



# Net-Zero America - new jersey state report

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These data underlie graphs and tables presented in the Princeton Net-Zero America study:

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## Notes

- These data are all data from the study available at <https://netzeroamerica.princeton.edu>.
- The Net-Zero America study describes five pathways to reach net-zero emissions and one “no new policies” reference scenario. In this document, state-level results are grouped by scenario. For some scenarios, the study generated national, but not state-level results.
- Within results for a given scenario, data tables are organized into corresponding sections of the full net-zero study (e.g., Pillar 1, Pillar 2, etc.)
- For Pillar 6 (Land sinks), values shown are maximum carbon storage potentials.

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)	0	41,628	45,491	0	0	0	0
Sales of cooking units - Electric Resistance (%)	18.5	33.7	75.3	83.5	83.9	84	84
Sales of cooking units - Gas (%)	81.5	66.3	24.7	16.5	16.1	16	16
Sales of space heating units - Electric Heat Pump (%)	0.831	16.8	53.8	78.3	81.8	82	81.9
Sales of space heating units - Electric Resistance (%)	2.64	4.45	11.2	16.1	17	17	17.2
Sales of space heating units - Fossil (%)	8.14	11.7	2.29	0.1	0	0	0
Sales of space heating units - Gas Furnace (%)	88.4	67.1	32.7	5.5	1.14	0.906	0.899
Sales of water heating units - Electric Heat Pump (%)	0.247	7.96	43.7	60.3	62.3	62.4	62.4
Sales of water heating units - Electric Resistance (%)	1.46	5.37	23	35.5	37.3	37.4	37.4
Sales of water heating units - Gas Furnace (%)	97.6	85.5	33	4.08	0.216	0	0
Sales of water heating units - Other (%)	0.649	1.16	0.372	0.184	0.175	0.176	0.176

Table 2: *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)		3.49	3.59	11.3	12.3	10	10.7

Table 3: *E+ scenario - PILLAR 1: Efficiency/Electrification - Overview*

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	306	301	289	269	251	242	241
Final energy use - Industry (PJ)	130	131	133	133	134	135	137
Final energy use - Residential (PJ)	376	351	316	265	217	183	164
Final energy use - Transportation (PJ)	683	640	573	490	414	364	340

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)	0	7.13	8.05	0	0	0	0
Sales of cooking units - Electric Resistance (%)	33.6	47.7	91.1	99.5	100	100	100
Sales of cooking units - Gas (%)	66.4	52.3	8.94	0.45	0	0	0
Sales of space heating units - Electric Heat Pump (%)	4.07	17.8	67.1	90.9	93.9	94.1	94
Sales of space heating units - Electric Resistance (%)	6.87	9.53	5.27	2.94	2.62	2.66	2.75
Sales of space heating units - Fossil (%)	9.77	15	4.87	2.25	2.08	2.05	1.99
Sales of space heating units - Gas (%)	79.3	57.7	22.7	3.87	1.37	1.23	1.23
Sales of water heating units - Electric Heat Pump (%)	0	7.03	39.6	53.9	55.6	55.7	55.7
Sales of water heating units - Electric Resistance (%)	17.8	33.3	37.6	43.3	44.2	44.3	44.3
Sales of water heating units - Gas Furnace (%)	79.1	57.8	22.4	2.77	0.146	0	0
Sales of water heating units - Other (%)	3.14	1.9	0.397	0.064	0.049	0.049	0.05

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million \$2018)	0	1,151	2,985	4,782	7,266	7,885	7,530
Public EV charging plugs - DC Fast (1000 units)	0.341	0	1.73	0	7.27	0	11.7
Public EV charging plugs - L2 (1000 units)	0.794	0	41.6	0	175	0	281
Vehicle sales - Heavy-duty - diesel (%)	97.2	92.1	67	23.3	4.22	0.628	0
Vehicle sales - Heavy-duty - EV (%)	0.588	3.81	19	45.6	57.4	59.6	60
Vehicle sales - Heavy-duty - gasoline (%)	0.227	0.227	0.176	0.066	0.013	0.002	0
Vehicle sales - Heavy-duty - hybrid (%)	0.082	0.09	0.077	0.031	0.007	0.001	0
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.392	2.54	12.7	30.4	38.2	39.7	40
Vehicle sales - Heavy-duty - other (%)	1.5	1.23	1.07	0.568	0.163	0.038	0
Vehicle sales - Light-duty - diesel (%)	1.28	1.58	1.15	0.366	0.07	0.013	0
Vehicle sales - Light-duty - EV (%)	4.81	17.9	50.5	83.4	96.5	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88.4	74.9	44.6	14.9	3.08	0.584	0
Vehicle sales - Light-duty - hybrid (%)	5.29	5.17	3.5	1.27	0.314	0.07	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.109	0.324	0.182	0.055	0.011	0.002	0
Vehicle sales - Light-duty - other (%)	0.09	0.085	0.053	0.018	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

Table 6: *E+ scenario - PILLAR 2: Clean Electricity - Generating capacity*

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant (billion \$2018)	0	0.008	0.35	0	0	0.019	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
Capital invested - Offshore Wind - Base (billion \$2018)	0	0.236	0.183	0.208	0.284	41.2	14.5
Capital invested - Offshore Wind - Constrained (billion \$2018)	0	0.236	0.231	0.226	0.132	34.2	20.6
Capital invested - Solar PV - Base (billion \$2018)	0	1.39	1.17	0.71	0	0	0
Capital invested - Solar PV - Constrained (billion \$2018)	0	3.68	0.736	0.911	0	0	0
Capital invested - Wind - Constrained (billion \$2018)	0	0	0	0.075	0.536	0	0
Installed (cumulative) - Offshore Wind - Base land use assumptions (MW)	0	83.2	159	261	425	28,362	39,330
Installed (cumulative) - Rooftop PV (MW)	1,929	2,892	3,843	5,079	6,573	8,274	10,225
Installed (cumulative) - Solar - Base land use assumptions (MW)	772	1,809	2,789	3,433	3,433	3,433	3,433
Installed (cumulative) - Wind - Base land use assumptions (MW)	9	9	9	9	9	9	9

Table 7: *E+ scenario - PILLAR 2: Clean Electricity - Generation*

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	14.6	701	701	701	741	741
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0

Table 7: *E+ scenario - PILLAR 2: Clean Electricity - Generation (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use assumptions (GWh)	0	355	322	441	705	123,317	50,720
OffshoreWind - Constrained land use assumptions (GWh)	0	355	322	441	705	123,317	50,720
Solar - Base land use assumptions (GWh)	1,439	1,871	1,727	1,127	0	0	0
Solar - Constrained land use assumptions (GWh)	77.8	1,461	920	571	0	0	0
Wind - Base land use assumptions (GWh)	30.5	0	0	0	0	0	0
Wind - Constrained land use assumptions (GWh)	30.5	0	0	124	784	0	0

Table 8: *E+ scenario - PILLAR 3: Clean fuels - Bioenergy*

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million \$2018/year)	0	1.81	65.2	66.1	66.2	67.3	67.3
Conversion capital investment - Cumulative 5-yr (million \$2018)	0	8.36	390	27.3	2.77	22.9	0
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel (quantity)	0	0	0	1	1	1	1
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Power (quantity)	0	1	1	1	1	1	1
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	1	1	1	1
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	1	1	1	1	1	1
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

Table 9: *E+ scenario - PILLAR 4: CCUS - CO2 capture*

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

Table 10: *E+ scenario - PILLAR 4: CCUS - CO2 pipelines*

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	107	142	142	142	142
Cumulative investment - All (million \$2018)		0	230	438	438	438	438
Cumulative investment - Spur (million \$2018)		0	0	0	0	0	0
Cumulative investment - Trunk (million \$2018)		0	230	438	438	438	438
Spur (km)		0	0	0	0	0	0
Trunk (km)		0	107	142	142	142	142

Table 11: E+ scenario - PILLAR 4: CCUS - CO2 storage

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (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 12: E+ scenario - PILLAR 6: Land sinks - Agriculture

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-341
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-8.38
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-349
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-178
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-4.19
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-182
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)							172
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							15.2
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							188
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)							89.9
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							7.62
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							97.6

Table 13: *E+ scenario - PILLAR 6: Land sinks - Forests*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-68.4
Carbon sink potential - High - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-3,576
Carbon sink potential - High - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-1,305
Carbon sink potential - High - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-969
Carbon sink potential - High - Improve plantations (1000 tCO <sub>2</sub> e/y)							-6.74
Carbon sink potential - High - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-172
Carbon sink potential - High - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-269
Carbon sink potential - High - Reforest cropland (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-308
Carbon sink potential - High - Restore productivity (1000 tCO <sub>2</sub> e/y)							-478
Carbon sink potential - Low - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-34.3
Carbon sink potential - Low - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-963
Carbon sink potential - Low - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-218
Carbon sink potential - Low - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-372
Carbon sink potential - Low - Improve plantations (1000 tCO <sub>2</sub> e/y)							-3.43
Carbon sink potential - Low - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-57.4
Carbon sink potential - Low - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-94.1
Carbon sink potential - Low - Reforest cropland (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-23.3
Carbon sink potential - Low - Restore productivity (1000 tCO <sub>2</sub> e/y)							-161
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-51.4
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-2,269
Carbon sink potential - Mid - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-761
Carbon sink potential - Mid - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-671
Carbon sink potential - Mid - Improve plantations (1000 tCO <sub>2</sub> e/y)							-5.02
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-115
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-181
Carbon sink potential - Mid - Reforest cropland (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-165
Carbon sink potential - Mid - Restore productivity (1000 tCO <sub>2</sub> e/y)							-319



Table 13: *E+ scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							11.2
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							177
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							494
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2.48
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)							25.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							8.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							158
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							877
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							5.6
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							166
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							189
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.24
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)							13.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.51
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							95.8
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							473
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							8.4

Table 13: *E+ scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							171
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							342
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1.87
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)							19.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							11
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							193
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							747

Table 14: *E+ scenario - IMPACTS - Fossil fuel industries*

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		596	503	403	303	191	132
Natural gas consumption - Cumulative (tcf)		0	0	0	0	0	12,141
Natural gas production - Annual (tcf)		0	0	0	0	0	0
Oil consumption - Annual (million bbls)		160	138	108	79.4	57.2	35.6
Oil consumption - Cumulative (million bbls)		0	0	0	0	0	3,314
Oil production - Annual (million bbls)		0	0	0	0	0	0

Table 15: *E+ scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		975	0.677	0.673	0.627	0.41	0.028
Monetary damages from air pollution - Natural Gas (million 2019\$)		721	538	367	359	245	100
Monetary damages from air pollution - Transportation (million 2019\$)		3,928	3,747	2,908	1,717	789	300
Premature deaths from air pollution - Coal (deaths)		110	0.076	0.076	0.071	0.046	0.003
Premature deaths from air pollution - Natural Gas (deaths)		81.4	60.8	41.4	40.6	27.6	11.3
Premature deaths from air pollution - Transportation (deaths)		442	421	327	193	88.7	33.7

Table 16: *E+ scenario - IMPACTS - Jobs*

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		81.7	243	271	229	187	151
By economic sector - Construction (jobs)		11,359	11,076	13,094	13,576	32,022	34,571
By economic sector - Manufacturing (jobs)		13,162	24,229	24,490	19,330	24,937	19,631
By economic sector - Mining (jobs)		3,110	2,210	1,447	893	518	276

Table 16: E+ scenario - IMPACTS - Jobs (continued)

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		1,388	1,462	1,835	2,076	3,898	5,731
By economic sector - Pipeline (jobs)		749	664	527	373	246	163
By economic sector - Professional (jobs)		4,624	4,637	5,486	5,831	16,754	20,653
By economic sector - Trade (jobs)		3,826	3,528	3,815	3,934	9,786	12,578
By economic sector - Utilities (jobs)		9,854	9,936	12,948	13,999	35,997	31,142
By education level - All sectors - Associates degree or some college (jobs)		15,146	18,317	20,396	19,406	40,441	40,573
By education level - All sectors - Bachelors degree (jobs)		9,888	11,721	12,678	11,817	24,557	25,102
By education level - All sectors - Doctoral degree (jobs)		296	308	337	331	799	931
By education level - All sectors - High school diploma or less (jobs)		20,577	25,102	27,709	26,009	52,564	51,966
By education level - All sectors - Masters or professional degree (jobs)		2,249	2,536	2,793	2,679	5,983	6,324
By resource sector - Biomass (jobs)		350	670	771	691	681	647
By resource sector - CO2 (jobs)		0	234	209	0	0	0
By resource sector - Coal (jobs)		209	70	0	0	0	0
By resource sector - Grid (jobs)		10,677	12,029	19,548	21,831	69,149	58,759
By resource sector - Natural Gas (jobs)		7,886	6,335	5,401	6,079	4,247	3,788
By resource sector - Nuclear (jobs)		1,833	1,803	1,540	953	360	0.169
By resource sector - Oil (jobs)		7,097	5,643	4,064	2,777	1,868	1,091
By resource sector - Solar (jobs)		20,012	30,166	31,521	25,480	25,447	30,596
By resource sector - Wind (jobs)		90.1	1,033	859	2,432	22,592	30,016
Median wages - Annual - All (\$2019 per job)		68,976	67,710	69,100	70,944	74,431	75,716
On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs)		7,815	9,291	10,346	9,862	20,695	20,676
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)		3,020	3,238	3,715	3,720	8,466	8,688
On-Site or In-Plant Training - Total jobs - None (jobs)		7,869	9,562	10,457	9,788	19,941	20,322
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)		397	467	532	518	1,128	1,128
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)		29,054	35,426	38,863	36,354	74,114	74,082
On-the-Job Training - All sectors - 1 to 4 years (jobs)		10,014	11,830	13,206	12,638	26,734	26,766
On-the-Job Training - All sectors - 4 to 10 years (jobs)		2,920	3,101	3,600	3,646	8,415	8,669
On-the-Job Training - All sectors - None (jobs)		2,620	3,093	3,371	3,165	6,459	6,678
On-the-Job Training - All sectors - Over 10 years (jobs)		512	653	698	632	1,186	1,188
On-the-Job Training - All sectors - Up to 1 year (jobs)		32,088	39,308	43,038	40,160	81,549	81,595
Related work experience - All sectors - 1 to 4 years (jobs)		17,245	20,578	22,680	21,423	44,534	44,801
Related work experience - All sectors - 4 to 10 years (jobs)		11,147	13,241	14,621	13,857	29,072	29,285
Related work experience - All sectors - None (jobs)		6,888	8,228	9,137	8,692	18,002	18,050
Related work experience - All sectors - Over 10 years (jobs)		3,094	3,841	4,185	3,872	7,812	7,719
Related work experience - All sectors - Up to 1 year (jobs)		9,782	12,096	13,290	12,397	24,923	25,041
Wage income - All (million \$2019)		3,322	3,926	4,417	4,274	9,256	9,458

Table 17: E- scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)	0	41,604	45,411	0	0	0	0
Sales of cooking units - Electric Resistance (%)	18.5	21.6	27.5	43	64.5	77.7	82.3
Sales of cooking units - Gas (%)	81.5	78.4	72.5	57	35.5	22.3	17.7
Sales of space heating units - Electric Heat Pump (%)	0.831	10.8	15	27.7	49.8	69	77.8
Sales of space heating units - Electric Resistance (%)	2.64	3.4	4.18	6.57	10.9	14.6	16.6
Sales of space heating units - Fossil (%)	8.14	13.5	12.9	9.99	5	1.6	0.431
Sales of space heating units - Gas Furnace (%)	88.4	72.3	67.9	55.8	34.4	14.9	5.15
Sales of water heating units - Electric Heat Pump (%)	0.247	1.77	5.84	17.8	37.6	53.1	59.7
Sales of water heating units - Electric Resistance (%)	1.46	2.65	4.65	10.7	21.4	30.9	35.4
Sales of water heating units - Gas Furnace (%)	97.6	94.3	88.2	70.5	40.4	15.7	4.7
Sales of water heating units - Other (%)	0.649	1.31	1.29	1.01	0.586	0.311	0.212

Table 18: E- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		2.76	2.76	4.34	4.53	9.51	10.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	306	301	299	297	292	284	276
Final energy use - Industry (PJ)	130	131	133	135	136	137	139
Final energy use - Residential (PJ)	376	353	337	317	287	250	214
Final energy use - Transportation (PJ)	684	645	598	556	522	481	433

Table 20: E- scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)	0	7.14	8.46	0	0	0	0
Sales of cooking units - Electric Resistance (%)	33.3	35.1	41.2	57.3	79.6	93.4	98.2
Sales of cooking units - Gas (%)	66.7	64.9	58.8	42.7	20.4	6.57	1.77
Sales of space heating units - Electric Heat Pump (%)	4.07	9.27	14.9	31.5	59.1	80.8	90.2
Sales of space heating units - Electric Resistance (%)	6.87	10.2	9.71	8.26	5.82	3.82	3.01
Sales of space heating units - Fossil (%)	9.77	16.9	15.8	12.4	7.29	3.83	2.52
Sales of space heating units - Gas (%)	79.3	63.6	59.6	47.8	27.8	11.6	4.3
Sales of water heating units - Electric Heat Pump (%)	0	1.31	5.02	15.9	33.8	47.5	53.3
Sales of water heating units - Electric Resistance (%)	17.8	32.8	33.2	34.8	38	41.5	43.4
Sales of water heating units - Gas Furnace (%)	79.1	63.7	59.7	47.8	27.4	10.7	3.19
Sales of water heating units - Other (%)	3.14	2.18	2.01	1.52	0.769	0.279	0.109

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million \$2018)	0	0	192	391	1,332	4,152	6,062
Public EV charging plugs - DC Fast (1000 units)	0.341	0	0.582	0	2.73	0	7.49
Public EV charging plugs - L2 (1000 units)	0.794	0	14	0	65.6	0	180
Vehicle sales - Heavy-duty - diesel (%)	97.4	96	91.3	79.8	58.2	32.1	13.7
Vehicle sales - Heavy-duty - EV (%)	0.498	1.45	4.11	10.8	23.6	39.5	51
Vehicle sales - Heavy-duty - gasoline (%)	0.228	0.236	0.239	0.225	0.179	0.109	0.051
Vehicle sales - Heavy-duty - hybrid (%)	0.083	0.094	0.104	0.107	0.092	0.06	0.03
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.332	0.969	2.74	7.17	15.7	26.3	34
Vehicle sales - Heavy-duty - other (%)	1.5	1.28	1.46	1.95	2.25	1.96	1.14
Vehicle sales - Light-duty - diesel (%)	1.3	1.75	2.01	1.58	0.994	0.506	0.218
Vehicle sales - Light-duty - EV (%)	2.2	5.38	13.2	28.1	50.8	73.6	88.2
Vehicle sales - Light-duty - gasoline (%)	90.8	86.1	77.4	63.9	43.5	23.2	10.3
Vehicle sales - Light-duty - hybrid (%)	5.5	6.26	6.92	6.17	4.49	2.58	1.22
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.372	0.311	0.232	0.161	0.088	0.041
Vehicle sales - Light-duty - other (%)	0.091	0.095	0.085	0.073	0.052	0.028	0.013
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen FC (%)	0.166	0.485	1.37	3.58	7.86	13.2	17
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102

Table 22: E- scenario - PILLAR 6: Land sinks - Agriculture

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-341
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-8.38
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-349
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-178
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-4.19
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-182
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)							172
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							15.2

Table 22: E- scenario - PILLAR 6: Land sinks - Agriculture (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							188
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)							89.9
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							7.62
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							97.6

Table 23: E- scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-68.4
Carbon sink potential - High - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-3,576
Carbon sink potential - High - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-1,305
Carbon sink potential - High - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-969
Carbon sink potential - High - Improve plantations (1000 tCO <sub>2</sub> e/y)							-6.74
Carbon sink potential - High - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-172
Carbon sink potential - High - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-269
Carbon sink potential - High - Reforest cropland (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-308
Carbon sink potential - High - Restore productivity (1000 tCO <sub>2</sub> e/y)							-478
Carbon sink potential - Low - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-34.3
Carbon sink potential - Low - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-963
Carbon sink potential - Low - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-218
Carbon sink potential - Low - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-372
Carbon sink potential - Low - Improve plantations (1000 tCO <sub>2</sub> e/y)							-3.43
Carbon sink potential - Low - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-57.4
Carbon sink potential - Low - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-94.1
Carbon sink potential - Low - Reforest cropland (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-23.3
Carbon sink potential - Low - Restore productivity (1000 tCO <sub>2</sub> e/y)							-161
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-51.4

Table 23: E- scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-2,269
Carbon sink potential - Mid - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-761
Carbon sink potential - Mid - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-671
Carbon sink potential - Mid - Improve plantations (1000 tCO <sub>2</sub> e/y)							-5.02
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-115
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-181
Carbon sink potential - Mid - Reforest cropland (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-165
Carbon sink potential - Mid - Restore productivity (1000 tCO <sub>2</sub> e/y)							-319
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							11.2
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							177
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							494
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2.48
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)							25.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							8.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							158
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							877
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							5.6
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							166
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							189
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.24
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0

Table 23: E- scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							13.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.51
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							95.8
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							473
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							8.4
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							171
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							342
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1.87
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)							19.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							11
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							193
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							747

Table 24: E- scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		975	0.677	0.673	0.627	0.41	0.028
Monetary damages from air pollution - Natural Gas (million 2019\$)		678	395	187	88.8	27.1	20.6
Monetary damages from air pollution - Transportation (million 2019\$)		4,005	4,154	4,132	3,799	3,086	2,158
Premature deaths from air pollution - Coal (deaths)		110	0.076	0.076	0.071	0.046	0.003
Premature deaths from air pollution - Natural Gas (deaths)		76.6	44.6	21.1	10	3.05	2.33
Premature deaths from air pollution - Transportation (deaths)		450	467	465	427	347	243



Table 25: *E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Commercial*

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)	0	41,628	45,491	0	0	0	0
Sales of cooking units - Electric Resistance (%)	18.5	33.7	75.3	83.5	83.9	84	84
Sales of cooking units - Gas (%)	81.5	66.3	24.7	16.5	16.1	16	16
Sales of space heating units - Electric Heat Pump (%)	0.831	16.8	53.8	78.3	81.8	82	81.9
Sales of space heating units - Electric Resistance (%)	2.64	4.45	11.2	16.1	17	17	17.2
Sales of space heating units - Fossil (%)	8.14	11.7	2.29	0.1	0	0	0
Sales of space heating units - Gas Furnace (%)	88.4	67.1	32.7	5.5	1.14	0.906	0.899
Sales of water heating units - Electric Heat Pump (%)	0.247	7.96	43.7	60.3	62.3	62.4	62.4
Sales of water heating units - Electric Resistance (%)	1.46	5.37	23	35.5	37.3	37.4	37.4
Sales of water heating units - Gas Furnace (%)	97.6	85.5	33	4.08	0.216	0	0
Sales of water heating units - Other (%)	0.649	1.16	0.372	0.184	0.175	0.176	0.176

Table 26: *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)		3.49	3.59	11.3	12.3	10	10.7

Table 27: *E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Overview*

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	306	301	289	269	251	242	241
Final energy use - Industry (PJ)	130	131	133	133	134	135	137
Final energy use - Residential (PJ)	376	351	316	265	217	183	164
Final energy use - Transportation (PJ)	683	640	573	490	414	364	340

Table 28: *E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Residential*

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)	0	7.13	8.05	0	0	0	0
Sales of cooking units - Electric Resistance (%)	33.6	47.7	91.1	99.5	100	100	100
Sales of cooking units - Gas (%)	66.4	52.3	8.94	0.45	0	0	0
Sales of space heating units - Electric Heat Pump (%)	4.07	17.8	67.1	90.9	93.9	94.1	94
Sales of space heating units - Electric Resistance (%)	6.87	9.53	5.27	2.94	2.62	2.66	2.75
Sales of space heating units - Fossil (%)	9.77	15	4.87	2.25	2.08	2.05	1.99
Sales of space heating units - Gas (%)	79.3	57.7	22.7	3.87	1.37	1.23	1.23
Sales of water heating units - Electric Heat Pump (%)	0	7.03	39.6	53.9	55.6	55.7	55.7
Sales of water heating units - Electric Resistance (%)	17.8	33.3	37.6	43.3	44.2	44.3	44.3
Sales of water heating units - Gas Furnace (%)	79.1	57.8	22.4	2.77	0.146	0	0
Sales of water heating units - Other (%)	3.14	1.9	0.397	0.064	0.049	0.049	0.05

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million \$2018)	0	1,151	2,985	4,782	7,266	7,885	7,530
Public EV charging plugs - DC Fast (1000 units)	0.341	0	1.73	0	7.27	0	11.7
Public EV charging plugs - L2 (1000 units)	0.794	0	41.6	0	175	0	281
Vehicle sales - Heavy-duty - diesel (%)	97.2	92.1	67	23.3	4.22	0.628	0
Vehicle sales - Heavy-duty - EV (%)	0.588	3.81	19	45.6	57.4	59.6	60
Vehicle sales - Heavy-duty - gasoline (%)	0.227	0.227	0.176	0.066	0.013	0.002	0
Vehicle sales - Heavy-duty - hybrid (%)	0.082	0.09	0.077	0.031	0.007	0.001	0
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.392	2.54	12.7	30.4	38.2	39.7	40
Vehicle sales - Heavy-duty - other (%)	1.5	1.23	1.07	0.568	0.163	0.038	0
Vehicle sales - Light-duty - diesel (%)	1.28	1.58	1.15	0.366	0.07	0.013	0
Vehicle sales - Light-duty - EV (%)	4.81	17.9	50.5	83.4	96.5	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88.4	74.9	44.6	14.9	3.08	0.584	0
Vehicle sales - Light-duty - hybrid (%)	5.29	5.17	3.5	1.27	0.314	0.07	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.109	0.324	0.182	0.055	0.011	0.002	0
Vehicle sales - Light-duty - other (%)	0.09	0.085	0.053	0.018	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

Table 30: *E+RE+ scenario - PILLAR 2: Clean Electricity - Generating capacity*

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Offshore Wind - Base (billion \$2018)	0	0.236	0.183	0.38	22.9	33.3	4.26
Capital invested - Solar PV - Base (billion \$2018)	0	4.45	0.529	0	0	0	5.3
Capital invested - Wind - Base (billion \$2018)	0	0	0	0	0	0.524	0.315
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	83.2	159	345	13,537	36,114	39,330
Installed (cumulative) - Solar - Base land use assumptions (MW)	772	4,096	4,538	4,538	4,538	4,538	10,263
Installed (cumulative) - Wind - Base land use assumptions (MW)	9	9	9	9	9	269	434

Table 31: *E+RE+ scenario - PILLAR 2: Clean Electricity - Generation*

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use assumptions (GWh)	0	355	322	801	57,655	101,667	15,060
OffshoreWind - Constrained land use assumptions (GWh)	0	355	410	797	57,365	44,869	71,214
Solar - Base land use assumptions (GWh)	1,439	6,021	777	0	0	0	10,318
Solar - Constrained land use assumptions (GWh)	1,439	3,674	1,956	0	0	0	17,104
Wind - Base land use assumptions (GWh)	30.5	0	0	0	0	868	483
Wind - Constrained land use assumptions (GWh)	30.5	0	0	675	233	0	0

Table 32: *E+RE+ scenario - PILLAR 6: Land sinks - Agriculture*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO <sub>2</sub> e/y)							-341
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO <sub>2</sub> e/y)							-8.38
Carbon sink potential - Aggressive deployment - Total (1000 tCO <sub>2</sub> e/y)							-349
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO <sub>2</sub> e/y)							-178
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO <sub>2</sub> e/y)							-4.19
Carbon sink potential - Moderate deployment - Total (1000 tCO <sub>2</sub> e/y)							-182
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)							172
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							15.2
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							188
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)							89.9
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							7.62
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							97.6

Table 33: *E+RE+ scenario - PILLAR 6: Land sinks - Forests*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-68.4
Carbon sink potential - High - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-3,576
Carbon sink potential - High - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-1,305
Carbon sink potential - High - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-969
Carbon sink potential - High - Improve plantations (1000 tCO <sub>2</sub> e/y)							-6.74
Carbon sink potential - High - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-172

Table 33: *E+RE+ scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-269
Carbon sink potential - High - Reforest cropland (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-308
Carbon sink potential - High - Restore productivity (1000 tCO <sub>2</sub> e/y)							-478
Carbon sink potential - Low - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-34.3
Carbon sink potential - Low - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-963
Carbon sink potential - Low - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-218
Carbon sink potential - Low - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-372
Carbon sink potential - Low - Improve plantations (1000 tCO <sub>2</sub> e/y)							-3.43
Carbon sink potential - Low - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-57.4
Carbon sink potential - Low - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-94.1
Carbon sink potential - Low - Reforest cropland (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-23.3
Carbon sink potential - Low - Restore productivity (1000 tCO <sub>2</sub> e/y)							-161
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-51.4
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-2,269
Carbon sink potential - Mid - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-761
Carbon sink potential - Mid - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-671
Carbon sink potential - Mid - Improve plantations (1000 tCO <sub>2</sub> e/y)							-5.02
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-115
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-181
Carbon sink potential - Mid - Reforest cropland (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-165
Carbon sink potential - Mid - Restore productivity (1000 tCO <sub>2</sub> e/y)							-319
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							11.2
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							177
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							494
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2.48

Table 33: *E+RE+ scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							25.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							8.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							158
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							877
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							5.6
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							166
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							189
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.24
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)							13.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.51
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							95.8
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							473
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							8.4
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							171
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							342
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1.87
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)							19.5

Table 33: *E+RE+ 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)							11
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							193
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							747

Table 34: *E+RE+ scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		975	0.677	0.673	0.627	0.41	0.028
Monetary damages from air pollution - Natural Gas (million 2019\$)		628	462	296	227	84.3	15.7
Monetary damages from air pollution - Transportation (million 2019\$)		3,928	3,747	2,908	1,717	789	300
Premature deaths from air pollution - Coal (deaths)		110	0.076	0.076	0.071	0.046	0.003
Premature deaths from air pollution - Natural Gas (deaths)		70.8	52.2	33.4	25.6	9.52	1.77
Premature deaths from air pollution - Transportation (deaths)		442	421	327	193	88.7	33.7

Table 35: *E+RE- scenario - PILLAR 1: Efficiency/Electrification - Commercial*

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)	0	41,628	45,491	0	0	0	0
Sales of cooking units - Electric Resistance (%)	18.5	33.7	75.3	83.5	83.9	84	84
Sales of cooking units - Gas (%)	81.5	66.3	24.7	16.5	16.1	16	16
Sales of space heating units - Electric Heat Pump (%)	0.831	16.8	53.8	78.3	81.8	82	81.9
Sales of space heating units - Electric Resistance (%)	2.64	4.45	11.2	16.1	17	17	17.2
Sales of space heating units - Fossil (%)	8.14	11.7	2.29	0.1	0	0	0
Sales of space heating units - Gas Furnace (%)	88.4	67.1	32.7	5.5	1.14	0.906	0.899
Sales of water heating units - Electric Heat Pump (%)	0.247	7.96	43.7	60.3	62.3	62.4	62.4
Sales of water heating units - Electric Resistance (%)	1.46	5.37	23	35.5	37.3	37.4	37.4
Sales of water heating units - Gas Furnace (%)	97.6	85.5	33	4.08	0.216	0	0
Sales of water heating units - Other (%)	0.649	1.16	0.372	0.184	0.175	0.176	0.176

Table 36: *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)		3.49	3.59	11.3	12.3	10	10.7

Table 37: *E+RE- scenario - PILLAR 1: Efficiency/Electrification - Overview*

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	306	301	289	269	251	242	241

Table 37: *E+RE- scenario - PILLAR 1: Efficiency/Electrification - Overview (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	130	131	133	133	134	135	137
Final energy use - Residential (PJ)	376	351	316	265	217	183	164
Final energy use - Transportation (PJ)	683	640	573	490	414	364	340

Table 38: *E+RE- scenario - PILLAR 1: Efficiency/Electrification - Residential*

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)	0	7.13	8.05	0	0	0	0
Sales of cooking units - Electric Resistance (%)	33.6	47.7	91.1	99.5	100	100	100
Sales of cooking units - Gas (%)	66.4	52.3	8.94	0.45	0	0	0
Sales of space heating units - Electric Heat Pump (%)	4.07	17.8	67.1	90.9	93.9	94.1	94
Sales of space heating units - Electric Resistance (%)	6.87	9.53	5.27	2.94	2.62	2.66	2.75
Sales of space heating units - Fossil (%)	9.77	15	4.87	2.25	2.08	2.05	1.99
Sales of space heating units - Gas (%)	79.3	57.7	22.7	3.87	1.37	1.23	1.23
Sales of water heating units - Electric Heat Pump (%)	0	7.03	39.6	53.9	55.6	55.7	55.7
Sales of water heating units - Electric Resistance (%)	17.8	33.3	37.6	43.3	44.2	44.3	44.3
Sales of water heating units - Gas Furnace (%)	79.1	57.8	22.4	2.77	0.146	0	0
Sales of water heating units - Other (%)	3.14	1.9	0.397	0.064	0.049	0.049	0.05

Table 39: *E+RE- scenario - PILLAR 1: Efficiency/Electrification - Transportation*

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million \$2018)	0	1,151	2,985	4,782	7,266	7,885	7,530
Public EV charging plugs - DC Fast (1000 units)	0.341	0	1.73	0	7.27	0	11.7
Public EV charging plugs - L2 (1000 units)	0.794	0	41.6	0	175	0	281
Vehicle sales - Heavy-duty - diesel (%)	97.2	92.1	67	23.3	4.22	0.628	0
Vehicle sales - Heavy-duty - EV (%)	0.588	3.81	19	45.6	57.4	59.6	60
Vehicle sales - Heavy-duty - gasoline (%)	0.227	0.227	0.176	0.066	0.013	0.002	0
Vehicle sales - Heavy-duty - hybrid (%)	0.082	0.09	0.077	0.031	0.007	0.001	0
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.392	2.54	12.7	30.4	38.2	39.7	40
Vehicle sales - Heavy-duty - other (%)	1.5	1.23	1.07	0.568	0.163	0.038	0
Vehicle sales - Light-duty - diesel (%)	1.28	1.58	1.15	0.366	0.07	0.013	0
Vehicle sales - Light-duty - EV (%)	4.81	17.9	50.5	83.4	96.5	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88.4	74.9	44.6	14.9	3.08	0.584	0
Vehicle sales - Light-duty - hybrid (%)	5.29	5.17	3.5	1.27	0.314	0.07	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.109	0.324	0.182	0.055	0.011	0.002	0
Vehicle sales - Light-duty - other (%)	0.09	0.085	0.053	0.018	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

Table 40: *E+RE- scenario - PILLAR 2: Clean Electricity - Generating capacity*

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Offshore Wind - Base (billion \$2018)		0.451	0.447	0.359	0.621	4.07	1.56
Capital invested - Offshore Wind - Constrained (billion \$2018)		0.507	0.267	0.527	0.533	3.39	1.03
Capital invested - Solar PV - Base (billion \$2018)		0.566	0.667	0.657	0.669	0	0
Capital invested - Solar PV - Constrained (billion \$2018)		0.309	1.06	0.212	0.31	0	0
Capital invested - Wind - Base (billion \$2018)		0	0	0	0	0	0
Capital invested - Wind - Constrained (billion \$2018)		0	0	0	0	0	0

Table 41: *E+RE- scenario - PILLAR 2: Clean Electricity - Generation*

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use assumptions (GWh)	0	677	801	754	1,517	11,890	5,163
OffshoreWind - Constrained land use assumptions (GWh)	0	765	475	1,108	1,308	9,913	3,398
Solar - Base land use assumptions (GWh)	1,439	774	1,014	1,055	1,143	0	0
Solar - Constrained land use assumptions (GWh)	1,439	423	1,583	339	526	0	0
Wind - Base land use assumptions (GWh)	30.5	0	0	0	0	0	0
Wind - Constrained land use assumptions (GWh)	30.5	0	0	0	0	0	0

Table 42: *E+RE- scenario - PILLAR 6: Land sinks - Agriculture*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-341
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-8.38
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-349
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-178
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-4.19
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-182
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)							172
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							15.2



Table 42: *E+RE- scenario - PILLAR 6: Land sinks - Agriculture (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							188
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)							89.9
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							7.62
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							97.6

Table 43: *E+RE- scenario - PILLAR 6: Land sinks - Forests*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-68.4
Carbon sink potential - High - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-3,576
Carbon sink potential - High - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-1,305
Carbon sink potential - High - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-969
Carbon sink potential - High - Improve plantations (1000 tCO <sub>2</sub> e/y)							-6.74
Carbon sink potential - High - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-172
Carbon sink potential - High - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-269
Carbon sink potential - High - Reforest cropland (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-308
Carbon sink potential - High - Restore productivity (1000 tCO <sub>2</sub> e/y)							-478
Carbon sink potential - Low - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-34.3
Carbon sink potential - Low - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-963
Carbon sink potential - Low - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-218
Carbon sink potential - Low - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-372
Carbon sink potential - Low - Improve plantations (1000 tCO <sub>2</sub> e/y)							-3.43
Carbon sink potential - Low - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-57.4
Carbon sink potential - Low - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-94.1
Carbon sink potential - Low - Reforest cropland (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-23.3
Carbon sink potential - Low - Restore productivity (1000 tCO <sub>2</sub> e/y)							-161
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO <sub>2</sub> e/y)							-51.4

Table 43: E+RE- scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO <sub>2</sub> e/y)							-2,269
Carbon sink potential - Mid - Avoid deforestation (1000 tCO <sub>2</sub> e/y)							-761
Carbon sink potential - Mid - Extend rotation length (1000 tCO <sub>2</sub> e/y)							-671
Carbon sink potential - Mid - Improve plantations (1000 tCO <sub>2</sub> e/y)							-5.02
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO <sub>2</sub> e/y)							-115
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO <sub>2</sub> e/y)							-181
Carbon sink potential - Mid - Reforest cropland (1000 tCO <sub>2</sub> e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO <sub>2</sub> e/y)							-165
Carbon sink potential - Mid - Restore productivity (1000 tCO <sub>2</sub> e/y)							-319
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							11.2
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							177
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							494
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2.48
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)							25.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							8.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							158
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							877
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							5.6
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							166
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							189
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.24
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0

Table 43: *E+RE- scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							13.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.51
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							95.8
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							473
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							8.4
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							171
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							342
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1.87
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)							19.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							11
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							193
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							747

Table 44: *E+RE- scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		975	0.677	0.673	0.627	0.41	0.028
Monetary damages from air pollution - Natural Gas (million 2019\$)		679	537	605	482	214	59.1
Monetary damages from air pollution - Transportation (million 2019\$)		3,928	3,747	2,908	1,717	789	300
Premature deaths from air pollution - Coal (deaths)		110	0.076	0.076	0.071	0.046	0.003
Premature deaths from air pollution - Natural Gas (deaths)		76.6	60.7	68.3	54.4	24.2	6.67
Premature deaths from air pollution - Transportation (deaths)		442	421	327	193	88.7	33.7

Table 45: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Commercial

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)	0	41,604	45,411	0	0	0	0
Sales of cooking units - Electric Resistance (%)	18.5	21.6	27.5	43	64.5	77.7	82.3
Sales of cooking units - Gas (%)	81.5	78.4	72.5	57	35.5	22.3	17.7
Sales of space heating units - Electric Heat Pump (%)	0.831	10.8	15	27.7	49.8	69	77.8
Sales of space heating units - Electric Resistance (%)	2.64	3.4	4.18	6.57	10.9	14.6	16.6
Sales of space heating units - Fossil (%)	8.14	13.5	12.9	9.99	5	1.6	0.431
Sales of space heating units - Gas Furnace (%)	88.4	72.3	67.9	55.8	34.4	14.9	5.15
Sales of water heating units - Electric Heat Pump (%)	0.247	1.77	5.84	17.8	37.6	53.1	59.7
Sales of water heating units - Electric Resistance (%)	1.46	2.65	4.65	10.7	21.4	30.9	35.4
Sales of water heating units - Gas Furnace (%)	97.6	94.3	88.2	70.5	40.4	15.7	4.7
Sales of water heating units - Other (%)	0.649	1.31	1.29	1.01	0.586	0.311	0.212

Table 46: 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)		2.76	2.76	4.34	4.53	9.51	10.3

Table 47: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	306	301	299	297	292	284	276
Final energy use - Industry (PJ)	130	131	133	135	136	137	139
Final energy use - Residential (PJ)	376	353	337	317	287	250	214
Final energy use - Transportation (PJ)	684	645	598	556	522	481	433

Table 48: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)	0	7.14	8.46	0	0	0	0
Sales of cooking units - Electric Resistance (%)	33.3	35.1	41.2	57.3	79.6	93.4	98.2
Sales of cooking units - Gas (%)	66.7	64.9	58.8	42.7	20.4	6.57	1.77
Sales of space heating units - Electric Heat Pump (%)	4.07	9.27	14.9	31.5	59.1	80.8	90.2
Sales of space heating units - Electric Resistance (%)	6.87	10.2	9.71	8.26	5.82	3.82	3.01
Sales of space heating units - Fossil (%)	9.77	16.9	15.8	12.4	7.29	3.83	2.52
Sales of space heating units - Gas (%)	79.3	63.6	59.6	47.8	27.8	11.6	4.3
Sales of water heating units - Electric Heat Pump (%)	0	1.31	5.02	15.9	33.8	47.5	53.3
Sales of water heating units - Electric Resistance (%)	17.8	32.8	33.2	34.8	38	41.5	43.4
Sales of water heating units - Gas Furnace (%)	79.1	63.7	59.7	47.8	27.4	10.7	3.19
Sales of water heating units - Other (%)	3.14	2.18	2.01	1.52	0.769	0.279	0.109

Table 49: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Transportation

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million \$2018)	0	0	192	391	1,332	4,152	6,062
Public EV charging plugs - DC Fast (1000 units)	0.341	0	0.582	0	2.73	0	7.49
Public EV charging plugs - L2 (1000 units)	0.794	0	14	0	65.6	0	180
Vehicle sales - Heavy-duty - diesel (%)	97.4	96	91.3	79.8	58.2	32.1	13.7
Vehicle sales - Heavy-duty - EV (%)	0.498	1.45	4.11	10.8	23.6	39.5	51
Vehicle sales - Heavy-duty - gasoline (%)	0.228	0.236	0.239	0.225	0.179	0.109	0.051
Vehicle sales - Heavy-duty - hybrid (%)	0.083	0.094	0.104	0.107	0.092	0.06	0.03
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.332	0.969	2.74	7.17	15.7	26.3	34
Vehicle sales - Heavy-duty - other (%)	1.5	1.28	1.46	1.95	2.25	1.96	1.14
Vehicle sales - Light-duty - diesel (%)	1.3	1.75	2.01	1.58	0.994	0.506	0.218
Vehicle sales - Light-duty - EV (%)	2.2	5.38	13.2	28.1	50.8	73.6	88.2
Vehicle sales - Light-duty - gasoline (%)	90.8	86.1	77.4	63.9	43.5	23.2	10.3
Vehicle sales - Light-duty - hybrid (%)	5.5	6.26	6.92	6.17	4.49	2.58	1.22
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.372	0.311	0.232	0.161	0.088	0.041
Vehicle sales - Light-duty - other (%)	0.091	0.095	0.085	0.073	0.052	0.028	0.013
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen FC (%)	0.166	0.485	1.37	3.58	7.86	13.2	17
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102

Table 50: E-B+ scenario - PILLAR 2: Clean Electricity - Generating capacity

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant (billion \$2018)	0	0.008	0.352	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 51: E-B+ scenario - PILLAR 2: Clean Electricity - Generation

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	16.3	707	707	707	707	707
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0

Table 52: E-B+ scenario - PILLAR 3: Clean fuels - Bioenergy

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million \$2018/year)	0	14.3	180	183	183	184	593
Conversion capital investment - Cumulative 5-yr (million \$2018)	0	9.36	392	34.4	5.46	9	4,899
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel (quantity)	0	0	0	1	1	1	1
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Power (quantity)	0	1	1	1	1	1	1
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	1	1	1	7

Table 52: E-B+ scenario - PILLAR 3: Clean fuels - Bioenergy (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	1	1	1	1	1	1
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

Table 53: E-B+ scenario - PILLAR 4: CCUS - CO2 capture

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

Table 54: E-B+ scenario - PILLAR 4: CCUS - CO2 pipelines

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	107	142	142	142	142
Cumulative investment - All (million \$2018)		0	230	438	438	460	460
Cumulative investment - Spur (million \$2018)		0	0	0	0	0	0
Cumulative investment - Trunk (million \$2018)		0	230	438	438	460	460
Spur (km)		0	0	0	0	0	0
Trunk (km)		0	107	142	142	142	142

Table 55: E-B+ scenario - PILLAR 4: CCUS - CO2 storage

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (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 56: E-B+ scenario - PILLAR 6: Land sinks - Agriculture

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-18.8
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-324
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 - Permanent conservation cover (1000 tCO2e/y)							-7.83
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-351

Table 56: E-B+ scenario - PILLAR 6: Land sinks - Agriculture (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-18.8
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-169
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 - Permanent conservation cover (1000 tCO2e/y)							-3.91
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-191
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							9.08
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							403
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							4.53
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							2.71
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							14.2
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							434
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							9.08
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							85.2
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							4.53
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							2.71
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							7.12
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							109

Table 57: E-B+ scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-68.4
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-3,576
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,305

Table 57: E-B+ 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)							-969
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-6.74
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-172
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-269
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-308
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-478
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-34.3
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-963
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-218
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-372
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-3.43
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-57.4
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-94.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-23.3
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-161
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-51.4
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-2,269
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-761
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-671
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-5.02
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-115
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-181
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-165
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-319
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							11.2
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							177



Table 57: 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)							494
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2.48
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)							25.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							8.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							158
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							877
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							5.6
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							166
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							189
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.24
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)							13.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.51
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							95.8
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							473
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							8.4
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							171
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							342
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1.87

Table 57: *E-B+ scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							19.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							11
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							193
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							747

Table 58: *E-B+ scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		975	0.677	0.673	0.627	0.41	0.028
Monetary damages from air pollution - Natural Gas (million 2019\$)		666	369	221	185	109	29.7
Monetary damages from air pollution - Transportation (million 2019\$)		4,005	4,154	4,132	3,799	3,086	2,158
Premature deaths from air pollution - Coal (deaths)		110	0.076	0.076	0.071	0.046	0.003
Premature deaths from air pollution - Natural Gas (deaths)		75.2	41.6	24.9	20.8	12.3	3.35
Premature deaths from air pollution - Transportation (deaths)		450	467	465	427	347	243

Table 59: *REF scenario - PILLAR 1: Efficiency/Electrification - Commercial*

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million \$2018)	0	41,117	42,334	0	0	0	0
Sales of cooking units - Electric Resistance (%)	18.5	19.4	19.4	19.6	19.7	19.8	19.9
Sales of cooking units - Gas (%)	81.5	80.6	80.6	80.4	80.3	80.2	80.1
Sales of space heating units - Electric Heat Pump (%)	0.831	15.4	41.5	62.9	66.3	66.6	66.5
Sales of space heating units - Electric Resistance (%)	2.64	4.05	8.88	20.9	30.7	32.3	32.6
Sales of space heating units - Fossil (%)	8.14	13.2	10.3	4.62	0.695	0.058	0
Sales of space heating units - Gas Furnace (%)	88.4	67.4	39.3	11.6	2.31	0.996	0.899
Sales of water heating units - Electric Heat Pump (%)	0.247	0.326	0.328	0.328	0.329	0.331	0.332
Sales of water heating units - Electric Resistance (%)	1.46	1.94	1.92	1.93	1.93	1.93	1.93
Sales of water heating units - Gas Furnace (%)	97.6	96.4	96.3	96.3	96.3	96.3	96.3
Sales of water heating units - Other (%)	0.649	1.34	1.42	1.41	1.43	1.46	1.47

Table 60: REF scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion \$2018)		2.77	2.78	8.27	8.93	8.04	8.51

Table 61: REF scenario - PILLAR 1: Efficiency/Electrification - Overview

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	306	305	307	309	314	329	352
Final energy use - Industry (PJ)	130	134	140	145	151	158	164
Final energy use - Residential (PJ)	376	350	336	325	318	315	313
Final energy use - Transportation (PJ)	684	651	614	593	597	615	636

Table 62: REF scenario - PILLAR 1: Efficiency/Electrification - Residential

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion \$2018)	0	6.64	7	0	0	0	0
Sales of cooking units - Electric Resistance (%)	32.8	32.8	32.8	32.8	32.8	32.8	32.8
Sales of cooking units - Gas (%)	67.2	67.2	67.2	67.2	67.2	67.2	67.2
Sales of space heating units - Electric Heat Pump (%)	2.27	23.8	24.8	26.1	26.8	27.3	28.1
Sales of space heating units - Electric Resistance (%)	7.12	8.97	8.81	8.6	8.48	7.9	7.12
Sales of space heating units - Fossil (%)	9.93	13.6	7.36	3.84	3.54	3.54	3.56
Sales of space heating units - Gas (%)	80.7	53.6	59.1	61.5	61.2	61.2	61.3
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	17.8	32.6	32.5	32.5	32.5	32.5	32.4
Sales of water heating units - Gas Furnace (%)	79.1	65.2	65.2	65.3	65.3	65.3	65.3
Sales of water heating units - Other (%)	3.14	2.24	2.24	2.24	2.24	2.24	2.24

Table 63: REF scenario - PILLAR 1: Efficiency/Electrification - Transportation

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Heavy-duty - diesel (%)	98.1	98.2	97.9	97	95.6	93.5	91.6
Vehicle sales - Heavy-duty - EV (%)	0	0	0	0	0	0	0
Vehicle sales - Heavy-duty - gasoline (%)	0.229	0.242	0.257	0.274	0.294	0.317	0.343
Vehicle sales - Heavy-duty - hybrid (%)	0.083	0.096	0.112	0.13	0.15	0.174	0.202
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.119	0.138	0.16	0.186	0.216	0.25	0.29
Vehicle sales - Heavy-duty - other (%)	1.51	1.31	1.57	2.37	3.69	5.71	7.57
Vehicle sales - Light-duty - diesel (%)	1.29	1.74	2.14	2	1.79	1.66	1.58
Vehicle sales - Light-duty - EV (%)	4.44	6.75	7.58	9.37	11.3	12.9	14.1
Vehicle sales - Light-duty - gasoline (%)	88.8	84.9	82.5	80.3	78.1	76.2	74.7
Vehicle sales - Light-duty - hybrid (%)	5.31	6.12	7.41	7.95	8.45	8.89	9.18
Vehicle sales - Light-duty - hydrogen FC (%)	0.109	0.367	0.331	0.29	0.285	0.284	0.294
Vehicle sales - Light-duty - other (%)	0.09	0.094	0.09	0.09	0.09	0.088	0.09
Vehicle sales - Medium-duty - diesel (%)	65.2	63.5	61.6	59.6	58	56.5	55.2
Vehicle sales - Medium-duty - EV (%)	0.027	0.105	0.329	0.671	0.895	0.973	0.993
Vehicle sales - Medium-duty - gasoline (%)	34	35.5	37	38.5	39.7	40.8	41.7
Vehicle sales - Medium-duty - hybrid (%)	0.365	0.427	0.496	0.577	0.674	0.793	0.929
Vehicle sales - Medium-duty - hydrogen FC (%)	0.175	0.208	0.242	0.285	0.339	0.409	0.487
Vehicle sales - Medium-duty - other (%)	0.255	0.271	0.298	0.345	0.42	0.528	0.671

Table 64: REF scenario - PILLAR 6: Land sinks - Forests

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-68.4
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-3,576
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,305
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-969
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-6.74
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-172
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-269
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-308
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-478
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-34.3
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-963
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-218
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-372
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-3.43
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-57.4
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-94.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-23.3
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-161
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-51.4
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-2,269
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-761
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-671
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-5.02
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-115
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-181
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-165
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-319

Table 64: REF scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							11.2
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							177
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							494
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2.48
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)							25.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							8.74
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							158
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							877
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							5.6
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							166
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							189
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.24
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)							13.4
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.51
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							95.8
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							473
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							8.4

Table 64: REF scenario - PILLAR 6: Land sinks - Forests (continued)

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							171
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							342
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1.87
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)							19.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							11
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							193
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							747

Table 65: 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)	0.55		-1.73				-1.55
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.047		-0.084				-0.088
Business-as-usual carbon sink - Total (Mt CO2e/y)	0.503		-1.82				-1.64

Table 66: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		2,530	1,621	1,520	1,481	1,455	1,336
Monetary damages from air pollution - Natural Gas (million 2019\$)		490	504	775	798	818	790
Monetary damages from air pollution - Transportation (million 2019\$)		3,992	4,196	4,392	4,611	4,833	5,068
Premature deaths from air pollution - Coal (deaths)		286	183	172	167	164	151
Premature deaths from air pollution - Natural Gas (deaths)		55.3	56.9	87.5	90.1	92.3	89.1
Premature deaths from air pollution - Transportation (deaths)		449	472	494	519	544	570