Net-Zero America - new york state report

2021-03-05

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.

Data by category and subcategory

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	89,684	98,037	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 (%)	0.625	15.6	51.1	76.3	79.8	80.3	80.2
Sales of space heating units - Electric Resistance (%)	2.13	4.73	12.8	18	19.1	18.8	18.9
Sales of space heating units - Fossil (%)	19.1	14.5	2.85	0.124	0	0	0
Sales of space heating units - Gas Furnace (%)	78.2	65.2	33.3	5.6	1.11	0.87	0.863
Sales of water heating units - Electric Heat Pump (%)	0.224	7.35	41	58.7	61	61.2	61.2
Sales of water heating units - Electric Resistance (%)	1.34	5.14	22.3	36.4	38.5	38.7	38.7
Sales of water heating units - Gas Furnace (%)	97	86.3	36.3	4.73	0.256	0	0
Sales of water heating units - Other (%)	1.45	1.19	0.377	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)		7.59	7.79	18.2	19.6	18.4	19.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	690	677	650	604	560	538	533
Final energy use - Industry (PJ)	488	505	512	521	523	530	532
Final energy use - Residential (PJ)	880	819	735	612	496	413	364
Final energy use - Transportation (PJ)	1,161	1,104	995	858	731	647	604

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	14.3	15.2	0	0	0	0
Sales of cooking units - Electric Resistance (%)	34.6	48.6	91.2	99.6	100	100	100
Sales of cooking units - Gas (%)	65.4	51.4	8.8	0.443	0	0	0
Sales of space heating units - Electric Heat Pump (%)	3.63	16.2	66.1	89	91.7	91.9	92
Sales of space heating units - Electric Resistance (%)	8.47	10.5	6.04	3.28	2.89	2.96	3.08
Sales of space heating units - Fossil (%)	24.2	32.1	10.3	4.74	4.39	4.24	4.06
Sales of space heating units - Gas (%)	63.7	41.2	17.6	3.03	0.991	0.876	0.88
Sales of water heating units - Electric Heat Pump (%)	0	6.54	37.2	51.7	53.5	53.6	53.6
Sales of water heating units - Electric Resistance (%)	18.7	35.7	39.8	45.4	46.3	46.4	46.3
Sales of water heating units - Gas Furnace (%)	71.1	52	21.9	2.85	0.155	0	0
Sales of water heating units - Other (%)	10.3	5.8	1.12	0.083	0.037	0.038	0.038

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	2,187	5,658	9,084	13,794	14,977	14,299
Public EV charging plugs - DC Fast (1000 units)	0.56	0	3.54	0	15	0	24.1
Public EV charging plugs - L2 (1000 units)	4.23	0	85.1	0	360	0	579
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 (%)	1.44	1.72	1.21	0.387	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.28	16.3	48.1	82.5	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.3	76.7	47.1	15.8	3.2	0.587	0
Vehicle sales - Light-duty - hybrid (%)	4.78	4.8	3.33	1.23	0.301	0.066	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.333	0.194	0.06	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.097	0.093	0.059	0.021	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	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0.005	0.001	0	0.013
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0.008	0	0.001	0	0
Capital invested - Offshore Wind - Base (billion $2018)	0	0.393	0.409	15.9	10.9	11	11.3
Capital invested - Offshore Wind - Constrained (billion $2018)	0	0.782	0.412	15.4	10.8	9.53	12.4
Capital invested - Solar PV - Base (billion $2018)	0	6.82	6.34	2.75	6.46	14.1	7.55
Capital invested - Solar PV - Constrained (billion $2018)	0	11.5	11.2	5.23	7.17	8.6	3.67
Capital invested - Wind - Base (billion $2018)	0	0	5.05	7.37	1.23	3.44	1.04
Capital invested - Wind - Constrained (billion $2018)	0	0	8.47	7.67	1.8	3.59	1.05
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	139	309	8,081	13,473	20,193	28,731
Installed (cumulative) - Rooftop PV (MW)	2,262	3,350	4,275	5,350	6,543	7,836	9,243
Installed (cumulative) - Solar - Base land use assumptions (MW)	1,588	6,680	11,974	14,471	20,687	35,011	43,162
Installed (cumulative) - Wind - Base land use assumptions (MW)	3,484	3,484	5,593	8,894	9,475	11,179	11,722

Table 7: *E+ 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 allam power plant (GWh)	0	0	0	4.5	5.42	5.42	18.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass w/ccu power plant (GWh)	0	0	8.55	8.55	9.28	9.28	9.28
OffshoreWind - Base land use assumptions (GWh)	0	562	687	31,510	22,203	28,224	36,190
OffshoreWind - Constrained land use assumptions (GWh)	0	562	687	31,510	22,203	28,224	36,190
Solar - Base land use assumptions (GWh)	2,912	8,743	9,008	4,160	10,465	24,337	13,832
Solar - Constrained land use assumptions (GWh)	935	9,932	16,979	7,578	11,882	15,990	9,640
Wind - Base land use assumptions (GWh)	14,244	0	7,891	11,920	2,068	6,000	1,894
Wind - Constrained land use assumptions (GWh)	14,244	0	7,812	12,176	2,987	6,102	1,899

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million $2018/year)	0	0	0.322	0.902	1.04	1.04	235
Conversion capital investment - Cumulative 5-yr (million $2018)	0	0	7.03	19.2	4.22	0	4,926
Number of facilities - Allam power w ccu (quantity)	0	0	0	1	1	1	2
Number of facilities - Beccs hydrogen (quantity)	0	0	0	1	1	1	3
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	1	1	1	2
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	1	1	1	1	1
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	2
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	1	1	1	1
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	1	1	1	1	2

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0.01	3.38	3.35	3.45	7.35
Annual - BECCS (MMT)		0	0.01	0.02	0.02	0.02	3.8
Annual - Cement and lime (MMT)		0	0	3.35	3.32	3.42	3.53
Annual - NGCC (MMT)		0	0	0.01	0.01	0.01	0.01
Cumulative - All (MMT)		0	0.01	3.39	6.74	10.2	17.5
Cumulative - BECCS (MMT)		0	0.01	0.03	0.05	0.07	3.87
Cumulative - Cement and lime (MMT)		0	0	3.35	6.67	10.1	13.6
Cumulative - NGCC (MMT)		0	0	0.01	0.02	0.03	0.04

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	279	437	612	612	1,309
Cumulative investment - All (million $2018)		0	225	402	493	496	905
Cumulative investment - Spur (million $2018)		0	111	288	379	382	791
Cumulative investment - Trunk (million $2018)		0	114	114	114	114	114
Spur (km)		0	216	374	549	549	1,246
Trunk (km)		0	63	63	63	63	63

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)							-264
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,322
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-89.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-2,675
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-264
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,224
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-44.8
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,532
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							85.7
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,489
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							163
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,738
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							85.7
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							785
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							81.5
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							953

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-383
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-31,435
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,752
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-11,858
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-604
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-5,464
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,072
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-273
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-5,516
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,513
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-192
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-9,448
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-459
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,555
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-307
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1,821
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-375
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-136
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-418
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,184
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-287
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-20,436
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,605
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-8,206
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-450
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-3,642
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-724
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-205
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,967
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,349

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)							62.6
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							373
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							6,047
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							223
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)							102
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							18
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							157
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,164
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,146
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							31.3
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							350
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,317
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							111
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)							53.6
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							9.02
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							27.2
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							705
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,603
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							47

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)							361
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							4,182
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							167
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)							77.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							13.5
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							196
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,419
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,464

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		1,045	881	707	532	335	232
Natural gas consumption - Cumulative (tcf)		0	0	0	0	0	21,286
Natural gas production - Annual (tcf)		14.4	13.6	11.9	10	7.95	6.18
Oil consumption - Annual (million bbls)		230	202	160	122	91.3	66.3
Oil consumption - Cumulative (million bbls)		0	0	0	0	0	4,947
Oil production - Annual (million bbls)		0.286	0.287	0.287	0.227	0.185	0.123

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		1,879	2.02	2.01	1.9	1.18	0.064
Monetary damages from air pollution - Natural Gas (million 2019$)		2,231	1,632	1,159	1,101	849	318
Monetary damages from air pollution - Transportation (million 2019$)		7,317	7,231	5,804	3,530	1,675	662
Premature deaths from air pollution - Coal (deaths)		212	0.228	0.227	0.215	0.134	0.007
Premature deaths from air pollution - Natural Gas (deaths)		252	184	131	124	95.9	35.9
Premature deaths from air pollution - Transportation (deaths)		823	813	653	397	188	74.4

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		481	669	431	268	106	368
By economic sector - Construction (jobs)		20,387	20,455	27,156	32,689	39,643	48,993
By economic sector - Manufacturing (jobs)		11,546	19,113	19,203	21,505	29,080	42,590
By economic sector - Mining (jobs)		4,807	3,439	2,289	1,447	864	516

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		2,536	2,751	3,294	4,521	6,473	8,647
By economic sector - Pipeline (jobs)		1,235	1,063	877	669	460	416
By economic sector - Professional (jobs)		8,724	8,961	12,804	16,053	20,586	29,307
By economic sector - Trade (jobs)		6,685	6,452	8,127	9,941	12,838	17,587
By economic sector - Utilities (jobs)		16,105	15,702	26,570	32,114	37,844	61,268
By education level - All sectors - Associates degree or some college (jobs)		22,844	24,849	32,391	38,634	47,903	66,739
By education level - All sectors - Bachelors degree (jobs)		14,775	15,756	19,991	23,552	29,435	43,855
By education level - All sectors - Doctoral degree (jobs)		500	504	655	789	1,005	1,549
By education level - All sectors - High school diploma or less (jobs)		30,861	33,823	42,897	50,492	62,360	86,719
By education level - All sectors - Masters or professional degree (jobs)		3,525	3,673	4,817	5,738	7,188	10,829
By resource sector - Biomass (jobs)		1,481	1,700	1,049	700	400	1,622
By resource sector - CO2 (jobs)		0	120	359	357	356	1,028
By resource sector - Coal (jobs)		481	139	10.1	9.64	9.2	3.53
By resource sector - Grid (jobs)		16,815	20,756	44,821	54,716	64,769	79,742
By resource sector - Natural Gas (jobs)		14,747	10,460	8,380	9,432	7,326	5,429
By resource sector - Nuclear (jobs)		1,883	1,369	1,224	1,031	3,074	24,820
By resource sector - Oil (jobs)		10,343	8,327	6,120	4,320	3,031	2,063
By resource sector - Solar (jobs)		23,548	26,599	20,144	27,960	44,430	54,376
By resource sector - Wind (jobs)		3,206	9,135	18,645	20,680	24,498	40,607
Median wages - Annual - All ($2019 per job)		69,341	68,899	71,169	72,306	73,075	75,182
On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs)		11,888	12,800	16,684	19,821	24,460	34,114
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)		4,987	5,092	6,883	8,241	10,009	13,555
On-Site or In-Plant Training - Total jobs - None (jobs)		11,786	12,831	16,219	19,218	24,032	34,555
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)		621	667	897	1,074	1,313	1,762
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)		43,223	47,216	60,069	70,852	88,078	125,705
On-the-Job Training - All sectors - 1 to 4 years (jobs)		15,319	16,425	21,524	25,613	31,579	44,038
On-the-Job Training - All sectors - 4 to 10 years (jobs)		4,883	4,978	6,806	8,188	9,944	13,312
On-the-Job Training - All sectors - None (jobs)		3,976	4,253	5,329	6,299	7,901	11,520
On-the-Job Training - All sectors - Over 10 years (jobs)		734	820	988	1,159	1,458	2,096
On-the-Job Training - All sectors - Up to 1 year (jobs)		47,593	52,129	66,105	77,945	97,011	138,725
Related work experience - All sectors - 1 to 4 years (jobs)		26,014	28,034	36,052	42,667	52,900	75,236
Related work experience - All sectors - 4 to 10 years (jobs)		16,897	18,134	23,486	27,855	34,480	48,899
Related work experience - All sectors - None (jobs)		10,497	11,336	14,604	17,304	21,370	29,856
Related work experience - All sectors - Over 10 years (jobs)		4,490	4,944	6,293	7,417	9,249	13,425
Related work experience - All sectors - Up to 1 year (jobs)		14,607	16,155	20,317	23,963	29,894	42,274
Wage income - All (million $2019)		5,028	5,416	7,171	8,620	10,809	15,767

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	89,637	97,820	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 (%)	0.625	10	13.9	25.5	45.9	63.9	72.2
Sales of space heating units - Electric Resistance (%)	2.13	3.41	4.29	6.96	11.7	15.4	17.3
Sales of space heating units - Fossil (%)	19.1	16.8	16.2	12.8	7.04	2.9	1.58
Sales of space heating units - Gas Furnace (%)	78.2	69.8	65.6	54.7	35.3	17.8	8.88
Sales of water heating units - Electric Heat Pump (%)	0.224	1.65	5.4	16.4	34.9	49.5	55.9
Sales of water heating units - Electric Resistance (%)	1.34	2.6	4.47	10.1	20.3	29.6	34
Sales of water heating units - Gas Furnace (%)	97	94.4	88.8	72.4	44.1	20.6	9.85
Sales of water heating units - Other (%)	1.45	1.35	1.33	1.05	0.642	0.377	0.282

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)		6.03	6.04	8.86	9.2	14.7	15.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	690	679	673	667	654	636	618
Final energy use - Industry (PJ)	488	505	514	526	531	538	538
Final energy use - Residential (PJ)	880	823	783	735	664	579	494
Final energy use - Transportation (PJ)	1,163	1,112	1,033	964	905	837	757

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	14.3	16.3	0	0	0	0
Sales of cooking units - Electric Resistance (%)	34.4	36.1	42.1	57.9	80	93.5	98.3
Sales of cooking units - Gas (%)	65.6	63.9	57.9	42.1	20	6.47	1.74
Sales of space heating units - Electric Heat Pump (%)	3.63	7.47	12.9	28.9	55.2	75.3	83.7
Sales of space heating units - Electric Resistance (%)	8.47	11.2	10.6	9.22	6.74	4.65	3.8
Sales of space heating units - Fossil (%)	24.2	36.3	34	27.2	16.6	9.64	6.99
Sales of space heating units - Gas (%)	63.7	45.1	42.4	34.7	21.5	10.4	5.47
Sales of water heating units - Electric Heat Pump (%)	0	1.21	4.63	14.7	31.2	43.9	49.3
Sales of water heating units - Electric Resistance (%)	18.7	35.3	35.6	36.9	39.6	42.6	44.2
Sales of water heating units - Gas Furnace (%)	71.1	56.8	53.6	43.7	26.7	12.4	5.95
Sales of water heating units - Other (%)	10.3	6.7	6.2	4.75	2.54	1.09	0.587

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	363	742	2,526	7,889	11,514
Public EV charging plugs - DC Fast (1000 units)	0.56	0	1.17	0	5.61	0	15.4
Public EV charging plugs - L2 (1000 units)	4.23	0	28.1	0	135	0	371
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 (%)	1.45	1.88	2.04	1.61	1.02	0.524	0.225
Vehicle sales - Light-duty - EV (%)	2.02	4.97	12.4	26.8	49.4	72.7	87.8
Vehicle sales - Light-duty - gasoline (%)	91.4	86.9	78.7	65.5	45.1	24.2	10.7
Vehicle sales - Light-duty - hybrid (%)	4.96	5.75	6.41	5.79	4.28	2.5	1.2
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.377	0.32	0.242	0.17	0.094	0.044
Vehicle sales - Light-duty - other (%)	0.098	0.102	0.092	0.08	0.057	0.031	0.014
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)							-264
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,322
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-89.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-2,675
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-264
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,224
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-44.8
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,532
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							85.7
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,489
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							163

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)							1,738
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							85.7
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							785
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							81.5
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							953

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-383
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-31,435
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,752
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-11,858
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-604
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-5,464
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,072
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-273
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-5,516
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,513
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-192
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-9,448
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-459
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,555
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-307
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1,821
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-375
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-136
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-418
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,184
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-287

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 tCO2e/y)							-20,436
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,605
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-8,206
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-450
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-3,642
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-724
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-205
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,967
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,349
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							62.6
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							373
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							6,047
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							223
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)							102
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							18
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							157
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,164
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,146
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							31.3
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							350
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,317
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							111
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)							53.6
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							9.02
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							27.2
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							705
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,603
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							47
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							361
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							4,182
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							167
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)							77.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							13.5
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							196
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,419
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,464

Table 24: *E- scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		1,879	2.02	2.01	1.9	1.18	0.064
Monetary damages from air pollution - Natural Gas (million 2019$)		2,199	1,243	562	221	56.9	78.1
Monetary damages from air pollution - Transportation (million 2019$)		7,451	7,988	8,203	7,769	6,492	4,675
Premature deaths from air pollution - Coal (deaths)		212	0.228	0.227	0.215	0.134	0.007
Premature deaths from air pollution - Natural Gas (deaths)		248	140	63.4	25	6.42	8.81
Premature deaths from air pollution - Transportation (deaths)		838	898	923	874	730	526

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	89,684	98,037	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 (%)	0.625	15.6	51.1	76.3	79.8	80.3	80.2
Sales of space heating units - Electric Resistance (%)	2.13	4.73	12.8	18	19.1	18.8	18.9
Sales of space heating units - Fossil (%)	19.1	14.5	2.85	0.124	0	0	0
Sales of space heating units - Gas Furnace (%)	78.2	65.2	33.3	5.6	1.11	0.87	0.863
Sales of water heating units - Electric Heat Pump (%)	0.224	7.35	41	58.7	61	61.2	61.2
Sales of water heating units - Electric Resistance (%)	1.34	5.14	22.3	36.4	38.5	38.7	38.7
Sales of water heating units - Gas Furnace (%)	97	86.3	36.3	4.73	0.256	0	0
Sales of water heating units - Other (%)	1.45	1.19	0.377	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)		7.59	7.79	18.2	19.6	18.4	19.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	690	677	650	604	560	538	533
Final energy use - Industry (PJ)	488	505	512	521	523	530	532
Final energy use - Residential (PJ)	880	819	735	612	496	413	364
Final energy use - Transportation (PJ)	1,161	1,104	995	858	731	647	604

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	14.3	15.2	0	0	0	0
Sales of cooking units - Electric Resistance (%)	34.6	48.6	91.2	99.6	100	100	100
Sales of cooking units - Gas (%)	65.4	51.4	8.8	0.443	0	0	0
Sales of space heating units - Electric Heat Pump (%)	3.63	16.2	66.1	89	91.7	91.9	92
Sales of space heating units - Electric Resistance (%)	8.47	10.5	6.04	3.28	2.89	2.96	3.08
Sales of space heating units - Fossil (%)	24.2	32.1	10.3	4.74	4.39	4.24	4.06
Sales of space heating units - Gas (%)	63.7	41.2	17.6	3.03	0.991	0.876	0.88
Sales of water heating units - Electric Heat Pump (%)	0	6.54	37.2	51.7	53.5	53.6	53.6
Sales of water heating units - Electric Resistance (%)	18.7	35.7	39.8	45.4	46.3	46.4	46.3
Sales of water heating units - Gas Furnace (%)	71.1	52	21.9	2.85	0.155	0	0
Sales of water heating units - Other (%)	10.3	5.8	1.12	0.083	0.037	0.038	0.038

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	2,187	5,658	9,084	13,794	14,977	14,299
Public EV charging plugs - DC Fast (1000 units)	0.56	0	3.54	0	15	0	24.1
Public EV charging plugs - L2 (1000 units)	4.23	0	85.1	0	360	0	579
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 (%)	1.44	1.72	1.21	0.387	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.28	16.3	48.1	82.5	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.3	76.7	47.1	15.8	3.2	0.587	0
Vehicle sales - Light-duty - hybrid (%)	4.78	4.8	3.33	1.23	0.301	0.066	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.333	0.194	0.06	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.097	0.093	0.059	0.021	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	0.393	0.409	25.7	17.3	18.6	28.4
Capital invested - Solar PV - Base (billion $2018)	0	8.73	8.17	9.85	8.95	12.1	4.29
Capital invested - Wind - Base (billion $2018)	0	0	5.05	8.67	2.98	8.08	5.03
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	139	309	12,869	21,417	32,753	54,198
Installed (cumulative) - Solar - Base land use assumptions (MW)	2,251	8,767	15,588	24,523	33,136	45,431	50,062
Installed (cumulative) - Wind - Base land use assumptions (MW)	3,484	3,484	5,593	9,475	10,873	14,878	17,517

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	562	687	51,201	35,945	47,900	94,412
OffshoreWind - Constrained land use assumptions (GWh)	0	1,121	694	50,066	27,607	0	127,156
Solar - Base land use assumptions (GWh)	4,001	11,206	11,525	15,022	14,631	20,848	7,859
Solar - Constrained land use assumptions (GWh)	3,079	15,489	12,427	12,765	14,133	16,711	7,456
Wind - Base land use assumptions (GWh)	14,244	0	7,891	13,988	4,937	13,792	8,839
Wind - Constrained land use assumptions (GWh)	14,244	0	7,812	15,056	5,132	13,095	7,925

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 tCO2e/y)							-264
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,322
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-89.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-2,675
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-264
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,224
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-44.8
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,532
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							85.7
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,489
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							163
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,738
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							85.7
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							785
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							81.5
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							953

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 tCO2e/y)							-383
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-31,435
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,752
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-11,858
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-604
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-5,464

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 tCO2e/y)							-1,072
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-273
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-5,516
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,513
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-192
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-9,448
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-459
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,555
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-307
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1,821
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-375
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-136
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-418
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,184
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-287
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-20,436
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,605
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-8,206
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-450
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-3,642
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-724
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-205
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,967
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,349
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							62.6
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							373
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							6,047
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							223

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)							102
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							18
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							157
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,164
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,146
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							31.3
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							350
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,317
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							111
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)							53.6
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							9.02
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							27.2
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							705
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,603
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							47
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							361
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							4,182
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							167
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)							77.7

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)							13.5
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							196
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,419
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,464

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		1,879	2.02	2.01	1.9	1.18	0.064
Monetary damages from air pollution - Natural Gas (million 2019$)		2,116	1,541	875	719	302	70.4
Monetary damages from air pollution - Transportation (million 2019$)		7,317	7,231	5,804	3,530	1,675	662
Premature deaths from air pollution - Coal (deaths)		212	0.228	0.227	0.215	0.134	0.007
Premature deaths from air pollution - Natural Gas (deaths)		239	174	98.7	81.2	34.1	7.95
Premature deaths from air pollution - Transportation (deaths)		823	813	653	397	188	74.4

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	89,684	98,037	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 (%)	0.625	15.6	51.1	76.3	79.8	80.3	80.2
Sales of space heating units - Electric Resistance (%)	2.13	4.73	12.8	18	19.1	18.8	18.9
Sales of space heating units - Fossil (%)	19.1	14.5	2.85	0.124	0	0	0
Sales of space heating units - Gas Furnace (%)	78.2	65.2	33.3	5.6	1.11	0.87	0.863
Sales of water heating units - Electric Heat Pump (%)	0.224	7.35	41	58.7	61	61.2	61.2
Sales of water heating units - Electric Resistance (%)	1.34	5.14	22.3	36.4	38.5	38.7	38.7
Sales of water heating units - Gas Furnace (%)	97	86.3	36.3	4.73	0.256	0	0
Sales of water heating units - Other (%)	1.45	1.19	0.377	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)		7.59	7.79	18.2	19.6	18.4	19.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	690	677	650	604	560	538	533

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	488	505	512	521	523	530	532
Final energy use - Residential (PJ)	880	819	735	612	496	413	364
Final energy use - Transportation (PJ)	1,161	1,104	995	858	731	647	604

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	14.3	15.2	0	0	0	0
Sales of cooking units - Electric Resistance (%)	34.6	48.6	91.2	99.6	100	100	100
Sales of cooking units - Gas (%)	65.4	51.4	8.8	0.443	0	0	0
Sales of space heating units - Electric Heat Pump (%)	3.63	16.2	66.1	89	91.7	91.9	92
Sales of space heating units - Electric Resistance (%)	8.47	10.5	6.04	3.28	2.89	2.96	3.08
Sales of space heating units - Fossil (%)	24.2	32.1	10.3	4.74	4.39	4.24	4.06
Sales of space heating units - Gas (%)	63.7	41.2	17.6	3.03	0.991	0.876	0.88
Sales of water heating units - Electric Heat Pump (%)	0	6.54	37.2	51.7	53.5	53.6	53.6
Sales of water heating units - Electric Resistance (%)	18.7	35.7	39.8	45.4	46.3	46.4	46.3
Sales of water heating units - Gas Furnace (%)	71.1	52	21.9	2.85	0.155	0	0
Sales of water heating units - Other (%)	10.3	5.8	1.12	0.083	0.037	0.038	0.038

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	2,187	5,658	9,084	13,794	14,977	14,299
Public EV charging plugs - DC Fast (1000 units)	0.56	0	3.54	0	15	0	24.1
Public EV charging plugs - L2 (1000 units)	4.23	0	85.1	0	360	0	579
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 (%)	1.44	1.72	1.21	0.387	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.28	16.3	48.1	82.5	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.3	76.7	47.1	15.8	3.2	0.587	0
Vehicle sales - Light-duty - hybrid (%)	4.78	4.8	3.33	1.23	0.301	0.066	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.333	0.194	0.06	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.097	0.093	0.059	0.021	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)		7.13	6.26	9.69	2.94	0.085	2.86
Capital invested - Offshore Wind - Constrained (billion $2018)		7.43	6.23	9.75	2.95	0	2.61
Capital invested - Solar PV - Base (billion $2018)		1.75	0.092	0.837	0.659	1.62	14.5
Capital invested - Solar PV - Constrained (billion $2018)		0.54	0	0.646	1.19	1.28	18
Capital invested - Wind - Base (billion $2018)		0	0	1.36	4.2	5.29	3.58
Capital invested - Wind - Constrained (billion $2018)		0	0.072	1.29	4.31	5.29	3.55

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	10,024	10,525	19,501	5,987	217	8,940
OffshoreWind - Constrained land use assumptions (GWh)	0	10,664	10,507	19,480	6,047	0	8,225
Solar - Base land use assumptions (GWh)	3,185	2,259	128	1,285	1,084	2,807	26,467
Solar - Constrained land use assumptions (GWh)	1,883	711	0	998	1,997	2,210	32,774
Wind - Base land use assumptions (GWh)	14,244	0	0	2,321	7,327	9,437	6,665
Wind - Constrained land use assumptions (GWh)	14,244	0	111	2,221	7,449	9,330	6,526

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)							-264
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,322
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-89.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-2,675
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-264
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,224
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-44.8
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,532
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							85.7
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,489
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							163

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)							1,738
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							85.7
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							785
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							81.5
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							953

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 tCO2e/y)							-383
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-31,435
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,752
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-11,858
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-604
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-5,464
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,072
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-273
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-5,516
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,513
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-192
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-9,448
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-459
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,555
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-307
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1,821
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-375
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-136
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-418
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,184
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-287

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 tCO2e/y)							-20,436
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,605
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-8,206
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-450
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-3,642
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-724
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-205
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,967
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,349
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							62.6
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							373
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							6,047
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							223
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)							102
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							18
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							157
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,164
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,146
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							31.3
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							350
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,317
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							111
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)							53.6
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							9.02
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							27.2
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							705
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,603
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							47
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							361
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							4,182
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							167
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)							77.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							13.5
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							196
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,419
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,464

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		1,879	2.02	2.01	1.9	1.18	0.064
Monetary damages from air pollution - Natural Gas (million 2019$)		2,124	1,301	1,573	1,388	962	156
Monetary damages from air pollution - Transportation (million 2019$)		7,317	7,231	5,804	3,530	1,675	662
Premature deaths from air pollution - Coal (deaths)		212	0.228	0.227	0.215	0.134	0.007
Premature deaths from air pollution - Natural Gas (deaths)		240	147	178	157	109	17.6
Premature deaths from air pollution - Transportation (deaths)		823	813	653	397	188	74.4

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	89,637	97,820	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 (%)	0.625	10	13.9	25.5	45.9	63.9	72.2
Sales of space heating units - Electric Resistance (%)	2.13	3.41	4.29	6.96	11.7	15.4	17.3
Sales of space heating units - Fossil (%)	19.1	16.8	16.2	12.8	7.04	2.9	1.58
Sales of space heating units - Gas Furnace (%)	78.2	69.8	65.6	54.7	35.3	17.8	8.88
Sales of water heating units - Electric Heat Pump (%)	0.224	1.65	5.4	16.4	34.9	49.5	55.9
Sales of water heating units - Electric Resistance (%)	1.34	2.6	4.47	10.1	20.3	29.6	34
Sales of water heating units - Gas Furnace (%)	97	94.4	88.8	72.4	44.1	20.6	9.85
Sales of water heating units - Other (%)	1.45	1.35	1.33	1.05	0.642	0.377	0.282

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)		6.03	6.04	8.86	9.2	14.7	15.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	690	679	673	667	654	636	618
Final energy use - Industry (PJ)	488	505	514	526	531	538	538
Final energy use - Residential (PJ)	880	823	783	735	664	579	494
Final energy use - Transportation (PJ)	1,163	1,112	1,033	964	905	837	757

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	14.3	16.3	0	0	0	0
Sales of cooking units - Electric Resistance (%)	34.4	36.1	42.1	57.9	80	93.5	98.3
Sales of cooking units - Gas (%)	65.6	63.9	57.9	42.1	20	6.47	1.74
Sales of space heating units - Electric Heat Pump (%)	3.63	7.47	12.9	28.9	55.2	75.3	83.7
Sales of space heating units - Electric Resistance (%)	8.47	11.2	10.6	9.22	6.74	4.65	3.8
Sales of space heating units - Fossil (%)	24.2	36.3	34	27.2	16.6	9.64	6.99
Sales of space heating units - Gas (%)	63.7	45.1	42.4	34.7	21.5	10.4	5.47
Sales of water heating units - Electric Heat Pump (%)	0	1.21	4.63	14.7	31.2	43.9	49.3
Sales of water heating units - Electric Resistance (%)	18.7	35.3	35.6	36.9	39.6	42.6	44.2
Sales of water heating units - Gas Furnace (%)	71.1	56.8	53.6	43.7	26.7	12.4	5.95
Sales of water heating units - Other (%)	10.3	6.7	6.2	4.75	2.54	1.09	0.587

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	363	742	2,526	7,889	11,514
Public EV charging plugs - DC Fast (1000 units)	0.56	0	1.17	0	5.61	0	15.4
Public EV charging plugs - L2 (1000 units)	4.23	0	28.1	0	135	0	371
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 (%)	1.45	1.88	2.04	1.61	1.02	0.524	0.225
Vehicle sales - Light-duty - EV (%)	2.02	4.97	12.4	26.8	49.4	72.7	87.8
Vehicle sales - Light-duty - gasoline (%)	91.4	86.9	78.7	65.5	45.1	24.2	10.7
Vehicle sales - Light-duty - hybrid (%)	4.96	5.75	6.41	5.79	4.28	2.5	1.2
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.377	0.32	0.242	0.17	0.094	0.044
Vehicle sales - Light-duty - other (%)	0.098	0.102	0.092	0.08	0.057	0.031	0.014
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	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0.005	0.001	0	0.011
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0.007	0	0.001	0	0.011

Table 51: *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 allam power plant (GWh)	0	0	0	4.49	5.23	5.45	16.9
Biomass w/ccu power plant (GWh)	0	0	8.38	8.38	9.01	9.12	21.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million $2018/year)	0	0	0.652	1.94	2.2	6.27	1,070
Conversion capital investment - Cumulative 5-yr (million $2018)	0	0	6.95	22.2	4.22	47.7	12,245
Number of facilities - Allam power w ccu (quantity)	0	0	0	1	1	1	1
Number of facilities - Beccs hydrogen (quantity)	0	0	0	1	1	1	1
Number of facilities - Diesel (quantity)	0	0	0	0	0	1	1
Number of facilities - Diesel ccu (quantity)	0	0	0	1	1	1	1
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	1	1	1	1	1
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	1	13

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	1	1	1	1
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	1	1	1	1	1

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0.01	3.38	3.35	3.45	3.67
Annual - BECCS (MMT)		0	0.01	0.02	0.02	0.03	0.12
Annual - Cement and lime (MMT)		0	0	3.35	3.32	3.42	3.53
Annual - NGCC (MMT)		0	0	0.01	0.01	0.01	0.01
Cumulative - All (MMT)		0	0.01	3.39	6.74	10.2	13.9
Cumulative - BECCS (MMT)		0	0.01	0.03	0.05	0.08	0.2
Cumulative - Cement and lime (MMT)		0	0	3.35	6.67	10.1	13.6
Cumulative - NGCC (MMT)		0	0	0.01	0.02	0.03	0.04

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	279	612	612	437	612
Cumulative investment - All (million $2018)		0	223	490	489	400	499
Cumulative investment - Spur (million $2018)		0	109	376	375	286	385
Cumulative investment - Trunk (million $2018)		0	114	114	114	114	114
Spur (km)		0	216	549	549	374	549
Trunk (km)		0	63	63	63	63	63

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)							-414
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,200
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)							-84.9
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-2,698

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)							-414
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,160
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)							-42.4
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,616
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							172
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							3,483
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							1.31
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							78.3
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							154
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							3,889
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							172
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							744
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							1.31
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							78.3
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							77.2
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,072

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)							-383
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-31,435
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,752

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)							-11,858
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-604
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-5,464
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,072
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-273
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-5,516
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,513
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-192
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-9,448
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-459
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,555
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-307
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1,821
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-375
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-136
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-418
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,184
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-287
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-20,436
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,605
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-8,206
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-450
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-3,642
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-724
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-205
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,967
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,349
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							62.6
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							373

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)							6,047
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							223
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)							102
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							18
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							157
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,164
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,146
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							31.3
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							350
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,317
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							111
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)							53.6
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							9.02
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							27.2
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							705
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,603
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							47
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							361
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							4,182
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							167

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)							77.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							13.5
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							196
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,419
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,464

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		1,879	2.02	2.01	1.9	1.18	0.064
Monetary damages from air pollution - Natural Gas (million 2019$)		2,222	1,223	650	552	386	109
Monetary damages from air pollution - Transportation (million 2019$)		7,451	7,988	8,203	7,769	6,492	4,675
Premature deaths from air pollution - Coal (deaths)		212	0.228	0.227	0.215	0.134	0.007
Premature deaths from air pollution - Natural Gas (deaths)		251	138	73.4	62.3	43.6	12.3
Premature deaths from air pollution - Transportation (deaths)		838	898	923	874	730	526

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	88,595	91,263	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 (%)	0.625	14.7	40.7	61.9	65.1	65.7	65.5
Sales of space heating units - Electric Resistance (%)	2.13	4.03	8.89	21.3	31.8	33.3	33.6
Sales of space heating units - Fossil (%)	19.1	16.3	12.8	5.74	0.874	0.07	0
Sales of space heating units - Gas Furnace (%)	78.2	65	37.7	11	2.19	0.952	0.86
Sales of water heating units - Electric Heat Pump (%)	0.224	0.326	0.327	0.328	0.329	0.331	0.331
Sales of water heating units - Electric Resistance (%)	1.34	1.93	1.92	1.93	1.93	1.92	1.93
Sales of water heating units - Gas Furnace (%)	97	96.4	96.3	96.3	96.3	96.3	96.3
Sales of water heating units - Other (%)	1.45	1.38	1.45	1.44	1.45	1.49	1.49

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)		6.35	6.41	12.1	12.8	14.6	15.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	690	686	690	689	696	725	772
Final energy use - Industry (PJ)	488	516	537	550	569	586	604
Final energy use - Residential (PJ)	880	816	779	749	730	718	709
Final energy use - Transportation (PJ)	1,162	1,127	1,072	1,042	1,053	1,087	1,129

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	13.5	14.1	0	0	0	0
Sales of cooking units - Electric Resistance (%)	33.8	33.8	33.8	33.8	33.8	33.8	33.8
Sales of cooking units - Gas (%)	66.2	66.2	66.2	66.2	66.2	66.2	66.2
Sales of space heating units - Electric Heat Pump (%)	1.94	19.2	20	21	21.5	22.1	22.9
Sales of space heating units - Electric Resistance (%)	8.69	9.88	9.71	9.54	9.43	8.85	8.05
Sales of space heating units - Fossil (%)	24.6	30	16	7.63	6.8	6.76	6.79
Sales of space heating units - Gas (%)	64.8	40.9	54.3	61.9	62.2	62.3	62.3
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	18.7	35.1	35	35	35	34.9	34.9
Sales of water heating units - Gas Furnace (%)	71.1	58	58.1	58.1	58.1	58.2	58.2
Sales of water heating units - Other (%)	10.3	6.88	6.87	6.87	6.88	6.87	6.87

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 (%)	1.44	1.87	2.17	2.02	1.81	1.69	1.6
Vehicle sales - Light-duty - EV (%)	3.92	6.07	6.88	8.48	10.3	11.8	13
Vehicle sales - Light-duty - gasoline (%)	89.6	86	83.7	81.7	79.5	77.6	76.1
Vehicle sales - Light-duty - hybrid (%)	4.8	5.63	6.86	7.42	7.96	8.48	8.86
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.373	0.339	0.3	0.296	0.296	0.306
Vehicle sales - Light-duty - other (%)	0.097	0.101	0.097	0.098	0.097	0.096	0.098
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)							-383
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-31,435
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,752
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-11,858
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-604
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-5,464
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,072
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-273
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-5,516
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,513
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-192
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-9,448
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-459
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,555
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-307
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1,821
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-375
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-136
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-418
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,184
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-287
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-20,436
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,605
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-8,206
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-450
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-3,642
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-724
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-205
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,967
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,349

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)							62.6
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							373
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							6,047
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							223
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)							102
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							18
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							157
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,164
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,146
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							31.3
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							350
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,317
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							111
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)							53.6
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							9.02
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							27.2
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							705
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,603
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							47

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)							361
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							4,182
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							167
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)							77.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							13.5
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							196
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,419
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,464

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)	-10.2		-16.4				-14.7
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-1.49		-2.67				-2.78
Business-as-usual carbon sink - Total (Mt CO2e/y)	-11.7		-19.1				-17.5

Table 66: *REF scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		5,161	3,218	2,978	2,881	2,821	2,535
Monetary damages from air pollution - Natural Gas (million 2019$)		1,653	1,596	2,181	2,162	2,472	2,733
Monetary damages from air pollution - Transportation (million 2019$)		7,434	8,078	8,725	9,431	10,167	10,949
Premature deaths from air pollution - Coal (deaths)		583	364	336	325	319	286
Premature deaths from air pollution - Natural Gas (deaths)		187	180	246	244	279	309
Premature deaths from air pollution - Transportation (deaths)		836	909	981	1,061	1,143	1,231