Net-Zero America - new hampshire state report

Larson et al. 2020

February 2021

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 a subset of 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.)
- Some results are not model outputs, but rather they are limits that apply across all scenarios (e.g., maximum carbon storage potential in agricultural soils).

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Table 1: *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	1.15	1.23	0	0	0	0
Sales of cooking units - Electric Resistance (%)	55.6	65	94	99.7	100	100	100
Sales of cooking units - Gas (%)	44.4	35	5.98	0.301	0	0	0
Sales of space heating units - Electric Heat Pump (%)	4.02	11.4	55.4	81.6	85.2	85.5	85.5
Sales of space heating units - Electric Resistance (%)	2.1	2.36	1.9	0.854	0.641	0.637	0.692
Sales of space heating units - Fossil (%)	75.2	76.2	35.5	16.4	14	13.8	13.7
Sales of space heating units - Gas (%)	18.7	10	7.16	1.21	0.152	0.086	0.084
Sales of water heating units - Electric Heat Pump (%)	0	1.91	15.5	34.6	37.8	38	38.1
Sales of water heating units - Electric Resistance (%)	25.3	41.2	50.4	60.2	61.8	61.9	61.8
Sales of water heating units - Gas Furnace (%)	51.5	43.4	31.5	5.04	0.297	0	0
Sales of water heating units - Other (%)	23.2	13.5	2.63	0.195	0.089	0.089	0.089

Table 2: *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	258	662	1,071	1,624	1,766	1,685
Public EV charging plugs - DC Fast (1000 units)	0.06	0	0.528	0	2.3	0	3.72
Public EV charging plugs - L2 (1000 units)	0.188	0	12.7	0	55.3	0	89.3
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 (%)	1.55	1.82	1.26	0.403	0.075	0.013	0
Vehicle sales - Light-duty - EV (%)	3.9	15.1	46.4	81.8	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.9	78.1	48.9	16.5	3.29	0.59	0
Vehicle sales - Light-duty - hybrid (%)	4.41	4.53	3.21	1.19	0.29	0.063	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.34	0.203	0.063	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.102	0.098	0.064	0.022	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 3: *E+ scenario - PILLAR 1: Efficiency/Electrification - Overview*

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	39.2	36.8	35.1	32.8	30.3	28.7	27.8
Final energy use - Industry (PJ)	21.1	20.7	20.2	19.9	19.6	19.6	19.5
Final energy use - Residential (PJ)	67.8	61.4	54.8	46.6	38.7	33	29.6
Final energy use - Transportation (PJ)	93.6	86.6	75.2	60.9	47.9	39.6	35.8

Table 4: *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	2,680	2,926	0	0	0	0
Sales of cooking units - Electric Resistance (%)	36.9	49.9	81.2	87.4	87.7	87.7	87.7
Sales of cooking units - Gas (%)	63.1	50.1	18.8	12.6	12.3	12.3	12.3
Sales of space heating units - Electric Heat Pump (%)	3.23	11	39.6	72.4	77.7	77.9	78
Sales of space heating units - Electric Resistance (%)	1.65	4.4	16.6	21.3	22	22.1	22
Sales of space heating units - Fossil (%)	57.4	32	6.13	0.259	0	0	0

Table 4: *E+ scenario - PILLAR 1: Efficiency/Electrification - Commercial (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Gas Furnace (%)	37.7	52.7	37.7	6.03	0.358	0	0
Sales of water heating units - Electric Heat Pump (%)	2.6	3.52	16	41.1	45.6	45.9	45.9
Sales of water heating units - Electric Resistance (%)	12.8	12.4	24	48	52.3	52.5	52.5
Sales of water heating units - Gas Furnace (%)	77.2	79.9	58.1	9.27	0.548	0	0
Sales of water heating units - Other (%)	7.43	4.15	1.94	1.59	1.57	1.57	1.59

Table 5: *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)	0	0.537	0.548	1.07	1.14	1.01	1.05

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	0.021
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	0	0	0.027
Capital invested - Solar PV - Base (billion $2018)	0	0	0	1.31	0.08	3.49	7.46
Capital invested - Solar PV - Constrained (billion $2018)	0	0	0.656	2.35	0	1.97	6.03
Capital invested - Wind - Base (billion $2018)	0	0.375	2.99	0.454	0.711	0.14	0.786
Capital invested - Wind - Constrained (billion $2018)	0	0.184	3.52	1.13	0.606	0.256	0.389

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	20.8
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	30
Solar - Base land use assumptions (GWh)	0	0	0	2,117	136	6,263	14,020
Solar - Constrained land use assumptions (GWh)	0	0	0	0	848	4,547	14,092
Wind - Base land use assumptions (GWh)	912	572	4,794	771	1,244	261	1,549
Wind - Constrained land use assumptions (GWh)	912	572	5,502	1,726	1,241	439	737

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	69.3
Conversion capital investment - Cumulative 5-yr (million $2018)	0	0	0	0	0	0	1,591
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	1
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	2
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	1
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	1
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	1

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)	0	0	0	0	0	0	1.88
Annual - BECCS (MMT)	0	0	0	0	0	0	1.88
Annual - Cement and lime (MMT)	0	0	0	0	0	0	0
Annual - NGCC (MMT)	0	0	0	0	0	0	0
Cumulative - All (MMT)	0	0	0	0	0	0	1.88
Cumulative - BECCS (MMT)	0	0	0	0	0	0	1.88
Cumulative - Cement and lime (MMT)	0	0	0	0	0	0	0
Cumulative - NGCC (MMT)	0	0	0	0	0	0	0

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)	0	0	55.8	55.8	55.8	55.8	236
Cumulative investment - All (million $2018)	0	0	101	101	101	101	223
Cumulative investment - Spur (million $2018)	0	0	0	0	0	0	122
Cumulative investment - Trunk (million $2018)	0	0	101	101	101	101	101
Spur (km)	0	0	0	0	0	0	180
Trunk (km)	0	0	55.8	55.8	55.8	55.8	55.8

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

Item	2020	2025	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)	0	0	0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)	0	0	-68.9
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)	0	0	-2.36
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)	0	0	-71.3
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)	0	0	0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)	0	0	-36.3
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)	0	0	-1.18
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)	0	0	-37.5
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)	0	0	0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)	0	0	39.5
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)	0	0	4.28
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)	0	0	43.7
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)	0	0	0

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

Item	2020	2025	2050
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)	0	0	20.8
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)	0	0	2.14
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)	0	0	22.9

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

Item	2020	2025	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)	0	0	34.7
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)	0	0	6,916
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)	0	0	471
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)	0	0	3,082
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)	0	0	15
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)	0	0	2,147
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)	0	0	89.2
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)	0	0	0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)	0	0	211
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)	0	0	866
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)	0	0	17.4
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)	0	0	2,342
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)	0	0	78.4
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)	0	0	1,184
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)	0	0	7.66
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)	0	0	716
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)	0	0	31.2
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)	0	0	0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)	0	0	16
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)	0	0	292
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)	0	0	26
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)	0	0	4,629
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)	0	0	274
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)	0	0	2,133
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)	0	0	11.2
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)	0	0	1,431

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

Item	2020	2025	2050
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)	0	0	60.2
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)	0	0	0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)	0	0	114
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)	0	0	579
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)	0	0	5.68
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)	0	0	63.7
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)	0	0	1,572
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)	0	0	5.54
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)	0	0	0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)	0	0	8.48
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)	0	0	0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)	0	0	6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)	0	0	287
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)	0	0	1,948
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)	0	0	2.84
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)	0	0	59.8
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)	0	0	602
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)	0	0	2.77
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)	0	0	0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)	0	0	4.46
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)	0	0	0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)	0	0	1.04
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)	0	0	174
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)	0	0	847
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	0	0	4.26
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)	0	0	61.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)	0	0	1,087
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)	0	0	4.17
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)	0	0	0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)	0	0	6.47

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

Item	2020	2025	2050
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)	0	0	0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)	0	0	7.52
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)	0	0	350
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)	0	0	1,521

Table 14: *E+ scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)	0	128	0.149	0.149	0.142	0.085	0.004
Monetary damages from air pollution - Natural Gas (million 2019$)	0	44.4	25.7	17.7	16.4	10.4	4.62
Monetary damages from air pollution - Transportation (million 2019$)	0	237	222	169	97.6	43.6	15.8
Premature deaths from air pollution - Coal (deaths)	0	14.4	0.017	0.017	0.016	0.01	0
Premature deaths from air pollution - Natural Gas (deaths)	0	5.02	2.9	2	1.85	1.17	0.522
Premature deaths from air pollution - Transportation (deaths)	0	26.6	25	19	11	4.91	1.78

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)	74.8	86.2	175	66.9	51.9	38.1	124
By economic sector - Construction (jobs)	1,630	1,488	1,683	2,535	1,965	4,286	13,179
By economic sector - Manufacturing (jobs)	793	1,078	1,750	1,648	1,759	2,522	4,943
By economic sector - Mining (jobs)	662	522	395	278	191	130	91.3
By economic sector - Other (jobs)	185	162	149	366	249	853	2,402
By economic sector - Pipeline (jobs)	86.1	86	89	63.9	51.5	40.1	56.1
By economic sector - Professional (jobs)	927	919	1,145	1,366	1,171	2,142	5,798
By economic sector - Trade (jobs)	729	657	694	884	727	1,437	3,883
By economic sector - Utilities (jobs)	1,537	1,539	1,872	2,225	2,143	3,361	12,884
By education level - All sectors - Associates degree or some college (jobs)	1,989	1,970	2,424	2,957	2,613	4,758	14,138
By education level - All sectors - Bachelors degree (jobs)	1,467	1,447	1,718	1,955	1,741	2,933	8,251
By education level - All sectors - Doctoral degree (jobs)	54	52.5	61.2	71	61	105	277
By education level - All sectors - High school diploma or less (jobs)	2,754	2,716	3,333	3,970	3,468	6,291	18,638
By education level - All sectors - Masters or professional degree (jobs)	359	352	417	479	424	722	2,058
By resource sector - Biomass (jobs)	310	370	483	191	156	139	529
By resource sector - CO2 (jobs)	0	0	101	0	0	0	196
By resource sector - Coal (jobs)	208	62.1	0	0	0	0	0
By resource sector - Grid (jobs)	1,581	1,673	2,307	3,181	2,966	5,971	26,704
By resource sector - Natural Gas (jobs)	526	517	450	385	438	335	68.9
By resource sector - Nuclear (jobs)	637	627	617	607	598	347	0
By resource sector - Oil (jobs)	1,624	1,464	1,230	963	743	581	463
By resource sector - Solar (jobs)	1,564	1,509	1,264	2,337	1,631	5,749	12,794
By resource sector - Wind (jobs)	174	316	1,501	1,769	1,777	1,688	2,606
Median wages - Annual - All ($2019 per job)	62,095	62,869	63,270	63,634	64,894	64,606	66,185
On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs)	1,050	1,033	1,258	1,530	1,345	2,436	7,281
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)	431	414	491	626	537	1,007	3,112
On-Site or In-Plant Training - Total jobs - None (jobs)	1,089	1,077	1,312	1,548	1,361	2,418	6,895

Table 15: *E+ scenario - IMPACTS - Jobs (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)	51.2	50.9	63.3	79.1	69.7	129	399
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)	4,003	3,963	4,828	5,650	4,996	8,819	25,673
On-the-Job Training - All sectors - 1 to 4 years (jobs)	1,346	1,323	1,612	1,969	1,731	3,137	9,400
On-the-Job Training - All sectors - 4 to 10 years (jobs)	413	395	471	613	523	1,002	3,132
On-the-Job Training - All sectors - None (jobs)	380	370	436	521	452	811	2,298
On-the-Job Training - All sectors - Over 10 years (jobs)	64.4	64.2	78.5	94.2	82.7	147	397
On-the-Job Training - All sectors - Up to 1 year (jobs)	4,421	4,385	5,355	6,236	5,519	9,713	28,133
Related work experience - All sectors - 1 to 4 years (jobs)	2,411	2,374	2,872	3,389	2,988	5,293	15,519
Related work experience - All sectors - 4 to 10 years (jobs)	1,538	1,516	1,836	2,190	1,934	3,426	10,052
Related work experience - All sectors - None (jobs)	938	926	1,129	1,350	1,185	2,147	6,390
Related work experience - All sectors - Over 10 years (jobs)	413	412	504	589	528	910	2,617
Related work experience - All sectors - Up to 1 year (jobs)	1,324	1,309	1,611	1,915	1,672	3,033	8,782
Wage income - All (million $2019)	411	411	503	600	539	957	2,870

Table 16: *E+ scenario - IMPACTS - Fossil fuel industries*

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)	38.1	38.6	32.6	26.1	19.7	12.4	8.58
Natural gas consumption - Cumulative (tcf)	0	0	0	0	0	0	787
Natural gas production - Annual (tcf)	0	0	0	0	0	0	0
Oil consumption - Annual (million bbls)	33.3	32.9	30.2	25.6	21.2	17.8	15.1
Oil consumption - Cumulative (million bbls)	0	0	0	0	0	0	783
Oil production - Annual (million bbls)	0	0	0	0	0	0	0

Table 17: *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	1.15	1.3	0	0	0	0
Sales of cooking units - Electric Resistance (%)	55.4	56.6	60.7	71.4	86.4	95.6	98.8
Sales of cooking units - Gas (%)	44.6	43.4	39.3	28.6	13.6	4.4	1.18
Sales of space heating units - Electric Heat Pump (%)	4.02	3.88	8.07	20.5	41.9	60	68.2
Sales of space heating units - Electric Resistance (%)	2.1	2.38	2.37	2.3	1.88	1.38	1.1
Sales of space heating units - Fossil (%)	75.2	83.5	79.6	68.2	49.4	34.5	28.2
Sales of space heating units - Gas (%)	18.7	10.2	9.97	9.04	6.81	4.15	2.55
Sales of water heating units - Electric Heat Pump (%)	0	0.469	1.77	5.89	14.5	24.1	29.3
Sales of water heating units - Electric Resistance (%)	25.3	39.9	40.7	43.4	48.7	54	56.8
Sales of water heating units - Gas Furnace (%)	51.5	43.9	42.9	39.1	29.7	17.8	10.8
Sales of water heating units - Other (%)	23.2	15.7	14.7	11.6	7.09	4.11	3.08

Table 18: *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	41.9	87.7	296	932	1,358
Public EV charging plugs - DC Fast (1000 units)	0.06	0	0.165	0	0.854	0	2.38
Public EV charging plugs - L2 (1000 units)	0.188	0	3.97	0	20.5	0	57.2
Vehicle sales - Heavy-duty - diesel (%)	97.4	96	91.3	79.8	58.2	32.1	13.7

Table 18: *E- scenario - PILLAR 1: Efficiency/Electrification - Transportation (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
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 (%)	1.57	1.98	2.06	1.64	1.05	0.538	0.23
Vehicle sales - Light-duty - EV (%)	1.88	4.67	11.8	25.8	48.3	72	87.6
Vehicle sales - Light-duty - gasoline (%)	91.8	87.5	79.6	66.7	46.3	24.9	11
Vehicle sales - Light-duty - hybrid (%)	4.57	5.38	6.04	5.5	4.12	2.44	1.18
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.38	0.326	0.249	0.177	0.098	0.046
Vehicle sales - Light-duty - other (%)	0.103	0.106	0.097	0.084	0.061	0.033	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 19: *E- scenario - PILLAR 1: Efficiency/Electrification - Overview*

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	39.2	36.9	35.8	34.9	33.7	32.5	31.4
Final energy use - Industry (PJ)	21.1	20.7	20.4	20.3	20.3	20.2	20
Final energy use - Residential (PJ)	67.8	61.6	57.1	53.2	48.5	43.3	38.2
Final energy use - Transportation (PJ)	93.7	87.4	79.2	72.1	66.4	59.8	52

Table 20: *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	2,680	2,929	0	0	0	0
Sales of cooking units - Electric Resistance (%)	36.9	40.7	44.7	56.5	72.7	82.9	86.4
Sales of cooking units - Gas (%)	63.1	59.3	55.3	43.5	27.3	17.1	13.6
Sales of space heating units - Electric Heat Pump (%)	3.23	7.44	10.2	18.5	35	52.2	61.5
Sales of space heating units - Electric Resistance (%)	1.65	2.12	3.22	6.62	12.2	16.4	17.9
Sales of space heating units - Fossil (%)	57.4	37.1	35.2	28.1	17	9.78	7.36
Sales of space heating units - Gas Furnace (%)	37.7	53.3	51.4	46.8	35.8	21.6	13.2
Sales of water heating units - Electric Heat Pump (%)	2.6	2.83	4	7.92	17.2	28.8	35.5
Sales of water heating units - Electric Resistance (%)	12.8	11.7	12.6	16.6	25.4	36.2	42.6
Sales of water heating units - Gas Furnace (%)	77.2	80.9	79.2	71.8	54.5	32.8	19.8
Sales of water heating units - Other (%)	7.43	4.56	4.2	3.64	2.86	2.25	2.09

Table 21: *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)	0	0.401	0.397	0.601	0.621	0.904	0.955

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

Item	2020	2025	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)	0	0	0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)	0	0	-68.9
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)	0	0	-2.36
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)	0	0	-71.3

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

Item	2020	2025	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)	0	0	0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)	0	0	-36.3
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)	0	0	-1.18
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)	0	0	-37.5
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)	0	0	0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)	0	0	39.5
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)	0	0	4.28
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)	0	0	43.7
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)	0	0	0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)	0	0	20.8
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)	0	0	2.14
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)	0	0	22.9

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

Item	2020	2025	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)	0	0	34.7
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)	0	0	6,916
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)	0	0	471
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)	0	0	3,082
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)	0	0	15
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)	0	0	2,147
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)	0	0	89.2
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)	0	0	0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)	0	0	211
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)	0	0	866
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)	0	0	17.4
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)	0	0	2,342
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)	0	0	78.4
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)	0	0	1,184
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)	0	0	7.66

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

Item	2020	2025	2050
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)	0	0	716
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)	0	0	31.2
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)	0	0	0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)	0	0	16
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)	0	0	292
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)	0	0	26
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)	0	0	4,629
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)	0	0	274
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)	0	0	2,133
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)	0	0	11.2
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)	0	0	1,431
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)	0	0	60.2
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)	0	0	0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)	0	0	114
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)	0	0	579
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)	0	0	5.68
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)	0	0	63.7
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)	0	0	1,572
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)	0	0	5.54
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)	0	0	0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)	0	0	8.48
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)	0	0	0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)	0	0	6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)	0	0	287
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)	0	0	1,948
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)	0	0	2.84
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)	0	0	59.8
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)	0	0	602
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)	0	0	2.77
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)	0	0	0

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

Item	2020	2025	2050
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)	0	0	4.46
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)	0	0	0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)	0	0	1.04
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)	0	0	174
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)	0	0	847
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	0	0	4.26
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)	0	0	61.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)	0	0	1,087
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)	0	0	4.17
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)	0	0	0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)	0	0	6.47
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)	0	0	0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)	0	0	7.52
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)	0	0	350
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)	0	0	1,521

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)	0	128	0.149	0.149	0.142	0.085	0.004
Monetary damages from air pollution - Natural Gas (million 2019$)	0	43.4	20.8	8.36	3.56	1.1	1.21
Monetary damages from air pollution - Transportation (million 2019$)	0	241	245	239	215	171	117
Premature deaths from air pollution - Coal (deaths)	0	14.4	0.017	0.017	0.016	0.01	0
Premature deaths from air pollution - Natural Gas (deaths)	0	4.9	2.35	0.944	0.403	0.124	0.137
Premature deaths from air pollution - Transportation (deaths)	0	27.1	27.5	26.8	24.1	19.2	13.2

Table 25: *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	1.15	1.23	0	0	0	0
Sales of cooking units - Electric Resistance (%)	55.6	65	94	99.7	100	100	100
Sales of cooking units - Gas (%)	44.4	35	5.98	0.301	0	0	0
Sales of space heating units - Electric Heat Pump (%)	4.02	11.4	55.4	81.6	85.2	85.5	85.5
Sales of space heating units - Electric Resistance (%)	2.1	2.36	1.9	0.854	0.641	0.637	0.692
Sales of space heating units - Fossil (%)	75.2	76.2	35.5	16.4	14	13.8	13.7
Sales of space heating units - Gas (%)	18.7	10	7.16	1.21	0.152	0.086	0.084
Sales of water heating units - Electric Heat Pump (%)	0	1.91	15.5	34.6	37.8	38	38.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Electric Resistance (%)	25.3	41.2	50.4	60.2	61.8	61.9	61.8
Sales of water heating units - Gas Furnace (%)	51.5	43.4	31.5	5.04	0.297	0	0
Sales of water heating units - Other (%)	23.2	13.5	2.63	0.195	0.089	0.089	0.089

Table 26: *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	258	662	1,071	1,624	1,766	1,685
Public EV charging plugs - DC Fast (1000 units)	0.06	0	0.528	0	2.3	0	3.72
Public EV charging plugs - L2 (1000 units)	0.188	0	12.7	0	55.3	0	89.3
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 (%)	1.55	1.82	1.26	0.403	0.075	0.013	0
Vehicle sales - Light-duty - EV (%)	3.9	15.1	46.4	81.8	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.9	78.1	48.9	16.5	3.29	0.59	0
Vehicle sales - Light-duty - hybrid (%)	4.41	4.53	3.21	1.19	0.29	0.063	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.34	0.203	0.063	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.102	0.098	0.064	0.022	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 27: *E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Overview*

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	39.2	36.8	35.1	32.8	30.3	28.7	27.8
Final energy use - Industry (PJ)	21.1	20.7	20.2	19.9	19.6	19.6	19.5
Final energy use - Residential (PJ)	67.8	61.4	54.8	46.6	38.7	33	29.6
Final energy use - Transportation (PJ)	93.6	86.6	75.2	60.9	47.9	39.6	35.8

Table 28: *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	2,680	2,926	0	0	0	0
Sales of cooking units - Electric Resistance (%)	36.9	49.9	81.2	87.4	87.7	87.7	87.7
Sales of cooking units - Gas (%)	63.1	50.1	18.8	12.6	12.3	12.3	12.3
Sales of space heating units - Electric Heat Pump (%)	3.23	11	39.6	72.4	77.7	77.9	78
Sales of space heating units - Electric Resistance (%)	1.65	4.4	16.6	21.3	22	22.1	22
Sales of space heating units - Fossil (%)	57.4	32	6.13	0.259	0	0	0
Sales of space heating units - Gas Furnace (%)	37.7	52.7	37.7	6.03	0.358	0	0
Sales of water heating units - Electric Heat Pump (%)	2.6	3.52	16	41.1	45.6	45.9	45.9
Sales of water heating units - Electric Resistance (%)	12.8	12.4	24	48	52.3	52.5	52.5
Sales of water heating units - Gas Furnace (%)	77.2	79.9	58.1	9.27	0.548	0	0
Sales of water heating units - Other (%)	7.43	4.15	1.94	1.59	1.57	1.57	1.59

Table 29: *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)	0	0.537	0.548	1.07	1.14	1.01	1.05

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Base (billion $2018)	0	0	0.863	2.4	0	5.76	4.95
Capital invested - Wind - Base (billion $2018)	0	0.375	2.99	0.454	0.711	0.14	0.856

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	0	0	1,284	3,896	0	10,270	9,255
Solar - Constrained land use assumptions (GWh)	0	0	0	1,738	727	14,441	13,239
Wind - Base land use assumptions (GWh)	912	572	4,794	771	1,244	261	1,683
Wind - Constrained land use assumptions (GWh)	912	572	5,502	1,726	1,241	439	1,045

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

Item	2020	2025	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)	0	0	0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)	0	0	-68.9
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)	0	0	-2.36
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)	0	0	-71.3
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)	0	0	0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)	0	0	-36.3
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)	0	0	-1.18
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)	0	0	-37.5
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)	0	0	0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)	0	0	39.5
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)	0	0	4.28
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)	0	0	43.7
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)	0	0	0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)	0	0	20.8
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)	0	0	2.14
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)	0	0	22.9

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

Item	2020	2025	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)	0	0	34.7
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)	0	0	6,916
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)	0	0	471
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)	0	0	3,082
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)	0	0	15
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)	0	0	2,147
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)	0	0	89.2
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)	0	0	0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)	0	0	211
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)	0	0	866
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)	0	0	17.4
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)	0	0	2,342
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)	0	0	78.4
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)	0	0	1,184
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)	0	0	7.66
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)	0	0	716
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)	0	0	31.2
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)	0	0	0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)	0	0	16
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)	0	0	292
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)	0	0	26
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)	0	0	4,629
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)	0	0	274
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)	0	0	2,133
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)	0	0	11.2
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)	0	0	1,431
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)	0	0	60.2
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)	0	0	0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)	0	0	114
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)	0	0	579
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)	0	0	5.68

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

Item	2020	2025	2050
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)	0	0	63.7
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)	0	0	1,572
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)	0	0	5.54
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)	0	0	0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)	0	0	8.48
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)	0	0	0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)	0	0	6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)	0	0	287
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)	0	0	1,948
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)	0	0	2.84
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)	0	0	59.8
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)	0	0	602
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)	0	0	2.77
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)	0	0	0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)	0	0	4.46
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)	0	0	0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)	0	0	1.04
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)	0	0	174
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)	0	0	847
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	0	0	4.26
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)	0	0	61.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)	0	0	1,087
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)	0	0	4.17
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)	0	0	0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)	0	0	6.47
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)	0	0	0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)	0	0	7.52
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)	0	0	350
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)	0	0	1,521

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)	0	128	0.149	0.149	0.142	0.085	0.004
Monetary damages from air pollution - Natural Gas (million 2019$)	0	41.3	22.9	12.9	10.4	3.69	1.27
Monetary damages from air pollution - Transportation (million 2019$)	0	237	222	169	97.6	43.6	15.8
Premature deaths from air pollution - Coal (deaths)	0	14.4	0.017	0.017	0.016	0.01	0
Premature deaths from air pollution - Natural Gas (deaths)	0	4.67	2.59	1.46	1.17	0.417	0.144
Premature deaths from air pollution - Transportation (deaths)	0	26.6	25	19	11	4.91	1.78

Table 35: *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	1.15	1.23	0	0	0	0
Sales of cooking units - Electric Resistance (%)	55.6	65	94	99.7	100	100	100
Sales of cooking units - Gas (%)	44.4	35	5.98	0.301	0	0	0
Sales of space heating units - Electric Heat Pump (%)	4.02	11.4	55.4	81.6	85.2	85.5	85.5
Sales of space heating units - Electric Resistance (%)	2.1	2.36	1.9	0.854	0.641	0.637	0.692
Sales of space heating units - Fossil (%)	75.2	76.2	35.5	16.4	14	13.8	13.7
Sales of space heating units - Gas (%)	18.7	10	7.16	1.21	0.152	0.086	0.084
Sales of water heating units - Electric Heat Pump (%)	0	1.91	15.5	34.6	37.8	38	38.1
Sales of water heating units - Electric Resistance (%)	25.3	41.2	50.4	60.2	61.8	61.9	61.8
Sales of water heating units - Gas Furnace (%)	51.5	43.4	31.5	5.04	0.297	0	0
Sales of water heating units - Other (%)	23.2	13.5	2.63	0.195	0.089	0.089	0.089

Table 36: *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	258	662	1,071	1,624	1,766	1,685
Public EV charging plugs - DC Fast (1000 units)	0.06	0	0.528	0	2.3	0	3.72
Public EV charging plugs - L2 (1000 units)	0.188	0	12.7	0	55.3	0	89.3
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 (%)	1.55	1.82	1.26	0.403	0.075	0.013	0
Vehicle sales - Light-duty - EV (%)	3.9	15.1	46.4	81.8	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.9	78.1	48.9	16.5	3.29	0.59	0
Vehicle sales - Light-duty - hybrid (%)	4.41	4.53	3.21	1.19	0.29	0.063	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.34	0.203	0.063	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.102	0.098	0.064	0.022	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 37: *E+RE- scenario - PILLAR 1: Efficiency/Electrification - Overview*

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	39.2	36.8	35.1	32.8	30.3	28.7	27.8
Final energy use - Industry (PJ)	21.1	20.7	20.2	19.9	19.6	19.6	19.5
Final energy use - Residential (PJ)	67.8	61.4	54.8	46.6	38.7	33	29.6
Final energy use - Transportation (PJ)	93.6	86.6	75.2	60.9	47.9	39.6	35.8

Table 38: *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	2,680	2,926	0	0	0	0
Sales of cooking units - Electric Resistance (%)	36.9	49.9	81.2	87.4	87.7	87.7	87.7
Sales of cooking units - Gas (%)	63.1	50.1	18.8	12.6	12.3	12.3	12.3
Sales of space heating units - Electric Heat Pump (%)	3.23	11	39.6	72.4	77.7	77.9	78
Sales of space heating units - Electric Resistance (%)	1.65	4.4	16.6	21.3	22	22.1	22
Sales of space heating units - Fossil (%)	57.4	32	6.13	0.259	0	0	0
Sales of space heating units - Gas Furnace (%)	37.7	52.7	37.7	6.03	0.358	0	0
Sales of water heating units - Electric Heat Pump (%)	2.6	3.52	16	41.1	45.6	45.9	45.9
Sales of water heating units - Electric Resistance (%)	12.8	12.4	24	48	52.3	52.5	52.5
Sales of water heating units - Gas Furnace (%)	77.2	79.9	58.1	9.27	0.548	0	0
Sales of water heating units - Other (%)	7.43	4.15	1.94	1.59	1.57	1.57	1.59

Table 39: *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)	0	0.537	0.548	1.07	1.14	1.01	1.05

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Base (billion $2018)	0	0	0	0.424	0	0	0.436
Capital invested - Solar PV - Constrained (billion $2018)	0	0	0.104	0	0.589	0	0
Capital invested - Wind - Base (billion $2018)	0	0.282	1.51	0	0	0.47	0.738
Capital invested - Wind - Constrained (billion $2018)	0	0.282	1.99	0	0	0.248	0.912

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	0	0	0	683	0	0	833
Solar - Constrained land use assumptions (GWh)	0	0	152	0	1,005	0	0
Wind - Base land use assumptions (GWh)	912	432	2,474	0	0	885	1,460
Wind - Constrained land use assumptions (GWh)	912	432	3,208	0	0	456	1,795

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

Item	2020	2025	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)	0	0	0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)	0	0	-68.9
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)	0	0	-2.36
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)	0	0	-71.3
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)	0	0	0

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

Item	2020	2025	2050
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)	0	0	-36.3
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)	0	0	-1.18
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)	0	0	-37.5
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)	0	0	0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)	0	0	39.5
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)	0	0	4.28
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)	0	0	43.7
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)	0	0	0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)	0	0	20.8
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)	0	0	2.14
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)	0	0	22.9

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

Item	2020	2025	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)	0	0	34.7
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)	0	0	6,916
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)	0	0	471
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)	0	0	3,082
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)	0	0	15
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)	0	0	2,147
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)	0	0	89.2
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)	0	0	0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)	0	0	211
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)	0	0	866
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)	0	0	17.4
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)	0	0	2,342
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)	0	0	78.4
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)	0	0	1,184
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)	0	0	7.66
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)	0	0	716

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

Item	2020	2025	2050
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)	0	0	31.2
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)	0	0	0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)	0	0	16
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)	0	0	292
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)	0	0	26
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)	0	0	4,629
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)	0	0	274
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)	0	0	2,133
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)	0	0	11.2
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)	0	0	1,431
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)	0	0	60.2
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)	0	0	0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)	0	0	114
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)	0	0	579
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)	0	0	5.68
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)	0	0	63.7
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)	0	0	1,572
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)	0	0	5.54
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)	0	0	0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)	0	0	8.48
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)	0	0	0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)	0	0	6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)	0	0	287
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)	0	0	1,948
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)	0	0	2.84
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)	0	0	59.8
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)	0	0	602
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)	0	0	2.77
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)	0	0	0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)	0	0	4.46

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

Item	2020	2025	2050
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)	0	0	0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)	0	0	1.04
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)	0	0	174
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)	0	0	847
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	0	0	4.26
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)	0	0	61.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)	0	0	1,087
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)	0	0	4.17
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)	0	0	0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)	0	0	6.47
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)	0	0	0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)	0	0	7.52
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)	0	0	350
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)	0	0	1,521

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)	0	128	0.149	0.149	0.142	0.085	0.004
Monetary damages from air pollution - Natural Gas (million 2019$)	0	43.7	25.2	28	21.6	10.9	2.47
Monetary damages from air pollution - Transportation (million 2019$)	0	237	222	169	97.6	43.6	15.8
Premature deaths from air pollution - Coal (deaths)	0	14.4	0.017	0.017	0.016	0.01	0
Premature deaths from air pollution - Natural Gas (deaths)	0	4.94	2.85	3.16	2.44	1.23	0.279
Premature deaths from air pollution - Transportation (deaths)	0	26.6	25	19	11	4.91	1.78

Table 45: *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	1.15	1.3	0	0	0	0
Sales of cooking units - Electric Resistance (%)	55.4	56.6	60.7	71.4	86.4	95.6	98.8
Sales of cooking units - Gas (%)	44.6	43.4	39.3	28.6	13.6	4.4	1.18
Sales of space heating units - Electric Heat Pump (%)	4.02	3.88	8.07	20.5	41.9	60	68.2
Sales of space heating units - Electric Resistance (%)	2.1	2.38	2.37	2.3	1.88	1.38	1.1
Sales of space heating units - Fossil (%)	75.2	83.5	79.6	68.2	49.4	34.5	28.2
Sales of space heating units - Gas (%)	18.7	10.2	9.97	9.04	6.81	4.15	2.55
Sales of water heating units - Electric Heat Pump (%)	0	0.469	1.77	5.89	14.5	24.1	29.3
Sales of water heating units - Electric Resistance (%)	25.3	39.9	40.7	43.4	48.7	54	56.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	51.5	43.9	42.9	39.1	29.7	17.8	10.8
Sales of water heating units - Other (%)	23.2	15.7	14.7	11.6	7.09	4.11	3.08

Table 46: *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	41.9	87.7	296	932	1,358
Public EV charging plugs - DC Fast (1000 units)	0.06	0	0.165	0	0.854	0	2.38
Public EV charging plugs - L2 (1000 units)	0.188	0	3.97	0	20.5	0	57.2
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 (%)	1.57	1.98	2.06	1.64	1.05	0.538	0.23
Vehicle sales - Light-duty - EV (%)	1.88	4.67	11.8	25.8	48.3	72	87.6
Vehicle sales - Light-duty - gasoline (%)	91.8	87.5	79.6	66.7	46.3	24.9	11
Vehicle sales - Light-duty - hybrid (%)	4.57	5.38	6.04	5.5	4.12	2.44	1.18
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.38	0.326	0.249	0.177	0.098	0.046
Vehicle sales - Light-duty - other (%)	0.103	0.106	0.097	0.084	0.061	0.033	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 47: *E-B+ scenario - PILLAR 1: Efficiency/Electrification - Overview*

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	39.2	36.9	35.8	34.9	33.7	32.5	31.4
Final energy use - Industry (PJ)	21.1	20.7	20.4	20.3	20.3	20.2	20
Final energy use - Residential (PJ)	67.8	61.6	57.1	53.2	48.5	43.3	38.2
Final energy use - Transportation (PJ)	93.7	87.4	79.2	72.1	66.4	59.8	52

Table 48: *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	2,680	2,929	0	0	0	0
Sales of cooking units - Electric Resistance (%)	36.9	40.7	44.7	56.5	72.7	82.9	86.4
Sales of cooking units - Gas (%)	63.1	59.3	55.3	43.5	27.3	17.1	13.6
Sales of space heating units - Electric Heat Pump (%)	3.23	7.44	10.2	18.5	35	52.2	61.5
Sales of space heating units - Electric Resistance (%)	1.65	2.12	3.22	6.62	12.2	16.4	17.9
Sales of space heating units - Fossil (%)	57.4	37.1	35.2	28.1	17	9.78	7.36
Sales of space heating units - Gas Furnace (%)	37.7	53.3	51.4	46.8	35.8	21.6	13.2
Sales of water heating units - Electric Heat Pump (%)	2.6	2.83	4	7.92	17.2	28.8	35.5
Sales of water heating units - Electric Resistance (%)	12.8	11.7	12.6	16.6	25.4	36.2	42.6
Sales of water heating units - Gas Furnace (%)	77.2	80.9	79.2	71.8	54.5	32.8	19.8
Sales of water heating units - Other (%)	7.43	4.56	4.2	3.64	2.86	2.25	2.09

Table 49: *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)	0	0.401	0.397	0.601	0.621	0.904	0.955

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	264
Conversion capital investment - Cumulative 5-yr (million $2018)	0	0	0	0	0	0	3,152
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	2
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 53: *E-B+ scenario - PILLAR 4: CCUS - CO2 capture*

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)	0	0	0	0	0	0	4.05
Annual - BECCS (MMT)	0	0	0	0	0	0	4.05
Annual - Cement and lime (MMT)	0	0	0	0	0	0	0
Annual - NGCC (MMT)	0	0	0	0	0	0	0
Cumulative - All (MMT)	0	0	0	0	0	0	4.05
Cumulative - BECCS (MMT)	0	0	0	0	0	0	4.05
Cumulative - Cement and lime (MMT)	0	0	0	0	0	0	0
Cumulative - NGCC (MMT)	0	0	0	0	0	0	0

Table 54: *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	0
Injection wells (wells)	0	0	0	0	0	0	0
Resource characterization, appraisal, permitting costs (million $2020)	0	0	0	0	0	0	0
Wells and facilities construction costs (million $2020)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)	0	0	55.8	55.8	55.8	55.8	236
Cumulative investment - All (million $2018)	0	0	101	101	101	101	252
Cumulative investment - Spur (million $2018)	0	0	0	0	0	0	151
Cumulative investment - Trunk (million $2018)	0	0	101	101	101	101	101
Spur (km)	0	0	0	0	0	0	180
Trunk (km)	0	0	55.8	55.8	55.8	55.8	55.8

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

Item	2020	2025	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)	0	0	0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)	0	0	-68.9
Carbon sink potential - Aggressive deployment - Cropland to woody energy crops (1000 tCO2e/y)	0	0	0
Carbon sink potential - Aggressive deployment - Pasture to energy crops (1000 tCO2e/y)	0	0	0
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)	0	0	-2.36
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)	0	0	-71.3
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)	0	0	0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)	0	0	-36.3
Carbon sink potential - Moderate deployment - Cropland to woody energy crops (1000 tCO2e/y)	0	0	0
Carbon sink potential - Moderate deployment - Pasture to energy crops (1000 tCO2e/y)	0	0	0
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)	0	0	-1.18
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)	0	0	-37.5
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)	0	0	0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)	0	0	97.4
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)	0	0	0
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)	0	0	0.272
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)	0	0	4.28
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)	0	0	102
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)	0	0	0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)	0	0	20.8
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)	0	0	0
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)	0	0	0.272
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)	0	0	2.14
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)	0	0	23.2

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

Item	2020	2025	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)	0	0	34.7
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)	0	0	6,916
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)	0	0	471
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)	0	0	3,082
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)	0	0	15
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)	0	0	2,147
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)	0	0	89.2
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)	0	0	0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)	0	0	211
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)	0	0	866
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)	0	0	17.4
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)	0	0	2,342
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)	0	0	78.4
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)	0	0	1,184
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)	0	0	7.66
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)	0	0	716
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)	0	0	31.2
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)	0	0	0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)	0	0	16
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)	0	0	292
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)	0	0	26
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)	0	0	4,629
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)	0	0	274
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)	0	0	2,133
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)	0	0	11.2
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)	0	0	1,431
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)	0	0	60.2
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)	0	0	0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)	0	0	114
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)	0	0	579
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)	0	0	5.68

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

Item	2020	2025	2050
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)	0	0	63.7
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)	0	0	1,572
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)	0	0	5.54
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)	0	0	0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)	0	0	8.48
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)	0	0	0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)	0	0	6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)	0	0	287
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)	0	0	1,948
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)	0	0	2.84
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)	0	0	59.8
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)	0	0	602
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)	0	0	2.77
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)	0	0	0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)	0	0	4.46
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)	0	0	0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)	0	0	1.04
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)	0	0	174
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)	0	0	847
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	0	0	4.26
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)	0	0	61.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)	0	0	1,087
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)	0	0	4.17
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)	0	0	0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)	0	0	6.47
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)	0	0	0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)	0	0	7.52
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)	0	0	350
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)	0	0	1,521

Table 58: *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	1.13	1.17	0	0	0	0
Sales of cooking units - Electric Resistance (%)	55	55	55	55	55	55	55
Sales of cooking units - Gas (%)	45	45	45	45	45	45	45
Sales of space heating units - Electric Heat Pump (%)	3.84	6.34	6.59	6.97	7.07	7.14	7.27
Sales of space heating units - Electric Resistance (%)	2.1	2.29	2.33	2.38	2.34	2.25	2.16
Sales of space heating units - Fossil (%)	75.3	74.5	50.1	33.3	32.3	32.1	32.2
Sales of space heating units - Gas (%)	18.7	16.9	40.9	57.3	58.3	58.5	58.4
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	25.3	39.6	39.4	39.4	39.3	39.3	39.2
Sales of water heating units - Gas Furnace (%)	51.5	44.3	44.5	44.5	44.6	44.7	44.8
Sales of water heating units - Other (%)	23.2	16.1	16.1	16	16	16	16

Table 59: *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 (%)	1.56	1.97	2.19	2.03	1.83	1.71	1.62
Vehicle sales - Light-duty - EV (%)	3.55	5.58	6.36	7.82	9.52	11	12.2
Vehicle sales - Light-duty - gasoline (%)	90.3	86.7	84.6	82.7	80.6	78.7	77.1
Vehicle sales - Light-duty - hybrid (%)	4.43	5.27	6.45	7.02	7.59	8.17	8.63
Vehicle sales - Light-duty - hydrogen FC (%)	0.111	0.377	0.346	0.307	0.305	0.305	0.316
Vehicle sales - Light-duty - other (%)	0.102	0.106	0.102	0.103	0.103	0.101	0.104
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 60: *REF scenario - PILLAR 1: Efficiency/Electrification - Overview*

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	39.2	37.6	37.4	36.9	36.4	36.8	38
Final energy use - Industry (PJ)	21.1	21.5	21.9	22.8	23.8	24.9	25.8
Final energy use - Residential (PJ)	67.8	61.9	58	55.1	52.9	51.1	49.7
Final energy use - Transportation (PJ)	93.6	87.4	79.7	74.8	74.3	76.1	78.5

Table 61: *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	2,647	2,721	0	0	0	0
Sales of cooking units - Electric Resistance (%)	36.9	39	38.6	38.5	38.3	38.5	38.4
Sales of cooking units - Gas (%)	63.1	61	61.4	61.5	61.7	61.5	61.6
Sales of space heating units - Electric Heat Pump (%)	3.23	13	41.2	64.3	67.9	68.2	68.3
Sales of space heating units - Electric Resistance (%)	1.65	2.61	7.4	19.7	29.9	31.7	31.7
Sales of space heating units - Fossil (%)	57.4	35.6	25	9.75	1.4	0.11	0
Sales of space heating units - Gas Furnace (%)	37.7	48.8	26.5	6.29	0.795	0.043	0
Sales of water heating units - Electric Heat Pump (%)	2.6	2.39	2.36	2.36	2.34	2.37	2.37

Table 61: *REF scenario - PILLAR 1: Efficiency/Electrification - Commercial (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Electric Resistance (%)	12.8	11.3	11	11.3	11.2	11.1	11.2
Sales of water heating units - Gas Furnace (%)	77.2	81.6	82.1	81.9	81.9	82.2	82.2
Sales of water heating units - Other (%)	7.43	4.63	4.47	4.42	4.51	4.27	4.25

Table 62: *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)	0	0.457	0.459	0.61	0.629	0.612	0.627

Table 63: *REF scenario - PILLAR 6: Land sinks - Forests*

Item	2020	2025	2030	2050
Business-as-usual carbon sink - Natural uptake (Mt CO2e/y)	1.14	0	-4.14	-3.7
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.584	0	-1.05	-1.09
Business-as-usual carbon sink - Total (Mt CO2e/y)	0.556	0	-5.19	-4.8
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)	0	0	0	34.7
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)	0	0	0	6,916
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)	0	0	0	471
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)	0	0	0	3,082
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)	0	0	0	15
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)	0	0	0	2,147
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)	0	0	0	89.2
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)	0	0	0	0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)	0	0	0	211
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)	0	0	0	866
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)	0	0	0	17.4
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)	0	0	0	2,342
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)	0	0	0	78.4
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)	0	0	0	1,184
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)	0	0	0	7.66
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)	0	0	0	716
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)	0	0	0	31.2
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)	0	0	0	0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)	0	0	0	16
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)	0	0	0	292
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)	0	0	0	26
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)	0	0	0	4,629

Table 63: *REF scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2050
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)	0	0	0	274
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)	0	0	0	2,133
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)	0	0	0	11.2
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)	0	0	0	1,431
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)	0	0	0	60.2
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)	0	0	0	0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)	0	0	0	114
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)	0	0	0	579
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)	0	0	0	5.68
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)	0	0	0	63.7
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)	0	0	0	1,572
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)	0	0	0	5.54
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)	0	0	0	0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)	0	0	0	8.48
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)	0	0	0	0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)	0	0	0	6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)	0	0	0	287
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)	0	0	0	1,948
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)	0	0	0	2.84
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)	0	0	0	59.8
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)	0	0	0	602
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)	0	0	0	2.77
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)	0	0	0	0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)	0	0	0	4.46
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)	0	0	0	0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)	0	0	0	1.04
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)	0	0	0	174
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)	0	0	0	847
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)	0	0	0	4.26
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)	0	0	0	61.8

Table 63: *REF scenario - PILLAR 6: Land sinks - Forests (continued)*

Item	2020	2025	2030	2050
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)	0	0	0	1,087
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)	0	0	0	4.17
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)	0	0	0	0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)	0	0	0	6.47
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)	0	0	0	0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)	0	0	0	7.52
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)	0	0	0	350
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)	0	0	0	1,521

Table 64: *REF scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)	0	423	289	272	266	262	225
Monetary damages from air pollution - Natural Gas (million 2019$)	0	32.9	27.5	35.4	37.3	36	34.2
Monetary damages from air pollution - Transportation (million 2019$)	0	241	248	254	260	267	274
Premature deaths from air pollution - Coal (deaths)	0	47.4	32.4	30.5	29.9	29.4	25.3
Premature deaths from air pollution - Natural Gas (deaths)	0	3.72	3.11	3.99	4.21	4.06	3.86
Premature deaths from air pollution - Transportation (deaths)	0	27.1	27.9	28.5	29.3	30	30.8