.04	0.297	0	0
Sales of water heating units - Other (%)	23.2	13.5	2.63	0.195	0.089	0.089	0.089
Sales of cooking units - Electric Resistance (%)	55.6	65	94	99.7	100	100	100
Sales of cooking units - Gas (%)	44.4	35	5.98	0.301	0	0	0
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		1.15	1.23				

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 (%)	3.23	11	39.6	72.4	77.7	77.9	78
Sales of space heating units - Electric Resistance (%)	1.65	4.4	16.6	21.3	22	22.1	22
Sales of space heating units - Gas (%)	37.7	52.7	37.7	6.03	0.358	0	0
Sales of space heating units - Fossil (%)	57.4	32	6.13	0.259	0	0	0
Sales of water heating units - Electric Heat Pump (%)	2.6	3.52	16	41.1	45.6	45.9	45.9
Sales of water heating units - Electric Resistance (%)	12.8	12.4	24	48	52.3	52.5	52.5
Sales of water heating units - Gas (%)	77.2	79.9	58.1	9.27	0.548	0	0
Sales of water heating units - Other (%)	7.43	4.15	1.94	1.59	1.57	1.57	1.59
Sales of cooking units - Electric Resistance (%)	36.9	49.9	81.2	87.4	87.7	87.7	87.7
Sales of cooking units - Gas (%)	63.1	50.1	18.8	12.6	12.3	12.3	12.3
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		2,680	2,926				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	459	346	346	346	346	346	0
Installed thermal - Natural gas (MW)	1,400	1,396	795	795	800	10	10
Installed thermal - Nuclear (MW)	1,242	1,242	1,242	1,356	1,961	1,961	2,751
Installed renewables - Rooftop PV (MW)	169	294	345	403	470	544	627
Installed renewables - Solar - Base land use assumptions (MW)	0	0	0	384	384	384	855
Installed renewables - Wind - Base land use assumptions (MW)	214	321	953	953	953	1,185	1,573
Installed renewables - Solar - Constrained land use assumptions (MW)	0	0	86.5	86.5	654	654	654
Installed renewables - Wind - Constrained land use assumptions (MW)	214	321	1,151	1,151	1,151	1,274	1,752
Installed renewables - Offshore Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion \$2018)		0	0	0.424	0	0	0.436
Capital invested - Wind - Base (billion \$2018)		0.282	1.51	0	0	0.47	0.738
Capital invested - Solar PV - Constrained (billion \$2018)		0	0.104	0	0.589	0	0
Capital invested - Wind - Constrained (billion \$2018)		0.282	1.99	0	0	0.248	0.912

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	0	0	0	683	683	683	1,516
Wind - Base land use assumptions (GWh)	912	1,344	3,818	3,818	3,818	4,703	6,164
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	0	0	152	152	1,157	1,157	1,157
Wind - Constrained land use assumptions (GWh)	912	1,344	4,552	4,552	4,552	5,008	6,803
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 tCO ₂ e/y)							-17.4
Carbon sink potential - Low - Avoid deforestation (1000 tCO ₂ e/y)							-78.4
Carbon sink potential - Low - Extend rotation length (1000 tCO ₂ e/y)							-1,184
Carbon sink potential - Low - Improve plantations (1000 tCO ₂ e/y)							-7.66
Carbon sink potential - Low - Increase retention of HWP (1000 tCO ₂ e/y)							-716
Carbon sink potential - Low - Increase trees outside forests (1000 tCO ₂ e/y)							-31.2
Carbon sink potential - Low - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO ₂ e/y)							-16
Carbon sink potential - Low - Restore productivity (1000 tCO ₂ e/y)							-292
Carbon sink potential - Low - All (not counting overlap) (1000 tCO ₂ e/y)							-2,342
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO ₂ e/y)							-26
Carbon sink potential - Mid - Avoid deforestation (1000 tCO ₂ e/y)							-274
Carbon sink potential - Mid - Extend rotation length (1000 tCO ₂ e/y)							-2,133
Carbon sink potential - Mid - Improve plantations (1000 tCO ₂ e/y)							-11.2
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO ₂ e/y)							-1,431
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO ₂ e/y)							-60.2
Carbon sink potential - Mid - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO ₂ e/y)							-114
Carbon sink potential - Mid - Restore productivity (1000 tCO ₂ e/y)							-579
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO ₂ e/y)							-4,629
Carbon sink potential - High - Accelerate regeneration (1000 tCO ₂ e/y)							-34.7
Carbon sink potential - High - Avoid deforestation (1000 tCO ₂ e/y)							-471
Carbon sink potential - High - Extend rotation length (1000 tCO ₂ e/y)							-3,082
Carbon sink potential - High - Improve plantations (1000 tCO ₂ e/y)							-15
Carbon sink potential - High - Increase retention of HWP (1000 tCO ₂ e/y)							-2,147
Carbon sink potential - High - Increase trees outside forests (1000 tCO ₂ e/y)							-89.2
Carbon sink potential - High - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO ₂ e/y)							-211
Carbon sink potential - High - All (not counting overlap) (1000 tCO ₂ e/y)							-6,916
Carbon sink potential - High - Restore productivity (1000 tCO ₂ e/y)							-866

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							2.84
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							59.8
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							602
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							2.77
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)							4.46
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.04
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							174
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							847
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							4.26
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							61.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							1,087
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							4.17
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)							6.47
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.52
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							350
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,521
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							5.68
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							63.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,572
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							5.54
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)							8.48
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							287
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,948

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 tCO ₂ e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO ₂ e/y)							-36.3
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-1.18
Carbon sink potential - Moderate deployment - Total (1000 tCO ₂ e/y)							-37.5
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO ₂ e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO ₂ e/y)							-68.9
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-2.36
Carbon sink potential - Aggressive deployment - Total (1000 tCO ₂ e/y)							-71.3
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							20.8
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							2.14
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							22.9

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							39.5
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							4.28
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							43.7

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)		14.4	0.017	0.017	0.016	0.01	0
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		4.92	2.22	1.11	0.86	0.523	0.197
Premature deaths from air pollution - Mobile - On-Road (deaths)		27.1	27.5	26.8	24.1	19.2	13.2
Premature deaths from air pollution - Gas Stations (deaths)		1.26	1.27	1.23	1.1	0.87	0.594
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		5.47	5.07	4.54	3.79	2.89	1.95
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		18.2	16.7	15.3	13.1	9.92	6.68
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.77	1.74	1.68	1.53	1.24	0.91
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.299	0.288	0.275	0.262	0.248	0.232
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		4.75	4.69	4.56	4.21	3.63	2.93
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		12.3	10.8	9.27	7.52	6.26	5.16
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.23	1.12	1	0.888	0.772	0.659
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.099	0.05	0.05	0.05	0.051	0.05
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		7.51	6.59	5.38	4.46	3.8	2.73
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		128	0.148	0.148	0.141	0.084	0.004
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		43.5	19.6	9.81	7.62	4.64	1.74
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		241	245	239	215	171	117
Monetary damages from air pollution - Gas Stations (million \$2019)		11.1	11.3	10.9	9.74	7.7	5.26

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		48.5	44.9	40.2	33.6	25.6	17.3
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		161	148	136	116	87.9	59.2
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		15.7	15.4	14.9	13.5	11	8.07
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		2.65	2.55	2.44	2.32	2.19	2.06
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		42	41.5	40.3	37.3	32.2	25.9
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		109	95.9	82	66.6	55.4	45.7
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		10.9	9.91	8.89	7.86	6.83	5.83
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		0.875	0.444	0.445	0.443	0.449	0.444
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		66.7	58.5	47.8	39.6	33.7	24.3

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		96.1	135	50.3	37.2	30.9	233
By economic sector - Construction (jobs)		1,479	1,404	1,938	1,602	3,619	12,737
By economic sector - Manufacturing (jobs)		709	865	816	664	1,031	2,978
By economic sector - Mining (jobs)		525	412	322	251	181	121
By economic sector - Other (jobs)		162	123	274	200	662	2,164
By economic sector - Pipeline (jobs)		86.1	99.2	69.7	63.9	54.3	84.5
By economic sector - Professional (jobs)		927	882	1,052	952	1,865	5,859
By economic sector - Trade (jobs)		660	603	743	651	1,255	3,768
By economic sector - Utilities (jobs)		1,482	1,654	1,691	1,670	3,196	13,388
By resource sector - Biomass (jobs)		382	362	170	156	143	1,099
By resource sector - CO2 (jobs)		0	178	0	0	0	346
By resource sector - Coal (jobs)		62.1	0	0	0	0	0
By resource sector - Grid (jobs)		1,546	1,721	2,204	2,217	5,255	26,668
By resource sector - Natural Gas (jobs)		512	543	292	252	356	91.8
By resource sector - Nuclear (jobs)		627	617	607	598	588	579
By resource sector - Oil (jobs)		1,477	1,297	1,138	1,000	813	613
By resource sector - Solar (jobs)		1,161	678	1,554	930	3,531	10,139
By resource sector - Wind (jobs)		361	781	990	939	1,208	1,798
By education level - All sectors - High school diploma or less (jobs)		2,534	2,577	2,910	2,522	4,995	17,685
By education level - All sectors - Associates degree or some college (jobs)		1,835	1,868	2,146	1,880	3,795	13,409
By education level - All sectors - Bachelors degree (jobs)		1,367	1,350	1,476	1,311	2,403	7,943
By education level - All sectors - Masters or professional degree (jobs)		339	332	367	329	610	2,019
By education level - All sectors - Doctoral degree (jobs)		52	49.3	56.1	50	91.4	278

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

Item	2020	2025	2030	2035	2040	2045	2050
Related work experience - All sectors - None (jobs)		870	883	996	871	1,729	6,103
Related work experience - All sectors - Up to 1 year (jobs)		1,220	1,229	1,399	1,209	2,391	8,314
Related work experience - All sectors - 1 to 4 years (jobs)		2,232	2,245	2,514	2,209	4,280	14,832
Related work experience - All sectors - 4 to 10 years (jobs)		1,425	1,434	1,618	1,424	2,773	9,609
Related work experience - All sectors - Over 10 years (jobs)		381	385	430	378	721	2,475
On-the-Job Training - All sectors - None (jobs)		350	343	392	340	657	2,196
On-the-Job Training - All sectors - Up to 1 year (jobs)		4,094	4,128	4,592	4,023	7,742	26,746
On-the-Job Training - All sectors - 1 to 4 years (jobs)		1,242	1,261	1,444	1,267	2,537	8,976
On-the-Job Training - All sectors - 4 to 10 years (jobs)		383	386	460	403	846	3,050
On-the-Job Training - All sectors - Over 10 years (jobs)		58.7	58.6	67.7	57.6	112	366
On-Site or In-Plant Training - All sectors - None (jobs)		1,009	1,011	1,139	992	1,929	6,549
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		3,703	3,732	4,165	3,651	7,048	24,430
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		969	982	1,122	983	1,964	6,942
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		399	402	471	414	849	3,031
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		47.7	49.3	57.3	50.6	105	382
Wage income - All (million \$2019)		354	361	407	365	709	2,497

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	93.7	87.4	79.2	72.1	66.4	59.8	52
Final energy use - Residential (PJ)	67.8	61.6	57.1	53.2	48.5	43.3	38.2
Final energy use - Commercial (PJ)	39.2	36.9	35.8	34.9	33.7	32.5	31.4
Final energy use - Industry (PJ)	21.1	20.7	20.4	20.3	20.3	20.2	20

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)		0.401	0.397	0.601	0.621	0.904	0.955

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle stocks - LDV – EV (1000 units)	7.18	39.4	71.7	221	371	701	1,032
Vehicle stocks - LDV – All others (1000 units)	1,349	1,349	1,349	1,280	1,211	933	655
Light-duty vehicle capital costs vs. REF - Cumulative 5-yr (million \$2018)		0	41.9	87.7	296	932	1,358
Public EV charging plugs - DC Fast (1000 units)	0.06		0.165		0.854		2.38
Public EV charging plugs - L2 (1000 units)	0.188		3.97		20.5		57.2

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 (%)	4.02	3.88	8.07	20.5	41.9	60	68.2
Sales of space heating units - Electric Resistance (%)	2.1	2.38	2.37	2.3	1.88	1.38	1.1
Sales of space heating units - Gas (%)	18.7	10.2	9.97	9.04	6.81	4.15	2.55
Sales of space heating units - Fossil (%)	75.2	83.5	79.6	68.2	49.4	34.5	28.2
Sales of water heating units - Electric Heat Pump (%)	0	0.469	1.77	5.89	14.5	24.1	29.3
Sales of water heating units - Electric Resistance (%)	25.3	39.9	40.7	43.4	48.7	54	56.8
Sales of water heating units - Gas Furnace (%)	51.5	43.9	42.9	39.1	29.7	17.8	10.8
Sales of water heating units - Other (%)	23.2	15.7	14.7	11.6	7.09	4.11	3.08
Sales of cooking units - Electric Resistance (%)	55.4	56.6	60.7	71.4	86.4	95.6	98.8
Sales of cooking units - Gas (%)	44.6	43.4	39.3	28.6	13.6	4.4	1.18
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		1.15	1.3				

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 (%)	3.23	7.44	10.2	18.5	35	52.2	61.5
Sales of space heating units - Electric Resistance (%)	1.65	2.12	3.22	6.62	12.2	16.4	17.9
Sales of space heating units - Gas (%)	37.7	53.3	51.4	46.8	35.8	21.6	13.2
Sales of space heating units - Fossil (%)	57.4	37.1	35.2	28.1	17	9.78	7.36
Sales of water heating units - Electric Heat Pump (%)	2.6	2.83	4	7.92	17.2	28.8	35.5
Sales of water heating units - Electric Resistance (%)	12.8	11.7	12.6	16.6	25.4	36.2	42.6
Sales of water heating units - Gas (%)	77.2	80.9	79.2	71.8	54.5	32.8	19.8
Sales of water heating units - Other (%)	7.43	4.56	4.2	3.64	2.86	2.25	2.09
Sales of cooking units - Electric Resistance (%)	36.9	40.7	44.7	56.5	72.7	82.9	86.4
Sales of cooking units - Gas (%)	63.1	59.3	55.3	43.5	27.3	17.1	13.6
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		2,680	2,929				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	459	0	0	0	0	0	0
Installed thermal - Natural gas (MW)	1,400	1,396	790	790	790	5	5
Installed thermal - Nuclear (MW)	1,242	1,242	1,242	1,242	1,242	1,242	1,242
Capital invested - Biomass power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion \$2018)	0	0	0	0	0	0	0

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	2
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0
Conversion capital investment - Cumulative 5-yr (million \$2018)		0	0	0	0	0	3,152
Biomass purchases (million \$2018/y)		0	0	0	0	0	264

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	0	0	4.05
Annual - BECCS (MMT)		0	0	0	0	0	4.05
Annual - NGCC (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	0	0	4.05
Cumulative - BECCS (MMT)		0	0	0	0	0	4.05
Cumulative - NGCC (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Trunk (km)		0	55.8	55.8	55.8	55.8	55.8
Spur (km)		0	0	0	0	0	180
All (km)		0	55.8	55.8	55.8	55.8	236
Cumulative investment - Trunk (million \$2018)		0	101	101	101	101	101
Cumulative investment - Spur (million \$2018)		0	0	0	0	0	151
Cumulative investment - All (million \$2018)		0	101	101	101	101	252

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-17.4
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-78.4
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-1,184
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-7.66
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-716
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-31.2
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-16
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-292
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-2,342
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-26
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-2,133
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-11.2
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-1,431
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-60.2
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-114
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-579
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-4,629
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-34.7
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-471
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-3,082
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-15
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-2,147
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-89.2
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-211
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-6,916
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-866

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							2.84
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							59.8
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							602
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							2.77
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)							4.46
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.04
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							174
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							847
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							4.26
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							61.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							1,087
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							4.17
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)							6.47
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.52
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							350
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,521
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							5.68
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							63.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,572
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							5.54
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)							8.48
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							287
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,948

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)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-36.3
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-1.18
Carbon sink potential - Moderate deployment - Cropland to woody energy crops (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Pasture to energy crops (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-37.5
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-68.9
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-2.36
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)							-71.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							20.8
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							2.14
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							0.272
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							23.2
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							97.4
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							4.28
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							0.272
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							102

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)		47.4	32.4	30.5	29.9	29.4	25.3
Premature deaths from air pollution - Fuel Comb - Electric Generation - Natural Gas (deaths)		3.72	3.11	3.99	4.21	4.06	3.86
Premature deaths from air pollution - Mobile - On-Road (deaths)		27.1	27.9	28.5	29.3	30	30.8
Premature deaths from air pollution - Gas Stations (deaths)		1.25	1.28	1.31	1.34	1.37	1.39
Premature deaths from air pollution - Fuel Comb - Residential - Natural Gas (deaths)		5.46	5.36	5.51	5.65	5.71	5.66
Premature deaths from air pollution - Fuel Comb - Residential - Oil (deaths)		17.7	13.7	8.73	5.09	2.96	1.87
Premature deaths from air pollution - Fuel Comb - Residential - Other (deaths)		1.74	1.67	1.57	1.5	1.45	1.42
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Coal (deaths)		0.312	0.315	0.316	0.316	0.315	0.313

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (deaths)		4.82	4.96	4.9	4.8	4.86	5.09
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Oil (deaths)		12.3	10.5	8.16	5.58	4.15	3.37
Premature deaths from air pollution - Fuel Comb - Comm/Institutional - Other (deaths)		1.28	1.33	1.37	1.4	1.43	1.45
Premature deaths from air pollution - Industrial Processes - Coal Mining (deaths)		0.192	0.14	0.117	0.113	0.11	0.105
Premature deaths from air pollution - Industrial Processes - Oil & Gas Production (deaths)		7.57	8.17	8.49	8.14	8.2	7.89
Monetary damages from air pollution - Fuel Comb - Electric Generation - Coal (million \$2019)		420	288	270	265	261	224
Monetary damages from air pollution - Fuel Comb - Electric Generation - Natural Gas (million \$2019)		32.9	27.6	35.4	37.3	36	34.2
Monetary damages from air pollution - Mobile - On-Road (million \$2019)		241	248	254	260	267	274
Monetary damages from air pollution - Gas Stations (million \$2019)		11.1	11.4	11.6	11.9	12.1	12.3
Monetary damages from air pollution - Fuel Comb - Residential - Natural Gas (million \$2019)		48.4	47.5	48.8	50.1	50.6	50.2
Monetary damages from air pollution - Fuel Comb - Residential - Oil (million \$2019)		156	122	77.3	45.1	26.2	16.5
Monetary damages from air pollution - Fuel Comb - Residential - Other (million \$2019)		15.5	14.8	13.9	13.3	12.9	12.6
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Coal (million \$2019)		2.77	2.79	2.8	2.8	2.79	2.77
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Natural Gas (million \$2019)		42.7	43.9	43.4	42.5	43	45.1
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Oil (million \$2019)		109	93.3	72.2	49.4	36.8	29.9
Monetary damages from air pollution - Fuel Comb - Comm/Institutional - Other (million \$2019)		11.4	11.8	12.1	12.4	12.6	12.9
Monetary damages from air pollution - Industrial Processes - Coal Mining (million \$2019)		1.7	1.23	1.04	0.994	0.973	0.924
Monetary damages from air pollution - Industrial Processes - Oil & Gas Production (million \$2019)		67.2	72.6	75.4	72.3	72.8	70.1

Table 65: REF scenario - IMPACTS - Jobs

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		91.2	81.7	80.7	65.7	65.7	71.2
By economic sector - Construction (jobs)		933	1,201	1,253	1,248	1,187	1,415
By economic sector - Manufacturing (jobs)		527	573	739	533	514	708
By economic sector - Mining (jobs)		561	459	378	316	269	217

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		46.4	106	117	128	133	256
By economic sector - Pipeline (jobs)		87.6	89.2	89.8	87.9	89.7	91.1
By economic sector - Professional (jobs)		731	803	801	811	801	913
By economic sector - Trade (jobs)		560	578	554	548	531	616
By economic sector - Utilities (jobs)		1,574	1,599	1,657	1,611	1,459	1,232
By resource sector - Biomass (jobs)		352	329	306	273	280	284
By resource sector - CO2 (jobs)		0	0	0	0	0	0
By resource sector - Coal (jobs)		222	209	198	188	180	69
By resource sector - Grid (jobs)		1,692	1,723	1,852	1,662	1,391	1,248
By resource sector - Natural Gas (jobs)		526	546	550	625	585	338
By resource sector - Nuclear (jobs)		627	617	607	598	588	579
By resource sector - Oil (jobs)		1,485	1,320	1,194	1,121	1,071	1,037
By resource sector - Solar (jobs)			493	527	552	571	1,386
By resource sector - Wind (jobs)		207	252	436	329	384	578
By education level - All sectors - High school diploma or less (jobs)		2,081	2,259	2,349	2,199	2,073	2,289
By education level - All sectors - Associates degree or some college (jobs)		1,512	1,650	1,722	1,630	1,535	1,681
By education level - All sectors - Bachelors degree (jobs)		1,182	1,230	1,247	1,179	1,118	1,200
By education level - All sectors - Masters or professional degree (jobs)		293	305	308	295	281	302
By education level - All sectors - Doctoral degree (jobs)		42.8	45.3	44.9	44.1	42.9	47.7
Related work experience - All sectors - None (jobs)		724	781	809	765	722	790
Related work experience - All sectors - Up to 1 year (jobs)		987	1,074	1,115	1,042	987	1,108
Related work experience - All sectors - 1 to 4 years (jobs)		1,884	2,011	2,070	1,955	1,846	2,004
Related work experience - All sectors - 4 to 10 years (jobs)		1,194	1,282	1,322	1,253	1,182	1,278
Related work experience - All sectors - Over 10 years (jobs)		322	343	355	333	314	340
On-the-Job Training - All sectors - None (jobs)		287	308	314	297	282	315
On-the-Job Training - All sectors - Up to 1 year (jobs)		3,442	3,667	3,785	3,550	3,356	3,675
On-the-Job Training - All sectors - 1 to 4 years (jobs)		1,028	1,119	1,162	1,104	1,038	1,125
On-the-Job Training - All sectors - 4 to 10 years (jobs)		308	345	356	348	327	351
On-the-Job Training - All sectors - Over 10 years (jobs)		45.3	50.3	52.7	49.1	46.7	53.4
On-Site or In-Plant Training - All sectors - None (jobs)		829	892	920	867	822	911
On-Site or In-Plant Training - All sectors - Up to 1 year (jobs)		3,114	3,322	3,428	3,219	3,040	3,324
On-Site or In-Plant Training - All sectors - 1 to 4 years (jobs)		802	872	905	858	807	877
On-Site or In-Plant Training - All sectors - 4 to 10 years (jobs)		326	361	371	361	339	363
On-Site or In-Plant Training - All sectors - Over 10 years (jobs)		39.1	43.3	45.5	43.6	40.9	44.2
Wage income - All (million \$2019)		302	325	338	325	311	337

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Transportation (PJ)	93.6	87.4	79.7	74.8	74.3	76.1	78.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Residential (PJ)	67.8	61.9	58	55.1	52.9	51.1	49.7
Final energy use - Commercial (PJ)	39.2	37.6	37.4	36.9	36.4	36.8	38
Final energy use - Industry (PJ)	21.1	21.5	21.9	22.8	23.8	24.9	25.8

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)		0.457	0.459	0.61	0.629	0.612	0.627

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 (%)	3.84	6.34	6.59	6.97	7.07	7.14	7.27
Sales of space heating units - Electric Resistance (%)	2.1	2.29	2.33	2.38	2.34	2.25	2.16
Sales of space heating units - Gas (%)	18.7	16.9	40.9	57.3	58.3	58.5	58.4
Sales of space heating units - Fossil (%)	75.3	74.5	50.1	33.3	32.3	32.1	32.2
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	25.3	39.6	39.4	39.4	39.3	39.3	39.2
Sales of water heating units - Gas Furnace (%)	51.5	44.3	44.5	44.5	44.6	44.7	44.8
Sales of water heating units - Other (%)	23.2	16.1	16.1	16	16	16	16
Sales of cooking units - Electric Resistance (%)	55	55	55	55	55	55	55
Sales of cooking units - Gas (%)	45	45	45	45	45	45	45
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)		1.13	1.17				

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 (%)	3.23	13	41.2	64.3	67.9	68.2	68.3
Sales of space heating units - Electric Resistance (%)	1.65	2.61	7.4	19.7	29.9	31.7	31.7
Sales of space heating units - Gas (%)	37.7	48.8	26.5	6.29	0.795	0.043	0
Sales of space heating units - Fossil (%)	57.4	35.6	25	9.75	1.4	0.11	0
Sales of water heating units - Electric Heat Pump (%)	2.6	2.39	2.36	2.36	2.34	2.37	2.37
Sales of water heating units - Electric Resistance (%)	12.8	11.3	11	11.3	11.2	11.1	11.2
Sales of water heating units - Gas (%)	77.2	81.6	82.1	81.9	81.9	82.2	82.2
Sales of water heating units - Other (%)	7.43	4.63	4.47	4.42	4.51	4.27	4.25
Sales of cooking units - Electric Resistance (%)	36.9	39	38.6	38.5	38.3	38.5	38.4
Sales of cooking units - Gas (%)	63.1	61	61.4	61.5	61.7	61.5	61.6
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)		2,647	2,721				

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed thermal - Coal (MW)	559	559	559	559	559	559	0
Installed thermal - Natural gas (MW)	1,400	1,396	1,396	1,396	795	10	10
Installed thermal - Nuclear (MW)	1,242	1,242	1,242	1,242	1,242	1,242	1,242
Installed renewables - Rooftop PV (MW)	169	294	345	403	470	544	627

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

Item	2020	2025	2030	2035	2040	2045	2050
Installed renewables - Wind - Base land use assumptions (MW)	356	356	426	426	426	575	795

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Base land use assumptions (GWh)	1,484	1,484	1,762	1,762	1,762	2,344	3,212
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)	1.14		-4.14				-3.7
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.584		-1.05				-1.09
Business-as-usual carbon sink - Total (Mt CO2e/y)	0.556		-5.19				-4.8

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)							-17.4
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-78.4
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-1,184
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-7.66
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-716
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-31.2
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-16
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-292
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-2,342
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-26
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-2,133
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-11.2
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-1,431
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-60.2
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-114

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-579
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-4,629
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-34.7
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-471
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-3,082
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-15
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-2,147
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-89.2
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-211
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-6,916
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-866
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							2.84
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							59.8
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							602
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							2.77
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)							4.46
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.04
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							174
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							847
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							4.26
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							61.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							1,087

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							4.17
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)							6.47
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.52
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							350
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,521
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							5.68
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							63.7
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,572
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							5.54
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)							8.48
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							287
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,948