Net-Zero America - maryland state report

2021-03-05

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)	0	21,776	24,347	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 (%)	2.22	28.1	70.4	83.7	85	85.1	85.1
Sales of space heating units - Electric Resistance (%)	2.54	8.39	10.6	12.7	13.1	13.1	13.1
Sales of space heating units - Fossil (%)	11	4.19	0.8	0.034	0	0	0
Sales of space heating units - Gas Furnace (%)	84.3	59.3	18.3	3.58	1.9	1.86	1.85
Sales of water heating units - Electric Heat Pump (%)	0.097	10.5	54.4	64.3	64.7	64.8	64.7
Sales of water heating units - Electric Resistance (%)	2.5	10.8	28.3	32.3	32.5	32.5	32.5
Sales of water heating units - Gas Furnace (%)	93	74.5	14.3	0.646	0.003	0	0
Sales of water heating units - Other (%)	4.44	4.22	3.02	2.72	2.72	2.72	2.71

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)		2.99	3.04	6	6.39	5.4	5.63

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	189	188	180	167	157	154	156
Final energy use - Industry (PJ)	130	132	132	141	151	159	167
Final energy use - Residential (PJ)	241	228	209	183	162	149	144
Final energy use - Transportation (PJ)	448	417	367	305	249	213	197

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	4.8	4.71	0	0	0	0
Sales of cooking units - Electric Resistance (%)	59.2	67.9	94.5	99.7	100	100	100
Sales of cooking units - Gas (%)	40.8	32.1	5.5	0.277	0	0	0
Sales of space heating units - Electric Heat Pump (%)	17.4	35.6	79.7	89.7	90.1	90.1	90.1
Sales of space heating units - Electric Resistance (%)	13.2	13.8	5.81	3.98	3.89	3.95	3.95
Sales of space heating units - Fossil (%)	14.3	18.9	5.51	2.51	2.38	2.35	2.35
Sales of space heating units - Gas (%)	55.1	31.6	8.99	3.84	3.61	3.62	3.62
Sales of water heating units - Electric Heat Pump (%)	0	9.19	48.7	57.6	58	58	58
Sales of water heating units - Electric Resistance (%)	35.7	51	42.2	40.3	40.2	40.2	40.2
Sales of water heating units - Gas Furnace (%)	59.5	36.5	7.04	0.317	0.002	0	0
Sales of water heating units - Other (%)	4.77	3.29	2.07	1.81	1.81	1.83	1.84

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	800	2,073	3,321	5,046	5,475	5,229
Public EV charging plugs - DC Fast (1000 units)	0.402	0	1.31	0	5.5	0	8.84
Public EV charging plugs - L2 (1000 units)	1.67	0	31.5	0	132	0	212
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 (%)	1.29	1.58	1.16	0.367	0.07	0.013	0
Vehicle sales - Light-duty - EV (%)	4.79	17.9	50.4	83.4	96.5	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88.5	75	44.7	14.9	3.08	0.584	0
Vehicle sales - Light-duty - hybrid (%)	5.27	5.16	3.5	1.27	0.314	0.07	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.109	0.325	0.182	0.055	0.011	0.002	0
Vehicle sales - Light-duty - other (%)	0.09	0.085	0.053	0.019	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	0
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Offshore Wind - Base (billion $2018)	0	0	0	0	0	6.33	14.7
Capital invested - Offshore Wind - Constrained (billion $2018)	0	0	0	0	0	1.46	19.1
Capital invested - Solar PV - Base (billion $2018)	0	4.41	2.06	2.19	1.12	1.28	0.169
Capital invested - Solar PV - Constrained (billion $2018)	0	2.9	0.138	0.35	0	1.23	1.46
Capital invested - Wind - Constrained (billion $2018)	0	0	0	0.457	3.71	0	0
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	4,288	15,370
Installed (cumulative) - Rooftop PV (MW)	851	1,276	1,695	2,240	2,899	3,650	4,510
Installed (cumulative) - Solar - Base land use assumptions (MW)	809	4,104	5,824	7,813	8,889	10,195	10,378
Installed (cumulative) - Wind - Base land use assumptions (MW)	191	191	191	191	191	191	191

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	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	19,084	53,030
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	19,084	53,030
Solar - Base land use assumptions (GWh)	1,524	6,122	3,207	3,739	1,993	2,352	345
Solar - Constrained land use assumptions (GWh)	845	6,139	947	2,025	1,017	2,336	1,070
Wind - Base land use assumptions (GWh)	786	0	0	0	0	0	0
Wind - Constrained land use assumptions (GWh)	786	0	0	263	8,465	1,221	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	0	0	0	0	222
Conversion capital investment - Cumulative 5-yr (million $2018)	0	0	0	0	0	0	4,833
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	4
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	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	3.32	3.42	9.75
Annual - BECCS (MMT)		0	0	0	0	0	6.21
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	3.32	6.74	16.5
Cumulative - BECCS (MMT)		0	0	0	0	0	6.21
Cumulative - Cement and lime (MMT)		0	0	0	3.32	6.74	10.3
Cumulative - NGCC (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	0	112	197	197	429
Cumulative investment - All (million $2018)		0	0	667	748	749	961
Cumulative investment - Spur (million $2018)		0	0	0	81.3	82.7	294
Cumulative investment - Trunk (million $2018)		0	0	667	667	667	667
Spur (km)		0	0	0	85.1	85.1	317
Trunk (km)		0	0	112	112	112	112

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

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	0	0	0	0	0
Injection wells (wells)		0	0	0	0	0	0
Resource characterization, appraisal, permitting costs (million $2020)		0	0	0	0	0	0
Wells and facilities construction costs (million $2020)		0	0	0	0	0	0

Table 12: *E+ scenario - PILLAR 6: Land sinks - Agriculture*

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-595
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-29
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-624
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-313
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.5
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-327
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							525
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							52.7
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							578
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							276
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							26.4
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							302

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)							-37.6
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-5,324
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,101
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-1,332
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-140
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-864
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-356
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-62.1
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-886
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-546
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-18.8
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-1,480
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-183
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-511
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-71.1
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-288
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-125
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-31.1
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-67.1
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-184
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-28.2
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-3,401
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-642
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-922
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-104
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-576
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-240
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-46.6
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-477
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-365

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)							6.15
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							149
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							679
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							51.5
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)							33.8
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							4.11
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							25.2
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							181
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,130
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							3.08
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							140
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							260
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							25.8
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)							17.8
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							2.05
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							4.36
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							110
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							563
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							4.61

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)							144
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							470
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							38.8
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)							25.8
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							3.08
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							31.5
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							221
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							938

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		233	196	157	118	74.6	51.7
Natural gas consumption - Cumulative (tcf)		0	0	0	0	0	4,741
Natural gas production - Annual (tcf)		0.029	0.028	0.024	0.02	0.016	0.013
Oil consumption - Annual (million bbls)		69.1	59.1	44.6	31.1	20.6	12.5
Oil consumption - Cumulative (million bbls)		0	0	0	0	0	1,382
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$)		743	0.504	0.499	0.457	0.318	0.027
Monetary damages from air pollution - Natural Gas (million 2019$)		248	185	123	112	65.6	27.4
Monetary damages from air pollution - Transportation (million 2019$)		2,187	2,036	1,542	889	398	147
Premature deaths from air pollution - Coal (deaths)		83.9	0.057	0.056	0.052	0.036	0.003
Premature deaths from air pollution - Natural Gas (deaths)		28	20.9	13.9	12.6	7.41	3.09
Premature deaths from air pollution - Transportation (deaths)		246	229	173	100	44.8	16.5

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		49.8	101	38.7	30	22	324
By economic sector - Construction (jobs)		8,177	6,965	8,178	8,092	10,411	20,267
By economic sector - Manufacturing (jobs)		6,920	12,734	12,785	10,098	11,764	11,071
By economic sector - Mining (jobs)		1,387	923	589	350	190	100

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		1,195	1,055	1,308	1,398	1,767	3,128
By economic sector - Pipeline (jobs)		304	256	280	153	102	100
By economic sector - Professional (jobs)		3,366	2,915	3,203	3,313	4,882	11,061
By economic sector - Trade (jobs)		2,506	2,074	2,245	2,286	3,158	6,652
By economic sector - Utilities (jobs)		5,917	5,608	6,814	7,153	9,692	20,441
By education level - All sectors - Associates degree or some college (jobs)		9,450	10,362	11,399	10,661	13,643	23,749
By education level - All sectors - Bachelors degree (jobs)		5,984	6,519	6,921	6,349	8,182	14,417
By education level - All sectors - Doctoral degree (jobs)		193	180	190	181	248	507
By education level - All sectors - High school diploma or less (jobs)		12,803	14,136	15,396	14,236	18,005	30,863
By education level - All sectors - Masters or professional degree (jobs)		1,392	1,433	1,535	1,446	1,912	3,608
By resource sector - Biomass (jobs)		214	279	110	90.3	80.4	1,382
By resource sector - CO2 (jobs)		0	0	655	56	72.2	326
By resource sector - Coal (jobs)		803	212	0	0	0	0
By resource sector - Grid (jobs)		7,244	7,653	10,558	12,271	18,066	40,246
By resource sector - Natural Gas (jobs)		3,257	2,606	2,312	2,623	1,856	1,306
By resource sector - Nuclear (jobs)		923	908	527	0	0	0
By resource sector - Oil (jobs)		3,071	2,410	1,678	1,089	673	385
By resource sector - Solar (jobs)		14,155	17,961	19,117	15,493	15,638	16,688
By resource sector - Wind (jobs)		154	602	483	1,250	5,605	12,811
Median wages - Annual - All ($2019 per job)		62,912	63,005	63,816	64,974	66,381	68,724
On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs)		4,871	5,255	5,779	5,410	6,920	12,158
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)		1,945	1,876	2,126	2,070	2,689	5,108
On-Site or In-Plant Training - Total jobs - None (jobs)		4,886	5,387	5,806	5,343	6,819	11,768
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)		250	267	299	286	369	666
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)		17,869	19,847	21,430	19,763	25,192	43,444
On-the-Job Training - All sectors - 1 to 4 years (jobs)		6,254	6,701	7,390	6,938	8,892	15,718
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,907	1,814	2,079	2,043	2,663	5,106
On-the-Job Training - All sectors - None (jobs)		1,634	1,749	1,880	1,734	2,213	3,862
On-the-Job Training - All sectors - Over 10 years (jobs)		316	366	389	346	430	681
On-the-Job Training - All sectors - Up to 1 year (jobs)		19,711	22,000	23,702	21,811	27,792	47,778
Related work experience - All sectors - 1 to 4 years (jobs)		10,646	11,563	12,549	11,667	14,937	26,208
Related work experience - All sectors - 4 to 10 years (jobs)		6,894	7,454	8,119	7,559	9,697	17,070
Related work experience - All sectors - None (jobs)		4,279	4,641	5,082	4,756	6,065	10,645
Related work experience - All sectors - Over 10 years (jobs)		1,876	2,138	2,297	2,094	2,666	4,500
Related work experience - All sectors - Up to 1 year (jobs)		6,127	6,835	7,394	6,797	8,625	14,720
Wage income - All (million $2019)		1,876	2,056	2,262	2,136	2,788	5,027

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	21,752	24,163	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 (%)	2.22	20.1	24.9	38.9	61	76.7	82.8
Sales of space heating units - Electric Resistance (%)	2.54	8.05	8.31	9.13	10.6	12	12.8
Sales of space heating units - Fossil (%)	11	4.85	4.51	3.43	1.69	0.531	0.139
Sales of space heating units - Gas Furnace (%)	84.3	67	62.3	48.5	26.7	10.8	4.34
Sales of water heating units - Electric Heat Pump (%)	0.097	2.03	7.02	21.4	43.5	57.9	63
Sales of water heating units - Electric Resistance (%)	2.5	7.39	9.34	15.1	24	29.8	31.8
Sales of water heating units - Gas Furnace (%)	93	86.1	79.2	59.6	29.2	9.38	2.45
Sales of water heating units - Other (%)	4.44	4.46	4.4	3.91	3.31	2.91	2.76

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)		2.54	2.53	3.68	3.81	5.55	5.88

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	189	189	186	183	177	171	167
Final energy use - Industry (PJ)	130	132	133	143	154	162	170
Final energy use - Residential (PJ)	241	229	222	214	200	183	167
Final energy use - Transportation (PJ)	449	421	386	356	331	302	268

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	4.8	4.72	0	0	0	0
Sales of cooking units - Electric Resistance (%)	59	60.1	63.8	73.7	87.5	96	98.9
Sales of cooking units - Gas (%)	41	39.9	36.2	26.3	12.5	4.04	1.09
Sales of space heating units - Electric Heat Pump (%)	17.4	27.2	32.2	46.7	68.8	83.3	88.3
Sales of space heating units - Electric Resistance (%)	13.2	15.3	14.3	11.6	7.67	5.11	4.2
Sales of space heating units - Fossil (%)	14.3	21.5	20.1	15.7	8.92	4.46	2.92
Sales of space heating units - Gas (%)	55.1	36	33.4	26	14.6	7.13	4.52
Sales of water heating units - Electric Heat Pump (%)	0	1.58	6.08	19	38.9	51.9	56.4
Sales of water heating units - Electric Resistance (%)	35.7	52.7	51.6	48.7	44.3	41.5	40.5
Sales of water heating units - Gas Furnace (%)	59.5	42.2	38.9	29.2	14.4	4.62	1.21
Sales of water heating units - Other (%)	4.77	3.53	3.4	3	2.4	2.02	1.89

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	133	271	925	2,883	4,210
Public EV charging plugs - DC Fast (1000 units)	0.402	0	0.44	0	2.06	0	5.66
Public EV charging plugs - L2 (1000 units)	1.67	0	10.6	0	49.6	0	136
Vehicle sales - Heavy-duty - diesel (%)	97.4	96	91.3	79.8	58.2	32.1	13.7
Vehicle sales - Heavy-duty - EV (%)	0.498	1.45	4.11	10.8	23.6	39.5	51
Vehicle sales - Heavy-duty - gasoline (%)	0.228	0.236	0.239	0.225	0.179	0.109	0.051
Vehicle sales - Heavy-duty - hybrid (%)	0.083	0.094	0.104	0.107	0.092	0.06	0.03
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.332	0.969	2.74	7.17	15.7	26.3	34
Vehicle sales - Heavy-duty - other (%)	1.5	1.28	1.46	1.95	2.25	1.96	1.14
Vehicle sales - Light-duty - diesel (%)	1.3	1.76	2.01	1.59	0.995	0.506	0.218
Vehicle sales - Light-duty - EV (%)	2.19	5.36	13.2	28	50.7	73.5	88.2
Vehicle sales - Light-duty - gasoline (%)	90.8	86.2	77.5	63.9	43.6	23.3	10.3
Vehicle sales - Light-duty - hybrid (%)	5.48	6.24	6.9	6.15	4.48	2.57	1.22
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.373	0.311	0.232	0.161	0.088	0.041
Vehicle sales - Light-duty - other (%)	0.092	0.095	0.085	0.073	0.052	0.028	0.013
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen FC (%)	0.166	0.485	1.37	3.58	7.86	13.2	17
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-595
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-29
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-624
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-313
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.5
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-327
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							525
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							52.7

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)							578
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							276
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							26.4
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							302

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)							-37.6
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-5,324
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,101
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-1,332
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-140
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-864
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-356
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-62.1
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-886
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-546
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-18.8
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-1,480
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-183
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-511
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-71.1
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-288
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-125
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-31.1
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-67.1
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-184
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-28.2

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)							-3,401
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-642
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-922
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-104
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-576
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-240
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-46.6
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-477
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-365
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							6.15
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							149
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							679
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							51.5
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)							33.8
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							4.11
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							25.2
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							181
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,130
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							3.08
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							140
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							260
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							25.8
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)							17.8
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							2.05
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							4.36
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							110
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							563
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							4.61
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							144
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							470
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							38.8
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)							25.8
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							3.08
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							31.5
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							221
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							938

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		743	0.504	0.499	0.457	0.318	0.027
Monetary damages from air pollution - Natural Gas (million 2019$)		248	162	73.2	34.7	11.7	7.64
Monetary damages from air pollution - Transportation (million 2019$)		2,231	2,262	2,199	1,975	1,567	1,069
Premature deaths from air pollution - Coal (deaths)		83.9	0.057	0.056	0.052	0.036	0.003
Premature deaths from air pollution - Natural Gas (deaths)		28	18.3	8.27	3.91	1.32	0.863
Premature deaths from air pollution - Transportation (deaths)		251	254	247	222	176	120

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	21,776	24,347	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 (%)	2.22	28.1	70.4	83.7	85	85.1	85.1
Sales of space heating units - Electric Resistance (%)	2.54	8.39	10.6	12.7	13.1	13.1	13.1
Sales of space heating units - Fossil (%)	11	4.19	0.8	0.034	0	0	0
Sales of space heating units - Gas Furnace (%)	84.3	59.3	18.3	3.58	1.9	1.86	1.85
Sales of water heating units - Electric Heat Pump (%)	0.097	10.5	54.4	64.3	64.7	64.8	64.7
Sales of water heating units - Electric Resistance (%)	2.5	10.8	28.3	32.3	32.5	32.5	32.5
Sales of water heating units - Gas Furnace (%)	93	74.5	14.3	0.646	0.003	0	0
Sales of water heating units - Other (%)	4.44	4.22	3.02	2.72	2.72	2.72	2.71

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)		2.99	3.04	6	6.39	5.4	5.63

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	189	188	180	167	157	154	156
Final energy use - Industry (PJ)	130	132	132	141	151	159	167
Final energy use - Residential (PJ)	241	228	209	183	162	149	144
Final energy use - Transportation (PJ)	448	417	367	305	249	213	197

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	4.8	4.71	0	0	0	0
Sales of cooking units - Electric Resistance (%)	59.2	67.9	94.5	99.7	100	100	100
Sales of cooking units - Gas (%)	40.8	32.1	5.5	0.277	0	0	0
Sales of space heating units - Electric Heat Pump (%)	17.4	35.6	79.7	89.7	90.1	90.1	90.1
Sales of space heating units - Electric Resistance (%)	13.2	13.8	5.81	3.98	3.89	3.95	3.95
Sales of space heating units - Fossil (%)	14.3	18.9	5.51	2.51	2.38	2.35	2.35
Sales of space heating units - Gas (%)	55.1	31.6	8.99	3.84	3.61	3.62	3.62
Sales of water heating units - Electric Heat Pump (%)	0	9.19	48.7	57.6	58	58	58
Sales of water heating units - Electric Resistance (%)	35.7	51	42.2	40.3	40.2	40.2	40.2
Sales of water heating units - Gas Furnace (%)	59.5	36.5	7.04	0.317	0.002	0	0
Sales of water heating units - Other (%)	4.77	3.29	2.07	1.81	1.81	1.83	1.84

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	800	2,073	3,321	5,046	5,475	5,229
Public EV charging plugs - DC Fast (1000 units)	0.402	0	1.31	0	5.5	0	8.84
Public EV charging plugs - L2 (1000 units)	1.67	0	31.5	0	132	0	212
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 (%)	1.29	1.58	1.16	0.367	0.07	0.013	0
Vehicle sales - Light-duty - EV (%)	4.79	17.9	50.4	83.4	96.5	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88.5	75	44.7	14.9	3.08	0.584	0
Vehicle sales - Light-duty - hybrid (%)	5.27	5.16	3.5	1.27	0.314	0.07	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.109	0.325	0.182	0.055	0.011	0.002	0
Vehicle sales - Light-duty - other (%)	0.09	0.085	0.053	0.019	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	1.71	17.2	3.59
Capital invested - Solar PV - Base (billion $2018)	0	4.53	0.414	2.16	2.49	3.65	14.9
Capital invested - Wind - Base (billion $2018)	0	0	0	0	0	2.43	6.5
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	987	12,663	15,370
Installed (cumulative) - Solar - Base land use assumptions (MW)	972	4,354	4,700	6,660	9,052	12,770	28,882
Installed (cumulative) - Wind - Base land use assumptions (MW)	191	191	191	191	191	1,394	4,802

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	4,268	54,657	13,188
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	4,276	0	67,845
Solar - Base land use assumptions (GWh)	1,833	6,232	655	3,541	4,173	6,377	29,914
Solar - Constrained land use assumptions (GWh)	2,449	3,162	3,022	4,628	2,879	475	36,372
Wind - Base land use assumptions (GWh)	786	0	0	0	0	4,164	9,643
Wind - Constrained land use assumptions (GWh)	786	0	0	5,492	4,458	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)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-595
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-29
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-624
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-313
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.5
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-327
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							525
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							52.7
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							578
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							276
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							26.4
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							302

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)							-37.6
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-5,324
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,101
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-1,332
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-140
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-864

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)							-356
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-62.1
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-886
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-546
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-18.8
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-1,480
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-183
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-511
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-71.1
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-288
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-125
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-31.1
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-67.1
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-184
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-28.2
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-3,401
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-642
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-922
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-104
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-576
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-240
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-46.6
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-477
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-365
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							6.15
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							149
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							679
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							51.5

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 - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							33.8
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							4.11
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							25.2
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							181
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,130
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							3.08
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							140
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							260
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							25.8
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)							17.8
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							2.05
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							4.36
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							110
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							563
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							4.61
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							144
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							470
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							38.8
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)							25.8

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 - Mid - Reforest cropland (1000 hectares)							3.08
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							31.5
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							221
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							938

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		743	0.504	0.499	0.457	0.318	0.027
Monetary damages from air pollution - Natural Gas (million 2019$)		228	159	99	69.7	24.4	4.65
Monetary damages from air pollution - Transportation (million 2019$)		2,187	2,036	1,542	889	398	147
Premature deaths from air pollution - Coal (deaths)		83.9	0.057	0.056	0.052	0.036	0.003
Premature deaths from air pollution - Natural Gas (deaths)		25.7	18	11.2	7.87	2.76	0.525
Premature deaths from air pollution - Transportation (deaths)		246	229	173	100	44.8	16.5

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)	0	21,776	24,347	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 (%)	2.22	28.1	70.4	83.7	85	85.1	85.1
Sales of space heating units - Electric Resistance (%)	2.54	8.39	10.6	12.7	13.1	13.1	13.1
Sales of space heating units - Fossil (%)	11	4.19	0.8	0.034	0	0	0
Sales of space heating units - Gas Furnace (%)	84.3	59.3	18.3	3.58	1.9	1.86	1.85
Sales of water heating units - Electric Heat Pump (%)	0.097	10.5	54.4	64.3	64.7	64.8	64.7
Sales of water heating units - Electric Resistance (%)	2.5	10.8	28.3	32.3	32.5	32.5	32.5
Sales of water heating units - Gas Furnace (%)	93	74.5	14.3	0.646	0.003	0	0
Sales of water heating units - Other (%)	4.44	4.22	3.02	2.72	2.72	2.72	2.71

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)		2.99	3.04	6	6.39	5.4	5.63

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	189	188	180	167	157	154	156

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	130	132	132	141	151	159	167
Final energy use - Residential (PJ)	241	228	209	183	162	149	144
Final energy use - Transportation (PJ)	448	417	367	305	249	213	197

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	4.8	4.71	0	0	0	0
Sales of cooking units - Electric Resistance (%)	59.2	67.9	94.5	99.7	100	100	100
Sales of cooking units - Gas (%)	40.8	32.1	5.5	0.277	0	0	0
Sales of space heating units - Electric Heat Pump (%)	17.4	35.6	79.7	89.7	90.1	90.1	90.1
Sales of space heating units - Electric Resistance (%)	13.2	13.8	5.81	3.98	3.89	3.95	3.95
Sales of space heating units - Fossil (%)	14.3	18.9	5.51	2.51	2.38	2.35	2.35
Sales of space heating units - Gas (%)	55.1	31.6	8.99	3.84	3.61	3.62	3.62
Sales of water heating units - Electric Heat Pump (%)	0	9.19	48.7	57.6	58	58	58
Sales of water heating units - Electric Resistance (%)	35.7	51	42.2	40.3	40.2	40.2	40.2
Sales of water heating units - Gas Furnace (%)	59.5	36.5	7.04	0.317	0.002	0	0
Sales of water heating units - Other (%)	4.77	3.29	2.07	1.81	1.81	1.83	1.84

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	800	2,073	3,321	5,046	5,475	5,229
Public EV charging plugs - DC Fast (1000 units)	0.402	0	1.31	0	5.5	0	8.84
Public EV charging plugs - L2 (1000 units)	1.67	0	31.5	0	132	0	212
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 (%)	1.29	1.58	1.16	0.367	0.07	0.013	0
Vehicle sales - Light-duty - EV (%)	4.79	17.9	50.4	83.4	96.5	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88.5	75	44.7	14.9	3.08	0.584	0
Vehicle sales - Light-duty - hybrid (%)	5.27	5.16	3.5	1.27	0.314	0.07	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.109	0.325	0.182	0.055	0.011	0.002	0
Vehicle sales - Light-duty - other (%)	0.09	0.085	0.053	0.019	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Offshore Wind - Constrained (billion $2018)		0	0	0	0	0.383	0.427
Capital invested - Solar PV - Base (billion $2018)		1.12	0.84	0.53	0.29	0	0
Capital invested - Solar PV - Constrained (billion $2018)		1.2	1.38	0.17	0.879	0.198	0
Capital invested - Wind - Base (billion $2018)		0	0	0	0	0	0
Capital invested - Wind - Constrained (billion $2018)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	1,098	1,388
Solar - Base land use assumptions (GWh)	1,078	1,541	1,311	891	525	0	0
Solar - Constrained land use assumptions (GWh)	1,345	1,662	2,107	293	1,561	369	0
Wind - Base land use assumptions (GWh)	786	0	0	0	0	0	0
Wind - Constrained land use assumptions (GWh)	786	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-595
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-29
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-624
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-313
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.5
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-327
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							525
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							52.7
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							578

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							276
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							26.4
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							302

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)							-37.6
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-5,324
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,101
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-1,332
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-140
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-864
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-356
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-62.1
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-886
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-546
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-18.8
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-1,480
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-183
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-511
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-71.1
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-288
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-125
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-31.1
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-67.1
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-184
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-28.2
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-3,401
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-642

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-922
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-104
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-576
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-240
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-46.6
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-477
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-365
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							6.15
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							149
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							679
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							51.5
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)							33.8
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							4.11
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							25.2
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							181
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,130
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							3.08
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							140
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							260
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							25.8
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)							17.8

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 - Reforest cropland (1000 hectares)							2.05
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							4.36
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							110
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							563
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							4.61
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							144
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							470
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							38.8
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)							25.8
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							3.08
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							31.5
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							221
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							938

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		743	0.504	0.499	0.457	0.318	0.027
Monetary damages from air pollution - Natural Gas (million 2019$)		202	159	206	157	54.8	16.7
Monetary damages from air pollution - Transportation (million 2019$)		2,187	2,036	1,542	889	398	147
Premature deaths from air pollution - Coal (deaths)		83.9	0.057	0.056	0.052	0.036	0.003
Premature deaths from air pollution - Natural Gas (deaths)		22.9	18	23.2	17.7	6.19	1.89
Premature deaths from air pollution - Transportation (deaths)		246	229	173	100	44.8	16.5

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)	0	21,752	24,163	0	0	0	0
Sales of cooking units - Electric Resistance (%)	32	36.2	40.9	53.4	71	81.7	85.5

Table 45: *E-B+ scenario - PILLAR 1: Efficiency/Electrification - Commercial (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
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 (%)	2.22	20.1	24.9	38.9	61	76.7	82.8
Sales of space heating units - Electric Resistance (%)	2.54	8.05	8.31	9.13	10.6	12	12.8
Sales of space heating units - Fossil (%)	11	4.85	4.51	3.43	1.69	0.531	0.139
Sales of space heating units - Gas Furnace (%)	84.3	67	62.3	48.5	26.7	10.8	4.34
Sales of water heating units - Electric Heat Pump (%)	0.097	2.03	7.02	21.4	43.5	57.9	63
Sales of water heating units - Electric Resistance (%)	2.5	7.39	9.34	15.1	24	29.8	31.8
Sales of water heating units - Gas Furnace (%)	93	86.1	79.2	59.6	29.2	9.38	2.45
Sales of water heating units - Other (%)	4.44	4.46	4.4	3.91	3.31	2.91	2.76

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)		2.54	2.53	3.68	3.81	5.55	5.88

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	189	189	186	183	177	171	167
Final energy use - Industry (PJ)	130	132	133	143	154	162	170
Final energy use - Residential (PJ)	241	229	222	214	200	183	167
Final energy use - Transportation (PJ)	449	421	386	356	331	302	268

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	4.8	4.72	0	0	0	0
Sales of cooking units - Electric Resistance (%)	59	60.1	63.8	73.7	87.5	96	98.9
Sales of cooking units - Gas (%)	41	39.9	36.2	26.3	12.5	4.04	1.09
Sales of space heating units - Electric Heat Pump (%)	17.4	27.2	32.2	46.7	68.8	83.3	88.3
Sales of space heating units - Electric Resistance (%)	13.2	15.3	14.3	11.6	7.67	5.11	4.2
Sales of space heating units - Fossil (%)	14.3	21.5	20.1	15.7	8.92	4.46	2.92
Sales of space heating units - Gas (%)	55.1	36	33.4	26	14.6	7.13	4.52
Sales of water heating units - Electric Heat Pump (%)	0	1.58	6.08	19	38.9	51.9	56.4
Sales of water heating units - Electric Resistance (%)	35.7	52.7	51.6	48.7	44.3	41.5	40.5
Sales of water heating units - Gas Furnace (%)	59.5	42.2	38.9	29.2	14.4	4.62	1.21
Sales of water heating units - Other (%)	4.77	3.53	3.4	3	2.4	2.02	1.89

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	133	271	925	2,883	4,210
Public EV charging plugs - DC Fast (1000 units)	0.402	0	0.44	0	2.06	0	5.66
Public EV charging plugs - L2 (1000 units)	1.67	0	10.6	0	49.6	0	136

Table 49: *E-B+ scenario - PILLAR 1: Efficiency/Electrification - Transportation (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Heavy-duty - diesel (%)	97.4	96	91.3	79.8	58.2	32.1	13.7
Vehicle sales - Heavy-duty - EV (%)	0.498	1.45	4.11	10.8	23.6	39.5	51
Vehicle sales - Heavy-duty - gasoline (%)	0.228	0.236	0.239	0.225	0.179	0.109	0.051
Vehicle sales - Heavy-duty - hybrid (%)	0.083	0.094	0.104	0.107	0.092	0.06	0.03
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.332	0.969	2.74	7.17	15.7	26.3	34
Vehicle sales - Heavy-duty - other (%)	1.5	1.28	1.46	1.95	2.25	1.96	1.14
Vehicle sales - Light-duty - diesel (%)	1.3	1.76	2.01	1.59	0.995	0.506	0.218
Vehicle sales - Light-duty - EV (%)	2.19	5.36	13.2	28	50.7	73.5	88.2
Vehicle sales - Light-duty - gasoline (%)	90.8	86.2	77.5	63.9	43.6	23.3	10.3
Vehicle sales - Light-duty - hybrid (%)	5.48	6.24	6.9	6.15	4.48	2.57	1.22
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.373	0.311	0.232	0.161	0.088	0.041
Vehicle sales - Light-duty - other (%)	0.092	0.095	0.085	0.073	0.052	0.028	0.013
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen FC (%)	0.166	0.485	1.37	3.58	7.86	13.2	17
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	0	0	0

Table 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	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million $2018/year)	0	0	0	0	0	0	476
Conversion capital investment - Cumulative 5-yr (million $2018)	0	0	0	0	0	0	5,252
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel (quantity)	0	0	0	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	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	6
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	0	3.32	3.42	3.53
Annual - BECCS (MMT)		0	0	0	0	0	0
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	3.32	6.74	10.3
Cumulative - BECCS (MMT)		0	0	0	0	0	0
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	112	197	197	257
Cumulative investment - All (million $2018)		0	0	667	748	749	820
Cumulative investment - Spur (million $2018)		0	0	0	81.3	82.7	153
Cumulative investment - Trunk (million $2018)		0	0	667	667	667	667
Spur (km)		0	0	0	85.1	85.1	145
Trunk (km)		0	0	112	112	112	112

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

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	0	0	0	0	0
Injection wells (wells)		0	0	0	0	0	0
Resource characterization, appraisal, permitting costs (million $2020)		0	0	0	0	0	0
Wells and facilities construction costs (million $2020)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-140
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-526
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)							-25.2
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-691
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-140
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-276
Carbon sink potential - Moderate deployment - Cropland to woody energy crops (1000 tCO2e/y)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Pasture to energy crops (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-12.6
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-429
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							66.5
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,142
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							24.8
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							15.5
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							45.8
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,295
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							66.5
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							243
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							24.8
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							15.5
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							22.9
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							372

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)							-37.6
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-5,324
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,101
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-1,332
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-140
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-864
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-356

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-62.1
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-886
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-546
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-18.8
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-1,480
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-183
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-511
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-71.1
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-288
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-125
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-31.1
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-67.1
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-184
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-28.2
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-3,401
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-642
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-922
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-104
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-576
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-240
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-46.6
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-477
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-365
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							6.15
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							149
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							679
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							51.5
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0

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 - Increase trees outside forests (1000 hectares)							33.8
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							4.11
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							25.2
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							181
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,130
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							3.08
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							140
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							260
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							25.8
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)							17.8
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							2.05
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							4.36
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							110
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							563
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							4.61
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							144
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							470
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							38.8
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)							25.8
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							3.08

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 - Reforest pasture (1000 hectares)							31.5
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							221
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							938

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		743	0.504	0.499	0.457	0.318	0.027
Monetary damages from air pollution - Natural Gas (million 2019$)		241	149	85.6	67.2	39.7	11.7
Monetary damages from air pollution - Transportation (million 2019$)		2,231	2,262	2,199	1,975	1,567	1,069
Premature deaths from air pollution - Coal (deaths)		83.9	0.057	0.056	0.052	0.036	0.003
Premature deaths from air pollution - Natural Gas (deaths)		27.2	16.8	9.67	7.59	4.48	1.32
Premature deaths from air pollution - Transportation (deaths)		251	254	247	222	176	120

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	21,455	22,311	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 (%)	2.22	24.1	48.5	68.5	71.8	72.2	72.1
Sales of space heating units - Electric Resistance (%)	2.54	8.78	12.8	20.1	25.2	25.9	26
Sales of space heating units - Fossil (%)	11	4.72	3.48	1.49	0.219	0.018	0
Sales of space heating units - Gas Furnace (%)	84.3	62.4	35.2	9.92	2.85	1.92	1.85
Sales of water heating units - Electric Heat Pump (%)	0.097	0.269	0.266	0.268	0.269	0.268	0.269
Sales of water heating units - Electric Resistance (%)	2.5	6.69	6.63	6.64	6.67	6.65	6.66
Sales of water heating units - Gas Furnace (%)	93	88.5	88.5	88.6	88.5	88.5	88.6
Sales of water heating units - Other (%)	4.44	4.5	4.6	4.5	4.54	4.55	4.51

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

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		2.72	2.74	4.82	5.09	5.1	5.33

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	189	191	193	193	194	199	210
Final energy use - Industry (PJ)	130	136	143	150	159	169	180
Final energy use - Residential (PJ)	241	228	225	225	227	233	239
Final energy use - Transportation (PJ)	449	422	391	372	373	384	398

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	4.7	4.34	0	0	0	0
Sales of cooking units - Electric Resistance (%)	58.7	58.7	58.7	58.7	58.7	58.7	58.7
Sales of cooking units - Gas (%)	41.3	41.3	41.3	41.3	41.3	41.3	41.3
Sales of space heating units - Electric Heat Pump (%)	15	40.3	41.5	42.8	43.7	44.6	45.9
Sales of space heating units - Electric Resistance (%)	13.7	12.7	12.4	12	11.7	10.8	9.45
Sales of space heating units - Fossil (%)	14.7	16.1	7.71	4.03	3.79	3.76	3.81
Sales of space heating units - Gas (%)	56.6	31	38.4	41.1	40.8	40.8	40.9
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	35.7	53	53	52.9	52.9	52.8	52.8
Sales of water heating units - Gas Furnace (%)	59.5	43.4	43.4	43.5	43.5	43.6	43.6
Sales of water heating units - Other (%)	4.77	3.57	3.58	3.59	3.6	3.6	3.61

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Heavy-duty - diesel (%)	98.1	98.2	97.9	97	95.6	93.5	91.6
Vehicle sales - Heavy-duty - EV (%)	0	0	0	0	0	0	0
Vehicle sales - Heavy-duty - gasoline (%)	0.229	0.242	0.257	0.274	0.294	0.317	0.343
Vehicle sales - Heavy-duty - hybrid (%)	0.083	0.096	0.112	0.13	0.15	0.174	0.202
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.119	0.138	0.16	0.186	0.216	0.25	0.29
Vehicle sales - Heavy-duty - other (%)	1.51	1.31	1.57	2.37	3.69	5.71	7.57
Vehicle sales - Light-duty - diesel (%)	1.29	1.75	2.14	2	1.79	1.66	1.58
Vehicle sales - Light-duty - EV (%)	4.42	6.72	7.55	9.34	11.3	12.8	14.1
Vehicle sales - Light-duty - gasoline (%)	88.8	85	82.5	80.4	78.1	76.3	74.8
Vehicle sales - Light-duty - hybrid (%)	5.29	6.1	7.38	7.93	8.43	8.88	9.17
Vehicle sales - Light-duty - hydrogen FC (%)	0.109	0.367	0.331	0.29	0.286	0.285	0.294
Vehicle sales - Light-duty - other (%)	0.09	0.094	0.09	0.091	0.09	0.088	0.091
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)							-37.6
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-5,324
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,101
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-1,332
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-140
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-864
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-356

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-62.1
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-886
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-546
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-18.8
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-1,480
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-183
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-511
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-71.1
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-288
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-125
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-31.1
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-67.1
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-184
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-28.2
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-3,401
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-642
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-922
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-104
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-576
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-240
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-46.6
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-477
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-365
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							6.15
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							149
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							679
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							51.5
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0

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 - Increase trees outside forests (1000 hectares)							33.8
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							4.11
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							25.2
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							181
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,130
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							3.08
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							140
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							260
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							25.8
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)							17.8
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							2.05
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							4.36
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							110
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							563
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							4.61
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							144
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							470
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							38.8
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)							25.8
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							3.08

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 - Reforest pasture (1000 hectares)							31.5
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							221
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							938

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)	-4.41		-2.14				-1.92
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.235		-0.423				-0.44
Business-as-usual carbon sink - Total (Mt CO2e/y)	-4.65		-2.57				-2.36

Table 66: *REF scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		1,938	1,218	1,140	1,108	1,087	997
Monetary damages from air pollution - Natural Gas (million 2019$)		199	221	263	277	254	246
Monetary damages from air pollution - Transportation (million 2019$)		2,223	2,284	2,337	2,400	2,459	2,517
Premature deaths from air pollution - Coal (deaths)		219	138	129	125	123	113
Premature deaths from air pollution - Natural Gas (deaths)		22.4	24.9	29.7	31.3	28.6	27.7
Premature deaths from air pollution - Transportation (deaths)		250	257	263	270	277	283