Net-Zero America - georgia state report

2021-03-15

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

E. Larson, C. Greig, J. Jenkins, E. Mayfield, A. Pascale, C. Zhang, J. Drossman, R. Williams, S. Pacala, R. Socolow, EJ Baik, R. Birdsey, R. Duke, R. Jones, B. Haley, E. Leslie, K. Paustian, and A. Swan, Net-Zero America: Potential Pathways, Infrastructure, and Impacts, interim report, Princeton University, Princeton, NJ, December 15, 2020. Report available at https://netzeroamerica.princeton.edu.

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)		34,949	38,935				
Sales of cooking units - Electric Resistance (%)	32	46	79.9	86.5	86.9	86.9	86.9
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Sales of space heating units - Electric Heat Pump (%)	7.3	27.4	70.6	84	85.3	85.4	85.4
Sales of space heating units - Electric Resistance (%)	6.68	8.23	10.2	12.3	12.7	12.7	12.7
Sales of space heating units - Fossil (%)	0	3.85	0.732	0.031	0	0	0
Sales of space heating units - Gas Furnace (%)	86	60.5	18.4	3.67	2	1.95	1.94
Sales of water heating units - Electric Heat Pump (%)	0.221	10.5	54.6	64.4	64.8	64.8	64.8
Sales of water heating units - Electric Resistance (%)	5.5	10.9	28.4	32.3	32.5	32.5	32.5
Sales of water heating units - Gas Furnace (%)	92.1	74.6	14.1	0.594	0	0	0
Sales of water heating units - Other (%)	2.13	3.93	2.95	2.7	2.71	2.7	2.7

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)		7.03	7.31	10.9	11.6	9.14	9.44

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	252	253	245	233	223	221	224
Final energy use - Industry (PJ)	420	427	428	425	426	427	431
Final energy use - Residential (PJ)	362	344	319	286	259	244	240
Final energy use - Transportation (PJ)	1,057	990	878	740	614	535	499

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)		8.06	8.87				
Sales of cooking units - Electric Resistance (%)	66.9	74	95.5	99.8	100	100	100
Sales of cooking units - Gas (%)	33.1	26	4.45	0.224	0	0	0
Sales of space heating units - Electric Heat Pump (%)	25.4	45	81.3	89.4	89.8	89.7	89.7
Sales of space heating units - Electric Resistance (%)	18.4	19.7	8.27	5.67	5.52	5.61	5.63
Sales of space heating units - Fossil (%)	4.42	5.56	2.13	1.36	1.33	1.31	1.31
Sales of space heating units - Gas (%)	51.8	29.7	8.3	3.54	3.35	3.36	3.35
Sales of water heating units - Electric Heat Pump (%)	0	11.6	61.4	72.5	73	72.9	72.9
Sales of water heating units - Electric Resistance (%)	47.2	57.2	31	25.2	24.9	24.9	24.9
Sales of water heating units - Gas Furnace (%)	50	29.1	5.49	0.232	0	0	0
Sales of water heating units - Other (%)	2.84	2.09	2.1	2.11	2.12	2.14	2.15

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)		1,609	4,204	6,681	10,172	11,015	10,532
Public EV charging plugs - DC Fast (1000 units)	0.376		3.15		12.8		20.6
Public EV charging plugs - L2 (1000 units)	2.43		75.7		308		494
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 (%)	1.47	1.74	1.22	0.391	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.2	16.1	47.7	82.3	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.4	77	47.5	16	3.22	0.588	0
Vehicle sales - Light-duty - hybrid (%)	4.69	4.74	3.31	1.22	0.298	0.066	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.335	0.196	0.061	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.098	0.094	0.06	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	0.034	0	0	0.013
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0.007	6.93	0.666	0.001
Capital invested - Solar PV - Base (billion $2018)		0	6.5	23.3	14.7	31.2	25.3
Capital invested - Solar PV - Constrained (billion $2018)		1.41	10.8	26.5	21	26.4	28.1
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	381	614	869	1,237	1,756	2,428	3,288
Installed renewables - Solar - Base land use assumptions (MW)	1,259	1,259	7,616	32,309	48,813	86,096	118,046
Installed renewables - Solar - Constrained land use assumptions (MW)	1,176	1,176	7,240	23,564	49,101	82,514	111,786
Installed renewables - Wind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0

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	33.7	33.7	33.7	47
Biomass w/ccu power plant (GWh)	0	0	0	8.06	7,781	8,528	8,529

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	0	0	0	0	0	0
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Base land use assumptions (GWh)	2,538	2,538	13,248	54,705	82,365	144,675	198,271
Solar - Constrained land use assumptions (GWh)	2,371	2,371	12,565	39,857	82,678	138,608	187,741
Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Constrained land use assumptions (GWh)	0	0	0	0	0	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	0	18.6	628	1,015	1,134
Conversion capital investment - Cumulative 5-yr (million $2018)		0	0	408	13,059	7,815	2,416
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	6	14	16
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
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	0	1	6	7	8
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	1	1	1	2
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0.55	18.4	25.9	31.9
Annual - BECCS (MMT)		0	0	0.47	16.5	25.8	28.8
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0.08	1.93	0.05	3.05
Cumulative - All (MMT)		0	0	0.55	19	44.8	76.7
Cumulative - BECCS (MMT)		0	0	0.47	17	42.8	71.6
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0.08	2.01	2.06	5.11

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	570	1,282	2,064	3,105	3,550
Cumulative investment - All (million $2018)		0	2,891	5,025	5,797	6,725	7,046
Cumulative investment - Spur (million $2018)		0	0	206	978	1,906	2,226
Cumulative investment - Trunk (million $2018)		0	2,891	4,819	4,819	4,819	4,819
Spur (km)		0	0	376	1,159	2,199	2,645
Trunk (km)		0	570	906	906	906	906

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

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	0	5.28	7.23	12.1	16.8
Injection wells (wells)		0	4	18	30	52	66
Resource characterization, appraisal, permitting costs (million $2020)		101	277	379	379	379	379
Wells and facilities construction costs (million $2020)		0	135	528	941	1,573	1,953

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)							-66
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-3,806
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-67.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-3,940
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-66
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,975
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-33.9
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-2,075
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							38.6
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,609
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							123
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,771
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							38.6
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							835
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							61.6
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							935

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)							-781
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-61,940
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,764
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-12,001
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-6,449
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-25,469
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,000
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,887
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-5,666
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-5,922
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-391
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-20,952
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-461
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,610
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-3,281
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-8,490
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-350
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-944
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-429
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,996
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-586
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-41,389
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,612
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-8,306
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-4,808
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-16,980
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-675
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,415
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,047
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,959

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)							128
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							374
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							6,120
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2,376
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)							95
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							125
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							161
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,963
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							11,342
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							63.9
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							351
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,345
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1,188
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)							50
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							62.4
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							27.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,188
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							5,276
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							95.8

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)							363
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							4,232
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,788
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)							72.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							93.6
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							202
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,392
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							9,239

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		572	482	387	291	183	127
Natural gas consumption - Cumulative (tcf)							11,650
Natural gas production - Annual (tcf)		0	0	0	0	0	0
Oil consumption - Annual (million bbls)		162	137	101	67.5	41.5	21.7
Oil consumption - Cumulative (million bbls)							3,127
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$)		458	0.839	0.761	0.535	0.353	0.029
Monetary damages from air pollution - Natural Gas (million 2019$)		310	291	175	133	67.2	25.4
Monetary damages from air pollution - Transportation (million 2019$)		3,449	3,336	2,621	1,565	731	289
Premature deaths from air pollution - Coal (deaths)		51.7	0.095	0.086	0.06	0.04	0.003
Premature deaths from air pollution - Natural Gas (deaths)		35	32.8	19.8	15	7.59	2.87
Premature deaths from air pollution - Transportation (deaths)		388	375	295	176	82.2	32.5

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		518	841	481	1,473	1,714	1,546
By economic sector - Construction (jobs)		8,017	13,649	25,968	24,743	36,486	43,167
By economic sector - Manufacturing (jobs)		13,877	25,461	25,847	21,005	24,522	20,768
By economic sector - Mining (jobs)		3,112	2,251	1,494	912	602	360

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		579	1,616	4,570	4,627	8,156	10,212
By economic sector - Pipeline (jobs)		733	929	757	444	412	396
By economic sector - Professional (jobs)		4,605	6,026	10,432	11,691	17,726	21,767
By economic sector - Trade (jobs)		3,315	4,064	7,122	7,274	11,466	14,462
By economic sector - Utilities (jobs)		12,277	14,692	19,695	20,934	26,102	31,429
By education level - All sectors - Associates degree or some college (jobs)		14,596	21,930	30,902	29,700	40,706	46,413
By education level - All sectors - Bachelors degree (jobs)		10,049	14,015	18,743	18,146	24,630	27,889
By education level - All sectors - Doctoral degree (jobs)		295	385	582	602	869	1,026
By education level - All sectors - High school diploma or less (jobs)		19,782	30,088	41,798	40,316	54,974	61,812
By education level - All sectors - Masters or professional degree (jobs)		2,309	3,112	4,341	4,339	6,007	6,967
By resource sector - Biomass (jobs)		1,824	2,220	1,246	4,360	6,262	6,637
By resource sector - CO2 (jobs)		54.7	2,697	2,528	1,044	1,978	2,463
By resource sector - Coal (jobs)		1,328	0	0	0	0	0
By resource sector - Grid (jobs)		13,098	16,979	28,948	32,373	45,105	57,917
By resource sector - Natural Gas (jobs)		7,360	6,976	5,694	6,745	4,317	3,553
By resource sector - Nuclear (jobs)		3,150	3,100	2,705	2,175	1,690	605
By resource sector - Oil (jobs)		7,190	5,570	3,788	2,362	1,358	666
By resource sector - Solar (jobs)		12,993	31,052	50,735	41,815	60,787	64,464
By resource sector - Wind (jobs)		33.8	933	720	2,229	5,690	7,803
Median wages - Annual - All ($2019 per job)		56,677	55,664	55,966	57,160	57,723	58,897
On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs)		7,516	11,176	15,784	15,180	20,750	23,661
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)		2,807	4,041	6,176	6,059	8,443	9,921
On-Site or In-Plant Training - Total jobs - None (jobs)		7,660	11,410	15,790	15,238	20,886	23,555
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)		381	570	824	802	1,102	1,275
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)		28,669	42,332	57,791	55,824	76,006	85,696
On-the-Job Training - All sectors - 1 to 4 years (jobs)		9,621	14,270	20,250	19,483	26,638	30,450
On-the-Job Training - All sectors - 4 to 10 years (jobs)		2,670	3,893	6,097	6,004	8,423	9,951
On-the-Job Training - All sectors - None (jobs)		2,524	3,690	5,212	5,023	6,978	7,930
On-the-Job Training - All sectors - Over 10 years (jobs)		478	755	1,028	943	1,275	1,393
On-the-Job Training - All sectors - Up to 1 year (jobs)		31,738	46,921	63,779	61,649	83,873	94,384
Related work experience - All sectors - 1 to 4 years (jobs)		16,928	24,699	34,161	33,101	45,188	51,334
Related work experience - All sectors - 4 to 10 years (jobs)		10,896	15,900	22,109	21,297	29,042	33,061
Related work experience - All sectors - None (jobs)		6,707	9,946	13,923	13,558	18,587	21,169
Related work experience - All sectors - Over 10 years (jobs)		3,075	4,541	6,069	5,750	7,728	8,636
Related work experience - All sectors - Up to 1 year (jobs)		9,425	14,443	20,104	19,397	26,641	29,908
Wage income - All (million $2019)		2,666	3,870	5,394	5,322	7,343	8,489

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)		34,927	38,922				
Sales of cooking units - Electric Resistance (%)	32	36.2	40.9	53.4	71	81.7	85.5
Sales of cooking units - Gas (%)	68	63.8	59.1	46.6	29	18.3	14.5
Sales of space heating units - Electric Heat Pump (%)	7.3	19.2	24.1	38.5	61	76.9	83
Sales of space heating units - Electric Resistance (%)	6.68	7.92	8.16	8.87	10.2	11.6	12.4
Sales of space heating units - Fossil (%)	0	4.46	4.13	3.1	1.52	0.487	0.128
Sales of space heating units - Gas Furnace (%)	86	68.4	63.6	49.6	27.2	11	4.45
Sales of water heating units - Electric Heat Pump (%)	0.221	2.04	7.05	21.5	43.6	58	63
Sales of water heating units - Electric Resistance (%)	5.5	7.53	9.45	15.2	24	29.8	31.8
Sales of water heating units - Gas Furnace (%)	92.1	86.3	79.4	59.6	29.1	9.31	2.42
Sales of water heating units - Other (%)	2.13	4.12	4.13	3.73	3.23	2.87	2.75

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)		5.72	5.83	7.6	7.92	9.61	10.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	252	254	251	248	242	237	235
Final energy use - Industry (PJ)	420	427	430	431	435	436	439
Final energy use - Residential (PJ)	362	345	337	326	309	288	268
Final energy use - Transportation (PJ)	1,059	999	916	848	794	730	654

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)		7.98	8.75				
Sales of cooking units - Electric Resistance (%)	66.8	67.7	70.7	78.7	89.9	96.7	99.1
Sales of cooking units - Gas (%)	33.2	32.3	29.3	21.3	10.1	3.27	0.881
Sales of space heating units - Electric Heat Pump (%)	25.4	38	42.2	54.2	72.4	84.2	88.3
Sales of space heating units - Electric Resistance (%)	18.4	21.9	20.5	16.6	10.8	7.24	5.98
Sales of space heating units - Fossil (%)	4.42	6.22	5.88	4.75	3	1.86	1.47
Sales of space heating units - Gas (%)	51.8	33.9	31.4	24.5	13.8	6.68	4.21
Sales of water heating units - Electric Heat Pump (%)	0	1.99	7.66	24	49	65.3	70.9
Sales of water heating units - Electric Resistance (%)	47.2	62.3	59.3	50.6	37.5	28.9	26
Sales of water heating units - Gas Furnace (%)	50	33.6	30.9	23.3	11.4	3.65	0.952
Sales of water heating units - Other (%)	2.84	2.09	2.1	2.12	2.13	2.14	2.15

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	274	545	1,871	5,792	8,472
Public EV charging plugs - DC Fast (1000 units)	0.376		1.11		4.86		13.2
Public EV charging plugs - L2 (1000 units)	2.43		26.7		117		316
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 (%)	1.48	1.9	2.04	1.62	1.03	0.527	0.226
Vehicle sales - Light-duty - EV (%)	1.99	4.9	12.3	26.6	49.1	72.5	87.8
Vehicle sales - Light-duty - gasoline (%)	91.5	87.1	78.9	65.8	45.4	24.3	10.8
Vehicle sales - Light-duty - hybrid (%)	4.87	5.66	6.33	5.72	4.25	2.48	1.2
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.378	0.321	0.243	0.172	0.095	0.044
Vehicle sales - Light-duty - other (%)	0.099	0.103	0.093	0.081	0.058	0.032	0.015
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)							-66
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-3,806
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-67.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-3,940
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-66
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,975
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-33.9
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-2,075
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							38.6
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,609
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							123

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)							1,771
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							38.6
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							835
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							61.6
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							935

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)							-781
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-61,940
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,764
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-12,001
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-6,449
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-25,469
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,000
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,887
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-5,666
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-5,922
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-391
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-20,952
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-461
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,610
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-3,281
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-8,490
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-350
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-944
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-429
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,996
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-586

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)							-41,389
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,612
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-8,306
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-4,808
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-16,980
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-675
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,415
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,047
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,959
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							128
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							374
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							6,120
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2,376
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)							95
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							125
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							161
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,963
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							11,342
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							63.9
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							351
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,345
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1,188
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)							50
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							62.4
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							27.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,188
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							5,276
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							95.8
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							363
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							4,232
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,788
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)							72.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							93.6
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							202
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,392
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							9,239

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		458	0.839	0.761	0.535	0.353	0.029
Monetary damages from air pollution - Natural Gas (million 2019$)		308	210	87.8	29.9	9.22	5.25
Monetary damages from air pollution - Transportation (million 2019$)		3,513	3,692	3,720	3,460	2,838	1,999
Premature deaths from air pollution - Coal (deaths)		51.7	0.095	0.086	0.06	0.04	0.003
Premature deaths from air pollution - Natural Gas (deaths)		34.8	23.7	9.91	3.38	1.04	0.593
Premature deaths from air pollution - Transportation (deaths)		395	415	418	389	319	225

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)		34,949	38,935				
Sales of cooking units - Electric Resistance (%)	32	46	79.9	86.5	86.9	86.9	86.9
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Sales of space heating units - Electric Heat Pump (%)	7.3	27.4	70.6	84	85.3	85.4	85.4
Sales of space heating units - Electric Resistance (%)	6.68	8.23	10.2	12.3	12.7	12.7	12.7
Sales of space heating units - Fossil (%)	0	3.85	0.732	0.031	0	0	0
Sales of space heating units - Gas Furnace (%)	86	60.5	18.4	3.67	2	1.95	1.94
Sales of water heating units - Electric Heat Pump (%)	0.221	10.5	54.6	64.4	64.8	64.8	64.8
Sales of water heating units - Electric Resistance (%)	5.5	10.9	28.4	32.3	32.5	32.5	32.5
Sales of water heating units - Gas Furnace (%)	92.1	74.6	14.1	0.594	0	0	0
Sales of water heating units - Other (%)	2.13	3.93	2.95	2.7	2.71	2.7	2.7

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)		7.03	7.31	10.9	11.6	9.14	9.44

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	252	253	245	233	223	221	224
Final energy use - Industry (PJ)	420	427	428	425	426	427	431
Final energy use - Residential (PJ)	362	344	319	286	259	244	240
Final energy use - Transportation (PJ)	1,057	990	878	740	614	535	499

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)		8.06	8.87				
Sales of cooking units - Electric Resistance (%)	66.9	74	95.5	99.8	100	100	100
Sales of cooking units - Gas (%)	33.1	26	4.45	0.224	0	0	0
Sales of space heating units - Electric Heat Pump (%)	25.4	45	81.3	89.4	89.8	89.7	89.7
Sales of space heating units - Electric Resistance (%)	18.4	19.7	8.27	5.67	5.52	5.61	5.63
Sales of space heating units - Fossil (%)	4.42	5.56	2.13	1.36	1.33	1.31	1.31
Sales of space heating units - Gas (%)	51.8	29.7	8.3	3.54	3.35	3.36	3.35
Sales of water heating units - Electric Heat Pump (%)	0	11.6	61.4	72.5	73	72.9	72.9
Sales of water heating units - Electric Resistance (%)	47.2	57.2	31	25.2	24.9	24.9	24.9
Sales of water heating units - Gas Furnace (%)	50	29.1	5.49	0.232	0	0	0
Sales of water heating units - Other (%)	2.84	2.09	2.1	2.11	2.12	2.14	2.15

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)		1,609	4,204	6,681	10,172	11,015	10,532
Public EV charging plugs - DC Fast (1000 units)	0.376		3.15		12.8		20.6
Public EV charging plugs - L2 (1000 units)	2.43		75.7		308		494
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 (%)	1.47	1.74	1.22	0.391	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.2	16.1	47.7	82.3	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.4	77	47.5	16	3.22	0.588	0
Vehicle sales - Light-duty - hybrid (%)	4.69	4.74	3.31	1.22	0.298	0.066	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.335	0.196	0.061	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.098	0.094	0.06	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	0	0	0.214	18.5
Capital invested - Solar PV - Base (billion $2018)		0.849	8.24	44	39.1	25.6	31.1
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	145	14,875
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	0	0	0	0	0	28,997
Installed renewables - Solar - Base land use assumptions (MW)	1,259	2,002	10,057	56,767	100,810	131,410	170,775
Installed renewables - Solar - Constrained land use assumptions (MW)	2,519	6,366	41,556	119,226	202,229	284,556	363,290
Installed renewables - Wind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0

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	0	0	0	0	514	52,926
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	103,114
Solar - Base land use assumptions (GWh)	2,538	3,787	17,297	95,627	169,536	220,970	287,120
Solar - Constrained land use assumptions (GWh)	5,076	11,571	70,639	200,934	340,126	478,238	610,957
Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Constrained land use assumptions (GWh)	0	0	0	0	0	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 tCO2e/y)							-66
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-3,806
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-67.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-3,940
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-66
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,975
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-33.9
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-2,075
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							38.6
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,609
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							123
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,771
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							38.6
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							835
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							61.6
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							935

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)							-781
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-61,940
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,764
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-12,001
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-6,449
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-25,469

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)							-1,000
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,887
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-5,666
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-5,922
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-391
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-20,952
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-461
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,610
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-3,281
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-8,490
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-350
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-944
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-429
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,996
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-586
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-41,389
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,612
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-8,306
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-4,808
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-16,980
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-675
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,415
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,047
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,959
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							128
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							374
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							6,120
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2,376

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)							95
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							125
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							161
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,963
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							11,342
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							63.9
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							351
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,345
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1,188
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)							50
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							62.4
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							27.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,188
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							5,276
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							95.8
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							363
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							4,232
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,788
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)							72.5

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)							93.6
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							202
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,392
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							9,239

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		458	0.839	0.761	0.535	0.353	0.029
Monetary damages from air pollution - Natural Gas (million 2019$)		329	278	138	81.3	18.7	6.69
Monetary damages from air pollution - Transportation (million 2019$)		3,449	3,336	2,621	1,565	731	289
Premature deaths from air pollution - Coal (deaths)		51.7	0.095	0.086	0.06	0.04	0.003
Premature deaths from air pollution - Natural Gas (deaths)		37.1	31.4	15.5	9.18	2.11	0.755
Premature deaths from air pollution - Transportation (deaths)		388	375	295	176	82.2	32.5

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)		34,949	38,935				
Sales of cooking units - Electric Resistance (%)	32	46	79.9	86.5	86.9	86.9	86.9
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Sales of space heating units - Electric Heat Pump (%)	7.3	27.4	70.6	84	85.3	85.4	85.4
Sales of space heating units - Electric Resistance (%)	6.68	8.23	10.2	12.3	12.7	12.7	12.7
Sales of space heating units - Fossil (%)	0	3.85	0.732	0.031	0	0	0
Sales of space heating units - Gas Furnace (%)	86	60.5	18.4	3.67	2	1.95	1.94
Sales of water heating units - Electric Heat Pump (%)	0.221	10.5	54.6	64.4	64.8	64.8	64.8
Sales of water heating units - Electric Resistance (%)	5.5	10.9	28.4	32.3	32.5	32.5	32.5
Sales of water heating units - Gas Furnace (%)	92.1	74.6	14.1	0.594	0	0	0
Sales of water heating units - Other (%)	2.13	3.93	2.95	2.7	2.71	2.7	2.7

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)		7.03	7.31	10.9	11.6	9.14	9.44

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	252	253	245	233	223	221	224

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	420	427	428	425	426	427	431
Final energy use - Residential (PJ)	362	344	319	286	259	244	240
Final energy use - Transportation (PJ)	1,057	990	878	740	614	535	499

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)		8.06	8.87				
Sales of cooking units - Electric Resistance (%)	66.9	74	95.5	99.8	100	100	100
Sales of cooking units - Gas (%)	33.1	26	4.45	0.224	0	0	0
Sales of space heating units - Electric Heat Pump (%)	25.4	45	81.3	89.4	89.8	89.7	89.7
Sales of space heating units - Electric Resistance (%)	18.4	19.7	8.27	5.67	5.52	5.61	5.63
Sales of space heating units - Fossil (%)	4.42	5.56	2.13	1.36	1.33	1.31	1.31
Sales of space heating units - Gas (%)	51.8	29.7	8.3	3.54	3.35	3.36	3.35
Sales of water heating units - Electric Heat Pump (%)	0	11.6	61.4	72.5	73	72.9	72.9
Sales of water heating units - Electric Resistance (%)	47.2	57.2	31	25.2	24.9	24.9	24.9
Sales of water heating units - Gas Furnace (%)	50	29.1	5.49	0.232	0	0	0
Sales of water heating units - Other (%)	2.84	2.09	2.1	2.11	2.12	2.14	2.15

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)		1,609	4,204	6,681	10,172	11,015	10,532
Public EV charging plugs - DC Fast (1000 units)	0.376		3.15		12.8		20.6
Public EV charging plugs - L2 (1000 units)	2.43		75.7		308		494
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 (%)	1.47	1.74	1.22	0.391	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.2	16.1	47.7	82.3	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.4	77	47.5	16	3.22	0.588	0
Vehicle sales - Light-duty - hybrid (%)	4.69	4.74	3.31	1.22	0.298	0.066	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.335	0.196	0.061	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.098	0.094	0.06	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 - Solar PV - Base (billion $2018)		0.592	1.02	4.63	8.35	15	1.17
Capital invested - Solar PV - Constrained (billion $2018)		0	0	7.72	9.68	11.9	0.605
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Solar - Base land use assumptions (MW)	1,259	1,777	2,778	7,694	17,099	35,032	36,506
Installed renewables - Solar - Constrained land use assumptions (MW)	1,259	1,259	1,259	9,461	20,362	34,503	35,268
Installed renewables - Wind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Wind - Constrained land use assumptions (MW)	0	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	0	0	0	0	0	0
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Base land use assumptions (GWh)	2,538	3,410	5,100	13,337	29,100	59,194	61,675
Solar - Constrained land use assumptions (GWh)	2,538	2,538	2,538	16,270	34,550	58,217	59,496
Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Constrained land use assumptions (GWh)	0	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)							-66
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-3,806
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-67.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-3,940
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-66
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,975
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-33.9
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-2,075
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							38.6

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 - Cropland measures (1000 hectares)							1,609
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							123
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,771
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							38.6
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							835
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							61.6
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							935

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)							-781
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-61,940
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,764
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-12,001
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-6,449
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-25,469
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,000
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,887
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-5,666
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-5,922
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-391
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-20,952
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-461
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,610
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-3,281
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-8,490
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-350
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-944

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-429
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,996
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-586
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-41,389
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,612
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-8,306
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-4,808
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-16,980
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-675
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,415
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,047
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,959
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							128
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							374
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							6,120
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2,376
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)							95
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							125
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							161
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,963
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							11,342
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							63.9
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							351
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,345

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 - Improve plantations (1000 hectares)							1,188
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)							50
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							62.4
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							27.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,188
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							5,276
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							95.8
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							363
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							4,232
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,788
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)							72.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							93.6
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							202
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,392
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							9,239

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		458	0.839	0.761	0.535	0.353	0.029
Monetary damages from air pollution - Natural Gas (million 2019$)		315	293	303	240	81.5	25.1
Monetary damages from air pollution - Transportation (million 2019$)		3,449	3,336	2,621	1,565	731	289
Premature deaths from air pollution - Coal (deaths)		51.7	0.095	0.086	0.06	0.04	0.003
Premature deaths from air pollution - Natural Gas (deaths)		35.5	33.1	34.3	27	9.2	2.83
Premature deaths from air pollution - Transportation (deaths)		388	375	295	176	82.2	32.5

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)		34,927	38,922				
Sales of cooking units - Electric Resistance (%)	32	36.2	40.9	53.4	71	81.7	85.5
Sales of cooking units - Gas (%)	68	63.8	59.1	46.6	29	18.3	14.5
Sales of space heating units - Electric Heat Pump (%)	7.3	19.2	24.1	38.5	61	76.9	83
Sales of space heating units - Electric Resistance (%)	6.68	7.92	8.16	8.87	10.2	11.6	12.4
Sales of space heating units - Fossil (%)	0	4.46	4.13	3.1	1.52	0.487	0.128
Sales of space heating units - Gas Furnace (%)	86	68.4	63.6	49.6	27.2	11	4.45
Sales of water heating units - Electric Heat Pump (%)	0.221	2.04	7.05	21.5	43.6	58	63
Sales of water heating units - Electric Resistance (%)	5.5	7.53	9.45	15.2	24	29.8	31.8
Sales of water heating units - Gas Furnace (%)	92.1	86.3	79.4	59.6	29.1	9.31	2.42
Sales of water heating units - Other (%)	2.13	4.12	4.13	3.73	3.23	2.87	2.75

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)		5.72	5.83	7.6	7.92	9.61	10.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	252	254	251	248	242	237	235
Final energy use - Industry (PJ)	420	427	430	431	435	436	439
Final energy use - Residential (PJ)	362	345	337	326	309	288	268
Final energy use - Transportation (PJ)	1,059	999	916	848	794	730	654

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)		7.98	8.75				
Sales of cooking units - Electric Resistance (%)	66.8	67.7	70.7	78.7	89.9	96.7	99.1
Sales of cooking units - Gas (%)	33.2	32.3	29.3	21.3	10.1	3.27	0.881
Sales of space heating units - Electric Heat Pump (%)	25.4	38	42.2	54.2	72.4	84.2	88.3
Sales of space heating units - Electric Resistance (%)	18.4	21.9	20.5	16.6	10.8	7.24	5.98
Sales of space heating units - Fossil (%)	4.42	6.22	5.88	4.75	3	1.86	1.47
Sales of space heating units - Gas (%)	51.8	33.9	31.4	24.5	13.8	6.68	4.21
Sales of water heating units - Electric Heat Pump (%)	0	1.99	7.66	24	49	65.3	70.9
Sales of water heating units - Electric Resistance (%)	47.2	62.3	59.3	50.6	37.5	28.9	26
Sales of water heating units - Gas Furnace (%)	50	33.6	30.9	23.3	11.4	3.65	0.952
Sales of water heating units - Other (%)	2.84	2.09	2.1	2.12	2.13	2.14	2.15

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	274	545	1,871	5,792	8,472
Public EV charging plugs - DC Fast (1000 units)	0.376		1.11		4.86		13.2
Public EV charging plugs - L2 (1000 units)	2.43		26.7		117		316
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 (%)	1.48	1.9	2.04	1.62	1.03	0.527	0.226
Vehicle sales - Light-duty - EV (%)	1.99	4.9	12.3	26.6	49.1	72.5	87.8
Vehicle sales - Light-duty - gasoline (%)	91.5	87.1	78.9	65.8	45.4	24.3	10.8
Vehicle sales - Light-duty - hybrid (%)	4.87	5.66	6.33	5.72	4.25	2.48	1.2
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.378	0.321	0.243	0.172	0.095	0.044
Vehicle sales - Light-duty - other (%)	0.099	0.103	0.093	0.081	0.058	0.032	0.015
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)	1	1	1	1	1	1	1
Capital invested - Biomass w/ccu allam power plant (billion $2018)	2	1	1	1	1	1	1
Capital invested - Biomass w/ccu power plant (billion $2018)	1	1	1	1	1	1	1

Table 51: *E-B+ scenario - PILLAR 2: Clean Electricity - Generation*

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	1	1	1	1	1	1	1
Biomass w/ccu allam power plant (GWh)	2	1	1	1	1	1	1
Biomass w/ccu power plant (GWh)	1	1	1	1	1	1	1

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	1,341	2,217	2,884	2,939
Conversion capital investment - Cumulative 5-yr (million $2018)		0	0	18,864	12,338	8,109	678
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	9	10
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	18	30	30	30
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0

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	0	0	0	0	0	0
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	22.9	37.8	48.2	48.1
Annual - BECCS (MMT)		0	0	22.8	37.8	48.2	48.1
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0.07	0.05	0.05	0.04
Cumulative - All (MMT)		0	0	22.9	60.7	109	157
Cumulative - BECCS (MMT)		0	0	22.8	60.6	109	157
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0.07	0.12	0.17	0.21

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	570	2,000	2,851	3,430	4,050
Cumulative investment - All (million $2018)		0	2,891	6,153	7,284	8,156	8,572
Cumulative investment - Spur (million $2018)		0	0	1,333	2,272	3,144	3,560
Cumulative investment - Trunk (million $2018)		0	2,891	4,819	5,012	5,012	5,012
Spur (km)		0	0	1,095	1,945	2,525	3,144
Trunk (km)		0	570	906	906	906	906

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

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	0	6.42	11.9	15.8	16.7
Injection wells (wells)		0	4	18	32	54	68
Resource characterization, appraisal, permitting costs (million $2020)		101	292	404	404	404	404
Wells and facilities construction costs (million $2020)		0	141	548	976	1,633	2,027

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)							-306
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-3,445
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)							-58.6
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-3,810

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)							-306
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,784
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)							-29.3
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-2,120
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							191
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							3,605
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							85.3
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							147
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							107
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							4,135
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							191
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							757
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							85.3
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							147
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							53.3
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,233

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)							-781
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-61,940
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,764

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)							-12,001
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-6,449
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-25,469
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,000
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,887
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-5,666
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-5,922
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-391
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-20,952
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-461
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,610
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-3,281
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-8,490
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-350
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-944
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-429
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,996
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-586
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-41,389
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,612
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-8,306
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-4,808
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-16,980
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-675
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,415
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,047
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,959
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							128
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							374

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)							6,120
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2,376
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)							95
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							125
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							161
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,963
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							11,342
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							63.9
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							351
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,345
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1,188
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)							50
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							62.4
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							27.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,188
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							5,276
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							95.8
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							363
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							4,232
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,788

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)							72.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							93.6
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							202
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,392
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							9,239

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		458	0.839	0.761	0.535	0.353	0.029
Monetary damages from air pollution - Natural Gas (million 2019$)		352	215	97.2	59	29.9	12.2
Monetary damages from air pollution - Transportation (million 2019$)		3,513	3,692	3,720	3,460	2,838	1,999
Premature deaths from air pollution - Coal (deaths)		51.7	0.095	0.086	0.06	0.04	0.003
Premature deaths from air pollution - Natural Gas (deaths)		39.8	24.3	11	6.66	3.37	1.38
Premature deaths from air pollution - Transportation (deaths)		395	415	418	389	319	225

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)		34,430	35,753				
Sales of cooking units - Electric Resistance (%)	32	34.3	34.3	34.3	34.4	34.3	34.3
Sales of cooking units - Gas (%)	68	65.7	65.7	65.7	65.6	65.7	65.7
Sales of space heating units - Electric Heat Pump (%)	7.3	29.1	63.5	71.8	72.4	72.4	72.4
Sales of space heating units - Electric Resistance (%)	6.68	9.42	14.6	20.2	24.8	25.6	25.6
Sales of space heating units - Fossil (%)	0	4.09	2.54	1.21	0.181	0.016	0
Sales of space heating units - Gas Furnace (%)	86	57.4	19.3	6.83	2.61	2	1.94
Sales of water heating units - Electric Heat Pump (%)	0.221	0.279	0.274	0.275	0.276	0.274	0.275
Sales of water heating units - Electric Resistance (%)	5.5	6.83	6.74	6.75	6.78	6.74	6.75
Sales of water heating units - Gas Furnace (%)	92.1	88.7	88.7	88.7	88.7	88.7	88.7
Sales of water heating units - Other (%)	2.13	4.16	4.3	4.23	4.29	4.32	4.3

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)		7.5	7.83	10.5	11.1	9.45	9.79

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	252	257	260	262	266	276	290
Final energy use - Industry (PJ)	420	441	459	477	500	522	549
Final energy use - Residential (PJ)	362	345	342	342	347	357	368
Final energy use - Transportation (PJ)	1,058	1,005	938	900	906	935	973

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)		7.85	7.66				
Sales of cooking units - Electric Resistance (%)	66.5	66.5	66.5	66.5	66.5	66.5	66.5
Sales of cooking units - Gas (%)	33.5	33.5	33.5	33.5	33.5	33.5	33.5
Sales of space heating units - Electric Heat Pump (%)	23.1	53.2	54.3	56	57.1	58.3	60.1
Sales of space heating units - Electric Resistance (%)	19	17.4	17.2	16.5	15.9	14.8	12.9
Sales of space heating units - Fossil (%)	4.53	3.7	3.73	3.74	3.7	3.7	3.74
Sales of space heating units - Gas (%)	53.4	25.6	24.8	23.8	23.3	23.2	23.3
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	47.2	63.3	63.3	63.2	63.1	63	63
Sales of water heating units - Gas Furnace (%)	50	34.6	34.6	34.7	34.8	34.8	34.9
Sales of water heating units - Other (%)	2.84	2.09	2.1	2.12	2.13	2.15	2.16

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 (%)	1.47	1.9	2.17	2.02	1.82	1.69	1.61
Vehicle sales - Light-duty - EV (%)	3.84	5.96	6.76	8.33	10.1	11.6	12.8
Vehicle sales - Light-duty - gasoline (%)	89.8	86.1	83.9	81.9	79.8	77.9	76.3
Vehicle sales - Light-duty - hybrid (%)	4.71	5.54	6.77	7.33	7.87	8.41	8.81
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.374	0.341	0.302	0.298	0.298	0.308
Vehicle sales - Light-duty - other (%)	0.098	0.102	0.098	0.099	0.098	0.097	0.099
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)							-781
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-61,940
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-2,764
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-12,001
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-6,449
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-25,469
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,000
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,887
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-5,666
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-5,922
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-391
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-20,952
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-461
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,610
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-3,281
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-8,490
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-350
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-944
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-429
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,996
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-586
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-41,389
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,612
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-8,306
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-4,808
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-16,980
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-675
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,415
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-3,047
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,959

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)							128
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							374
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							6,120
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2,376
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)							95
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							125
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							161
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,963
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							11,342
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							63.9
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							351
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,345
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1,188
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)							50
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							62.4
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							27.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,188
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							5,276
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							95.8

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)							363
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							4,232
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,788
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)							72.5
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							93.6
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							202
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							2,392
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							9,239

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)	-11.1		-19				-15.4
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-6.93		-11.6				-12.2
Business-as-usual carbon sink - Total (Mt CO2e/y)	-18		-30.5				-27.5

Table 66: *REF scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		1,958	1,331	1,080	977	935	926
Monetary damages from air pollution - Natural Gas (million 2019$)		306	381	400	439	483	526
Monetary damages from air pollution - Transportation (million 2019$)		3,505	3,734	3,959	4,203	4,447	4,695
Premature deaths from air pollution - Coal (deaths)		221	150	122	110	106	105
Premature deaths from air pollution - Natural Gas (deaths)		34.5	43	45.1	49.6	54.5	59.4
Premature deaths from air pollution - Transportation (deaths)		394	420	445	473	500	528