Net-Zero America - south carolina 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

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)	0	15,755	17,550	0	0	0	0
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 (%)	10.1	27.5	70.6	83.9	85.2	85.2	85.2
Sales of space heating units - Electric Resistance (%)	9.29	8.33	10.3	12.4	12.9	12.8	12.8
Sales of space heating units - Fossil (%)	2.15	3.92	0.743	0.032	0	0	0
Sales of space heating units - Gas Furnace (%)	78.5	60.3	18.3	3.66	1.98	1.94	1.94
Sales of water heating units - Electric Heat Pump (%)	0.316	10.5	54.5	64.3	64.7	64.8	64.8
Sales of water heating units - Electric Resistance (%)	7.81	11	28.4	32.3	32.5	32.5	32.5
Sales of water heating units - Gas Furnace (%)	88	74.5	14.1	0.593	0	0	0
Sales of water heating units - Other (%)	3.86	4.03	2.99	2.74	2.74	2.73	2.73

Table 2: *E+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		3.55	3.63	5.67	5.98	4.97	5.12

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	114	114	111	106	101	100	102
Final energy use - Industry (PJ)	358	374	380	387	398	399	404
Final energy use - Residential (PJ)	158	150	141	129	119	115	113
Final energy use - Transportation (PJ)	463	438	386	323	267	233	218

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	3.83	4.21	0	0	0	0
Sales of cooking units - Electric Resistance (%)	82.7	86.4	97.7	99.9	100	100	100
Sales of cooking units - Gas (%)	17.3	13.6	2.33	0.117	0	0	0
Sales of space heating units - Electric Heat Pump (%)	37.5	51.9	80.7	87.2	87.5	87.4	87.4
Sales of space heating units - Electric Resistance (%)	25.8	25.3	10.7	7.34	7.15	7.29	7.33
Sales of space heating units - Fossil (%)	6.1	7.81	4.43	3.7	3.67	3.6	3.59
Sales of space heating units - Gas (%)	30.5	15	4.16	1.77	1.69	1.69	1.68
Sales of water heating units - Electric Heat Pump (%)	0	12.1	64.1	75.7	76.2	76.2	76.1
Sales of water heating units - Electric Resistance (%)	67.7	70.5	30.6	21.7	21.3	21.3	21.3
Sales of water heating units - Gas Furnace (%)	28.2	14.7	2.78	0.118	0	0	0
Sales of water heating units - Other (%)	4.1	2.65	2.54	2.53	2.55	2.56	2.57

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	856	2,191	3,557	5,385	5,864	5,589
Public EV charging plugs - DC Fast (1000 units)	0.1	0	1.63	0	7.19	0	11.6
Public EV charging plugs - L2 (1000 units)	0.476	0	39.1	0	173	0	280
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	1.23	0.391	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.18	16	47.7	82.3	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.5	77.1	47.5	16	3.23	0.588	0
Vehicle sales - Light-duty - hybrid (%)	4.68	4.73	3.3	1.22	0.298	0.066	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.335	0.197	0.061	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.098	0.094	0.061	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	0	0.01	0
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	4.36	5.17	0
Capital invested - Offshore Wind - Base (billion $2018)	0	0	0	0	3.68	14.2	0
Capital invested - Offshore Wind - Constrained (billion $2018)	0	0	0	0	4.4	14.7	0
Capital invested - Solar PV - Base (billion $2018)	0	0	35.5	14.2	14.3	9.91	10
Capital invested - Solar PV - Constrained (billion $2018)	0	2.3	37.4	16.2	10.5	9.49	9.42
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	2,121	11,769	11,769
Installed (cumulative) - Rooftop PV (MW)	353	569	805	1,146	1,626	2,248	3,044
Installed (cumulative) - Solar - Base land use assumptions (MW)	1,484	1,484	31,133	43,988	57,737	67,834	78,662
Installed (cumulative) - Wind - Base 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	0	0	10.4	10.4
Biomass w/ccu power plant (GWh)	0	0	0	0	4,889	10,689	10,689
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	7,713	34,449	0

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

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	7,713	34,449	0
Solar - Base land use assumptions (GWh)	3,487	0	58,756	25,393	27,100	19,925	21,386
Solar - Constrained land use assumptions (GWh)	2,906	0	57,355	31,308	21,828	18,611	16,384

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	0	175	556	808
Conversion capital investment - Cumulative 5-yr (million $2018)	0	0	0	0	3,995	8,172	4,970
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	1	1
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	4	9
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	1	1
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	4	8	8
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	1.72	9.44	19.9	26.4
Annual - BECCS (MMT)		0	0	0	4.67	15.4	21.7
Annual - Cement and lime (MMT)		0	0	0	3.32	3.42	3.53
Annual - NGCC (MMT)		0	0	1.72	1.45	1.11	1.12
Cumulative - All (MMT)		0	0	1.72	11.2	31	57.4
Cumulative - BECCS (MMT)		0	0	0	4.67	20	41.8
Cumulative - Cement and lime (MMT)		0	0	0	3.32	6.74	10.3
Cumulative - NGCC (MMT)		0	0	1.72	3.17	4.28	5.4

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	0	178	849	1,457	1,776
Cumulative investment - All (million $2018)		0	0	962	1,718	2,258	2,606
Cumulative investment - Spur (million $2018)		0	0	11.3	767	1,307	1,655
Cumulative investment - Trunk (million $2018)		0	0	951	951	951	951
Spur (km)		0	0	18.7	690	1,298	1,616
Trunk (km)		0	0	159	159	159	159

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	2	2
Resource characterization, appraisal, permitting costs (million $2020)		3.29	7.9	10.5	10.5	10.5	10.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Wells and facilities construction costs (million $2020)		0	4.11	16	28.5	47.7	59.2

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)							-81.8
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,291
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-38.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-1,411
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-81.8
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-677
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-19.4
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-778
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							46.8
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							707
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							70.4
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							824
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							46.8
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							371
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							35.2
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							453

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)							-315
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-36,273
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,646

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,310
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-17,707
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-534
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-813
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-2,422
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,736
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-158
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-12,261
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,808
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,420
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,902
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-187
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-407
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-183
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-922
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-236
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-24,243
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-960
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,059
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,081
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-11,805
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-360
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-610
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,303
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-1,829
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							51.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							223

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 - Extend rotation length (1000 hectares)							3,727
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,028
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)							50.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							53.8
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							68.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							907
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,110
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							25.7
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							209
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,428
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							514
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)							26.7
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							26.9
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							11.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							549
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,791
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							38.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							216
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,578
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							774

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 - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							38.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							40.3
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							86.2
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,105
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,876

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		254	214	172	129	81.4	56.4
Natural gas consumption - Cumulative (tcf)		0	0	0	0	0	5,174
Natural gas production - Annual (tcf)		0	0	0	0	0	0
Oil consumption - Annual (million bbls)		97	83.4	63.6	45.3	30.8	19.7
Oil consumption - Cumulative (million bbls)		0	0	0	0	0	1,969
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$)		269	0.437	0.407	0.323	0.225	0.019
Monetary damages from air pollution - Natural Gas (million 2019$)		186	148	88.4	69.9	35	12.9
Monetary damages from air pollution - Transportation (million 2019$)		1,041	979	750	437	201	79.7
Premature deaths from air pollution - Coal (deaths)		30.4	0.049	0.046	0.036	0.025	0.002
Premature deaths from air pollution - Natural Gas (deaths)		21	16.7	9.98	7.89	3.95	1.45
Premature deaths from air pollution - Transportation (deaths)		117	110	84.4	49.2	22.6	8.97

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		182	370	141	433	924	1,074
By economic sector - Construction (jobs)		5,030	30,329	22,797	26,148	29,404	31,012
By economic sector - Manufacturing (jobs)		10,125	19,973	20,076	16,400	19,360	15,877
By economic sector - Mining (jobs)		1,727	1,235	795	478	270	148
By economic sector - Other (jobs)		445	5,893	4,191	5,230	5,634	6,866
By economic sector - Pipeline (jobs)		367	312	360	238	227	224
By economic sector - Professional (jobs)		2,923	12,014	9,195	11,480	14,943	16,704
By economic sector - Trade (jobs)		2,036	8,034	6,165	7,568	9,281	10,722
By economic sector - Utilities (jobs)		7,557	14,745	16,841	19,130	23,760	22,906
By education level - All sectors - Associates degree or some college (jobs)		9,440	29,656	25,934	28,119	33,445	33,958

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

Item	2020	2025	2030	2035	2040	2045	2050
By education level - All sectors - Bachelors degree (jobs)		6,532	17,905	15,600	16,777	20,227	20,632
By education level - All sectors - Doctoral degree (jobs)		191	631	496	574	709	770
By education level - All sectors - High school diploma or less (jobs)		12,743	40,456	34,878	37,574	44,457	44,997
By education level - All sectors - Masters or professional degree (jobs)		1,486	4,255	3,653	4,062	4,965	5,175
By resource sector - Biomass (jobs)		782	1,020	403	1,304	3,370	4,585
By resource sector - CO2 (jobs)		1.58	3.49	961	497	937	1,235
By resource sector - Coal (jobs)		744	0	0	0	0	0
By resource sector - Grid (jobs)		7,712	22,626	27,709	34,046	44,991	44,340
By resource sector - Natural Gas (jobs)		3,626	3,404	2,868	2,985	2,134	1,133
By resource sector - Nuclear (jobs)		2,635	2,593	2,194	1,214	337	0.097
By resource sector - Oil (jobs)		4,311	3,403	2,397	1,583	1,006	605
By resource sector - Solar (jobs)		10,556	59,130	43,470	42,438	39,611	42,263
By resource sector - Wind (jobs)		26.2	724	559	3,039	11,417	11,371
Median wages - Annual - All ($2019 per job)		55,437	53,264	54,500	55,316	56,410	57,209
On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs)		4,840	15,219	13,252	14,384	17,066	17,302
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)		1,751	6,178	5,244	5,909	7,005	7,237
On-Site or In-Plant Training - Total jobs - None (jobs)		4,995	15,411	13,194	14,222	16,920	17,258
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)		241	788	694	765	918	934
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)		18,566	55,308	48,178	51,825	61,895	62,801
On-the-Job Training - All sectors - 1 to 4 years (jobs)		6,189	19,537	17,015	18,509	21,968	22,279
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,660	6,155	5,203	5,907	6,992	7,247
On-the-Job Training - All sectors - None (jobs)		1,643	5,190	4,371	4,740	5,598	5,779
On-the-Job Training - All sectors - Over 10 years (jobs)		320	1,011	852	882	1,019	1,016
On-the-Job Training - All sectors - Up to 1 year (jobs)		20,581	61,011	53,120	57,069	68,227	69,211
Related work experience - All sectors - 1 to 4 years (jobs)		10,930	32,856	28,580	30,978	36,987	37,633
Related work experience - All sectors - 4 to 10 years (jobs)		7,034	21,258	18,510	20,042	23,919	24,286
Related work experience - All sectors - None (jobs)		4,293	13,394	11,637	12,688	15,118	15,432
Related work experience - All sectors - Over 10 years (jobs)		2,015	5,710	5,048	5,333	6,357	6,361
Related work experience - All sectors - Up to 1 year (jobs)		6,121	19,686	16,785	18,065	21,422	21,820
Wage income - All (million $2019)		1,685	4,949	4,391	4,819	5,856	6,038

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	15,746	17,554	0	0	0	0
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 (%)	10.1	19.3	24.3	38.5	60.9	76.8	82.9

Table 17: *E- scenario - PILLAR 1: Efficiency/Electrification - Commercial (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Resistance (%)	9.29	8.02	8.23	8.98	10.4	11.8	12.5
Sales of space heating units - Fossil (%)	2.15	4.53	4.19	3.17	1.56	0.496	0.13
Sales of space heating units - Gas Furnace (%)	78.5	68.1	63.3	49.4	27.1	10.9	4.44
Sales of water heating units - Electric Heat Pump (%)	0.316	2.04	7.05	21.5	43.6	58	63
Sales of water heating units - Electric Resistance (%)	7.81	7.62	9.51	15.3	24.1	29.8	31.8
Sales of water heating units - Gas Furnace (%)	88	86.1	79.2	59.5	29.1	9.29	2.42
Sales of water heating units - Other (%)	3.86	4.23	4.21	3.8	3.27	2.9	2.77

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		2.92	2.93	3.93	4.05	5.12	5.35

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	114	115	113	112	109	107	107
Final energy use - Industry (PJ)	358	374	381	391	402	403	407
Final energy use - Residential (PJ)	158	151	147	142	135	128	122
Final energy use - Transportation (PJ)	464	441	404	373	350	323	290

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	3.78	4.05	0	0	0	0
Sales of cooking units - Electric Resistance (%)	82.6	83.1	84.7	88.9	94.7	98.3	99.5
Sales of cooking units - Gas (%)	17.4	16.9	15.3	11.1	5.31	1.72	0.462
Sales of space heating units - Electric Heat Pump (%)	37.5	46.3	49.6	59.1	73.7	83	86.3
Sales of space heating units - Electric Resistance (%)	25.8	28.1	26.5	21.5	14	9.4	7.8
Sales of space heating units - Fossil (%)	6.1	8.46	8.09	7	5.31	4.17	3.78
Sales of space heating units - Gas (%)	30.5	17.1	15.8	12.4	7.01	3.39	2.12
Sales of water heating units - Electric Heat Pump (%)	0	2.08	8	25	51.1	68.2	74.1
Sales of water heating units - Electric Resistance (%)	67.7	78.2	73.7	60.5	40.4	27.4	22.9
Sales of water heating units - Gas Furnace (%)	28.2	17	15.7	11.9	5.84	1.86	0.487
Sales of water heating units - Other (%)	4.1	2.66	2.65	2.64	2.62	2.58	2.57

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	138	291	982	3,094	4,506
Public EV charging plugs - DC Fast (1000 units)	0.1	0	0.496	0	2.66	0	7.45
Public EV charging plugs - L2 (1000 units)	0.476	0	11.9	0	63.9	0	179
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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	1.91	2.04	1.62	1.03	0.528	0.226
Vehicle sales - Light-duty - EV (%)	1.98	4.89	12.3	26.5	49.1	72.5	87.8
Vehicle sales - Light-duty - gasoline (%)	91.5	87.1	79	65.8	45.4	24.4	10.8
Vehicle sales - Light-duty - hybrid (%)	4.86	5.65	6.32	5.71	4.24	2.48	1.19
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.378	0.321	0.244	0.172	0.095	0.044
Vehicle sales - Light-duty - other (%)	0.1	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)							-81.8
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,291
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-38.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-1,411
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-81.8
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-677
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-19.4
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-778
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							46.8
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							707
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							70.4
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							824
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							46.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							371
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							35.2
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							453

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)							-315
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-36,273
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,646
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,310
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-17,707
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-534
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-813
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-2,422
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,736
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-158
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-12,261
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,808
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,420
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,902
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-187
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-407
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-183
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-922
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-236
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-24,243
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-960
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,059

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,081
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-11,805
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-360
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-610
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,303
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-1,829
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							51.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							223
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,727
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,028
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)							50.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							53.8
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							68.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							907
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,110
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							25.7
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							209
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,428
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							514
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)							26.7
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							26.9

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 - Reforest pasture (1000 hectares)							11.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							549
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,791
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							38.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							216
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,578
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							774
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)							38.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							40.3
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							86.2
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,105
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,876

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		269	0.437	0.407	0.323	0.225	0.019
Monetary damages from air pollution - Natural Gas (million 2019$)		176	116	46.3	17.4	5.7	3.02
Monetary damages from air pollution - Transportation (million 2019$)		1,058	1,078	1,057	961	772	534
Premature deaths from air pollution - Coal (deaths)		30.4	0.049	0.046	0.036	0.025	0.002
Premature deaths from air pollution - Natural Gas (deaths)		19.9	13.1	5.23	1.96	0.644	0.341
Premature deaths from air pollution - Transportation (deaths)		119	121	119	108	86.8	60.1

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	15,755	17,550	0	0	0	0
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

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Heat Pump (%)	10.1	27.5	70.6	83.9	85.2	85.2	85.2
Sales of space heating units - Electric Resistance (%)	9.29	8.33	10.3	12.4	12.9	12.8	12.8
Sales of space heating units - Fossil (%)	2.15	3.92	0.743	0.032	0	0	0
Sales of space heating units - Gas Furnace (%)	78.5	60.3	18.3	3.66	1.98	1.94	1.94
Sales of water heating units - Electric Heat Pump (%)	0.316	10.5	54.5	64.3	64.7	64.8	64.8
Sales of water heating units - Electric Resistance (%)	7.81	11	28.4	32.3	32.5	32.5	32.5
Sales of water heating units - Gas Furnace (%)	88	74.5	14.1	0.593	0	0	0
Sales of water heating units - Other (%)	3.86	4.03	2.99	2.74	2.74	2.73	2.73

Table 26: *E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		3.55	3.63	5.67	5.98	4.97	5.12

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	114	114	111	106	101	100	102
Final energy use - Industry (PJ)	358	374	380	387	398	399	404
Final energy use - Residential (PJ)	158	150	141	129	119	115	113
Final energy use - Transportation (PJ)	463	438	386	323	267	233	218

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	3.83	4.21	0	0	0	0
Sales of cooking units - Electric Resistance (%)	82.7	86.4	97.7	99.9	100	100	100
Sales of cooking units - Gas (%)	17.3	13.6	2.33	0.117	0	0	0
Sales of space heating units - Electric Heat Pump (%)	37.5	51.9	80.7	87.2	87.5	87.4	87.4
Sales of space heating units - Electric Resistance (%)	25.8	25.3	10.7	7.34	7.15	7.29	7.33
Sales of space heating units - Fossil (%)	6.1	7.81	4.43	3.7	3.67	3.6	3.59
Sales of space heating units - Gas (%)	30.5	15	4.16	1.77	1.69	1.69	1.68
Sales of water heating units - Electric Heat Pump (%)	0	12.1	64.1	75.7	76.2	76.2	76.1
Sales of water heating units - Electric Resistance (%)	67.7	70.5	30.6	21.7	21.3	21.3	21.3
Sales of water heating units - Gas Furnace (%)	28.2	14.7	2.78	0.118	0	0	0
Sales of water heating units - Other (%)	4.1	2.65	2.54	2.53	2.55	2.56	2.57

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	856	2,191	3,557	5,385	5,864	5,589
Public EV charging plugs - DC Fast (1000 units)	0.1	0	1.63	0	7.19	0	11.6
Public EV charging plugs - L2 (1000 units)	0.476	0	39.1	0	173	0	280
Vehicle sales - Heavy-duty - diesel (%)	97.2	92.1	67	23.3	4.22	0.628	0

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

Item	2020	2025	2030	2035	2040	2045	2050
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	1.23	0.391	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.18	16	47.7	82.3	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.5	77.1	47.5	16	3.23	0.588	0
Vehicle sales - Light-duty - hybrid (%)	4.68	4.73	3.3	1.22	0.298	0.066	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.335	0.197	0.061	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.098	0.094	0.061	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	15	12.7	8.1	8.19
Capital invested - Solar PV - Base (billion $2018)	0	20.3	23.4	24	11.3	11.7	2.77
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	0	7,318	14,654	14,654	14,654
Installed (cumulative) - Solar - Base land use assumptions (MW)	1,484	16,616	36,177	57,900	68,776	80,708	83,696
Installed (cumulative) - Wind - Base 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	26,149	26,467	20,830	25,432
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	29,418	29,497	0	46,263
Solar - Base land use assumptions (GWh)	3,487	30,050	38,713	42,841	21,461	23,549	5,869
Solar - Constrained land use assumptions (GWh)	3,487	27,429	40,379	42,211	19,199	17,703	7,418

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)							-81.8
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,291
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-38.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-1,411

Table 32: *E+RE+ 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)							-81.8
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-677
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-19.4
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-778
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							46.8
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							707
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							70.4
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							824
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							46.8
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							371
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							35.2
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							453

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)							-315
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-36,273
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,646
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,310
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-17,707
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-534
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-813
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-2,422
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,736
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-158

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-12,261
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,808
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,420
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,902
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-187
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-407
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-183
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-922
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-236
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-24,243
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-960
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,059
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,081
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-11,805
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-360
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-610
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,303
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-1,829
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							51.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							223
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,727
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,028
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)							50.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							53.8
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							68.8

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 - Restore productivity (1000 hectares)							907
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,110
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							25.7
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							209
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,428
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							514
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)							26.7
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							26.9
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							11.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							549
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,791
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							38.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							216
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,578
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							774
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)							38.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							40.3
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							86.2
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,105
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,876

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		269	0.437	0.407	0.323	0.225	0.019
Monetary damages from air pollution - Natural Gas (million 2019$)		181	141	80.5	48.4	12.3	3.77
Monetary damages from air pollution - Transportation (million 2019$)		1,041	979	750	437	201	79.7
Premature deaths from air pollution - Coal (deaths)		30.4	0.049	0.046	0.036	0.025	0.002
Premature deaths from air pollution - Natural Gas (deaths)		20.4	16	9.08	5.46	1.39	0.425
Premature deaths from air pollution - Transportation (deaths)		117	110	84.4	49.2	22.6	8.97

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	15,755	17,550	0	0	0	0
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 (%)	10.1	27.5	70.6	83.9	85.2	85.2	85.2
Sales of space heating units - Electric Resistance (%)	9.29	8.33	10.3	12.4	12.9	12.8	12.8
Sales of space heating units - Fossil (%)	2.15	3.92	0.743	0.032	0	0	0
Sales of space heating units - Gas Furnace (%)	78.5	60.3	18.3	3.66	1.98	1.94	1.94
Sales of water heating units - Electric Heat Pump (%)	0.316	10.5	54.5	64.3	64.7	64.8	64.8
Sales of water heating units - Electric Resistance (%)	7.81	11	28.4	32.3	32.5	32.5	32.5
Sales of water heating units - Gas Furnace (%)	88	74.5	14.1	0.593	0	0	0
Sales of water heating units - Other (%)	3.86	4.03	2.99	2.74	2.74	2.73	2.73

Table 36: *E+RE- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		3.55	3.63	5.67	5.98	4.97	5.12

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	114	114	111	106	101	100	102
Final energy use - Industry (PJ)	358	374	380	387	398	399	404
Final energy use - Residential (PJ)	158	150	141	129	119	115	113
Final energy use - Transportation (PJ)	463	438	386	323	267	233	218

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	3.83	4.21	0	0	0	0
Sales of cooking units - Electric Resistance (%)	82.7	86.4	97.7	99.9	100	100	100
Sales of cooking units - Gas (%)	17.3	13.6	2.33	0.117	0	0	0
Sales of space heating units - Electric Heat Pump (%)	37.5	51.9	80.7	87.2	87.5	87.4	87.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Resistance (%)	25.8	25.3	10.7	7.34	7.15	7.29	7.33
Sales of space heating units - Fossil (%)	6.1	7.81	4.43	3.7	3.67	3.6	3.59
Sales of space heating units - Gas (%)	30.5	15	4.16	1.77	1.69	1.69	1.68
Sales of water heating units - Electric Heat Pump (%)	0	12.1	64.1	75.7	76.2	76.2	76.1
Sales of water heating units - Electric Resistance (%)	67.7	70.5	30.6	21.7	21.3	21.3	21.3
Sales of water heating units - Gas Furnace (%)	28.2	14.7	2.78	0.118	0	0	0
Sales of water heating units - Other (%)	4.1	2.65	2.54	2.53	2.55	2.56	2.57

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	856	2,191	3,557	5,385	5,864	5,589
Public EV charging plugs - DC Fast (1000 units)	0.1	0	1.63	0	7.19	0	11.6
Public EV charging plugs - L2 (1000 units)	0.476	0	39.1	0	173	0	280
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	1.23	0.391	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.18	16	47.7	82.3	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.5	77.1	47.5	16	3.23	0.588	0
Vehicle sales - Light-duty - hybrid (%)	4.68	4.73	3.3	1.22	0.298	0.066	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.335	0.197	0.061	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.098	0.094	0.061	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)		8.07	8.33	13.7	6.01	7.66	0.596
Capital invested - Solar PV - Constrained (billion $2018)		11.2	6.78	16.9	6.15	7.66	0.498

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	3,487	11,974	13,798	24,602	11,460	15,398	1,271
Solar - Constrained land use assumptions (GWh)	3,487	16,602	11,209	30,264	11,684	15,402	1,059

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)							-81.8
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,291
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-38.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-1,411
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-81.8
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-677
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-19.4
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-778
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							46.8
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							707
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							70.4
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							824
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							46.8
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							371
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							35.2
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							453

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)							-315
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-36,273
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,646
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,310
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-17,707

Table 43: *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)							-534
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-813
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-2,422
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,736
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-158
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-12,261
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,808
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,420
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,902
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-187
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-407
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-183
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-922
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-236
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-24,243
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-960
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,059
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,081
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-11,805
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-360
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-610
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,303
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-1,829
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							51.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							223
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,727
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,028

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 - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							50.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							53.8
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							68.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							907
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,110
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							25.7
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							209
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,428
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							514
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)							26.7
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							26.9
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							11.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							549
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,791
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							38.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							216
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,578
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							774
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)							38.7

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 - Mid - Reforest cropland (1000 hectares)							40.3
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							86.2
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,105
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,876

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		269	0.437	0.407	0.323	0.225	0.019
Monetary damages from air pollution - Natural Gas (million 2019$)		202	168	161	123	39.9	12.9
Monetary damages from air pollution - Transportation (million 2019$)		1,041	979	750	437	201	79.7
Premature deaths from air pollution - Coal (deaths)		30.4	0.049	0.046	0.036	0.025	0.002
Premature deaths from air pollution - Natural Gas (deaths)		22.8	18.9	18.1	13.9	4.5	1.45
Premature deaths from air pollution - Transportation (deaths)		117	110	84.4	49.2	22.6	8.97

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	15,746	17,554	0	0	0	0
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 (%)	10.1	19.3	24.3	38.5	60.9	76.8	82.9
Sales of space heating units - Electric Resistance (%)	9.29	8.02	8.23	8.98	10.4	11.8	12.5
Sales of space heating units - Fossil (%)	2.15	4.53	4.19	3.17	1.56	0.496	0.13
Sales of space heating units - Gas Furnace (%)	78.5	68.1	63.3	49.4	27.1	10.9	4.44
Sales of water heating units - Electric Heat Pump (%)	0.316	2.04	7.05	21.5	43.6	58	63
Sales of water heating units - Electric Resistance (%)	7.81	7.62	9.51	15.3	24.1	29.8	31.8
Sales of water heating units - Gas Furnace (%)	88	86.1	79.2	59.5	29.1	9.29	2.42
Sales of water heating units - Other (%)	3.86	4.23	4.21	3.8	3.27	2.9	2.77

Table 46: *E-B+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		2.92	2.93	3.93	4.05	5.12	5.35

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	114	115	113	112	109	107	107

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	358	374	381	391	402	403	407
Final energy use - Residential (PJ)	158	151	147	142	135	128	122
Final energy use - Transportation (PJ)	464	441	404	373	350	323	290

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	3.78	4.05	0	0	0	0
Sales of cooking units - Electric Resistance (%)	82.6	83.1	84.7	88.9	94.7	98.3	99.5
Sales of cooking units - Gas (%)	17.4	16.9	15.3	11.1	5.31	1.72	0.462
Sales of space heating units - Electric Heat Pump (%)	37.5	46.3	49.6	59.1	73.7	83	86.3
Sales of space heating units - Electric Resistance (%)	25.8	28.1	26.5	21.5	14	9.4	7.8
Sales of space heating units - Fossil (%)	6.1	8.46	8.09	7	5.31	4.17	3.78
Sales of space heating units - Gas (%)	30.5	17.1	15.8	12.4	7.01	3.39	2.12
Sales of water heating units - Electric Heat Pump (%)	0	2.08	8	25	51.1	68.2	74.1
Sales of water heating units - Electric Resistance (%)	67.7	78.2	73.7	60.5	40.4	27.4	22.9
Sales of water heating units - Gas Furnace (%)	28.2	17	15.7	11.9	5.84	1.86	0.487
Sales of water heating units - Other (%)	4.1	2.66	2.65	2.64	2.62	2.58	2.57

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	138	291	982	3,094	4,506
Public EV charging plugs - DC Fast (1000 units)	0.1	0	0.496	0	2.66	0	7.45
Public EV charging plugs - L2 (1000 units)	0.476	0	11.9	0	63.9	0	179
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	1.91	2.04	1.62	1.03	0.528	0.226
Vehicle sales - Light-duty - EV (%)	1.98	4.89	12.3	26.5	49.1	72.5	87.8
Vehicle sales - Light-duty - gasoline (%)	91.5	87.1	79	65.8	45.4	24.4	10.8
Vehicle sales - Light-duty - hybrid (%)	4.86	5.65	6.32	5.71	4.24	2.48	1.19
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.378	0.321	0.244	0.172	0.095	0.044
Vehicle sales - Light-duty - other (%)	0.1	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)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0	0.008	0	0.047
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	7.26	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	7.93	7.93	55.2
Biomass w/ccu power plant (GWh)	0	0	0	0	8,149	8,149	8,149

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	0	463	822	1,376
Conversion capital investment - Cumulative 5-yr (million $2018)	0	0	0	0	6,674	4,475	6,984
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	1	1	2
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	5	12
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	1	1	2
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	7	7	7
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	1
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	11.4	17.2	27
Annual - BECCS (MMT)		0	0	0	8.07	13.8	23.5
Annual - Cement and lime (MMT)		0	0	0	3.32	3.42	3.53
Annual - NGCC (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	11.4	28.6	55.6
Cumulative - BECCS (MMT)		0	0	0	8.07	21.9	45.4
Cumulative - Cement and lime (MMT)		0	0	0	3.32	6.74	10.3
Cumulative - NGCC (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	0	159	932	1,177	1,649
Cumulative investment - All (million $2018)		0	0	951	1,943	2,149	2,706
Cumulative investment - Spur (million $2018)		0	0	0	993	1,199	1,755
Cumulative investment - Trunk (million $2018)		0	0	951	951	951	951
Spur (km)		0	0	0	773	1,018	1,489
Trunk (km)		0	0	159	159	159	159

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	2	2
Resource characterization, appraisal, permitting costs (million $2020)		3.29	7.9	10.5	10.5	10.5	10.5
Wells and facilities construction costs (million $2020)		0	4.11	16	28.5	47.7	59.2

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)							-218
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,143
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)							-33.8
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-1,395
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-218
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-600
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)							-16.9
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-834
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							132
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,546
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							45.9
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							85.4
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							61.4
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,871

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							132
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							328
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							45.9
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							85.4
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							30.7
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							623

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)							-315
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-36,273
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,646
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,310
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-17,707
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-534
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-813
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-2,422
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,736
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-158
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-12,261
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,808
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,420
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,902
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-187
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-407
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-183
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-922

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-236
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-24,243
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-960
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,059
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,081
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-11,805
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-360
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-610
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,303
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-1,829
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							51.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							223
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,727
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,028
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)							50.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							53.8
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							68.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							907
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,110
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							25.7
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							209
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,428
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							514

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 - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							26.7
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							26.9
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							11.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							549
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,791
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							38.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							216
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,578
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							774
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)							38.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							40.3
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							86.2
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,105
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,876

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		269	0.437	0.407	0.323	0.225	0.019
Monetary damages from air pollution - Natural Gas (million 2019$)		193	127	61.5	37.8	19.9	8.22
Monetary damages from air pollution - Transportation (million 2019$)		1,058	1,078	1,057	961	772	534
Premature deaths from air pollution - Coal (deaths)		30.4	0.049	0.046	0.036	0.025	0.002
Premature deaths from air pollution - Natural Gas (deaths)		21.8	14.4	6.94	4.27	2.24	0.928
Premature deaths from air pollution - Transportation (deaths)		119	121	119	108	86.8	60.1

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	15,522	16,121	0	0	0	0
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 (%)	10.1	29.8	65.1	72	72.3	72.3	72.4
Sales of space heating units - Electric Resistance (%)	9.29	9.59	14.9	20.3	25	25.7	25.7
Sales of space heating units - Fossil (%)	2.15	4.14	2.51	1.22	0.185	0.016	0
Sales of space heating units - Gas Furnace (%)	78.5	56.5	17.5	6.45	2.54	1.99	1.94
Sales of water heating units - Electric Heat Pump (%)	0.316	0.281	0.275	0.277	0.278	0.276	0.277
Sales of water heating units - Electric Resistance (%)	7.81	6.92	6.81	6.83	6.85	6.81	6.81
Sales of water heating units - Gas Furnace (%)	88	88.5	88.5	88.6	88.5	88.5	88.5
Sales of water heating units - Other (%)	3.86	4.28	4.39	4.33	4.38	4.4	4.38

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)		3.94	4.06	5.79	6.1	5.26	5.44

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	114	116	117	119	121	125	132
Final energy use - Industry (PJ)	358	383	402	413	428	438	452
Final energy use - Residential (PJ)	158	152	151	152	156	160	165
Final energy use - Transportation (PJ)	463	441	406	385	385	396	410

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	3.77	3.56	0	0	0	0
Sales of cooking units - Electric Resistance (%)	82.5	82.5	82.5	82.5	82.5	82.5	82.5
Sales of cooking units - Gas (%)	17.5	17.5	17.5	17.5	17.5	17.5	17.5
Sales of space heating units - Electric Heat Pump (%)	36.1	57.9	58.6	59.8	60.9	62.4	64.6
Sales of space heating units - Electric Resistance (%)	26.4	22.4	22.2	21.4	20.5	19.2	16.9
Sales of space heating units - Fossil (%)	6.23	6.42	5.5	5.15	5.08	5.05	5.09
Sales of space heating units - Gas (%)	31.3	13.3	13.7	13.6	13.5	13.4	13.4
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	67.7	79.8	79.8	79.6	79.5	79.5	79.4
Sales of water heating units - Gas Furnace (%)	28.2	17.5	17.5	17.7	17.8	17.8	17.9
Sales of water heating units - Other (%)	4.1	2.67	2.66	2.69	2.72	2.72	2.73

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 (%)	3.82	5.94	6.74	8.31	10.1	11.6	12.8
Vehicle sales - Light-duty - gasoline (%)	89.8	86.2	83.9	82	79.8	77.9	76.4
Vehicle sales - Light-duty - hybrid (%)	4.7	5.53	6.75	7.31	7.86	8.4	8.8
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.374	0.341	0.302	0.298	0.298	0.309
Vehicle sales - Light-duty - other (%)	0.098	0.102	0.099	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)							-315
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-36,273
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,646
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-7,310
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-17,707
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-534
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-813
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-2,422
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-2,736
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-158
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-12,261
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,808
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,420
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,902
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-187
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-407

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-183
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-922
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-236
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-24,243
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-960
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-5,059
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,081
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-11,805
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-360
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-610
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,303
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-1,829
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							51.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							223
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,727
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,028
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)							50.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							53.8
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							68.8
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							907
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,110
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							25.7
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							209
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,428

Table 64: *REF 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)							514
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)							26.7
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							26.9
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							11.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							549
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							2,791
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							38.6
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							216
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,578
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							774
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)							38.7
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							40.3
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							86.2
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,105
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							4,876

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)	-9.71		-9.95				-8.06
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-4.82		-8.04				-8.46
Business-as-usual carbon sink - Total (Mt CO2e/y)	-14.5		-18				-16.5

Table 66: *REF scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		1,013	671	563	512	492	480
Monetary damages from air pollution - Natural Gas (million 2019$)		173	185	202	202	233	244
Monetary damages from air pollution - Transportation (million 2019$)		1,057	1,092	1,127	1,167	1,208	1,251
Premature deaths from air pollution - Coal (deaths)		114	75.8	63.5	57.8	55.6	54.2
Premature deaths from air pollution - Natural Gas (deaths)		19.6	20.9	22.8	22.8	26.3	27.6
Premature deaths from air pollution - Transportation (deaths)		119	123	127	131	136	141