Net-Zero America - new hampshire state report

2021-03-05

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

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	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 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)		0.537	0.548	1.07	1.14	1.01	1.05

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 - 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 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	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 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
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed (cumulative) - Rooftop PV (MW)	169	294	345	403	470	544	627
Installed (cumulative) - Solar - Base land use assumptions (MW)	0	0	0	1,191	1,268	4,823	12,874
Installed (cumulative) - Wind - Base land use assumptions (MW)	214	356	1,604	1,807	2,141	2,211	2,623

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

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

Item	2020	2025	2030	2035	2040	2045	2050
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	1.88
Annual - BECCS (MMT)		0	0	0	0	0	1.88
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	0	0	1.88
Cumulative - BECCS (MMT)		0	0	0	0	0	1.88
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
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	55.8	55.8	55.8	55.8	236
Cumulative investment - All (million $2018)		0	101	101	101	101	223
Cumulative investment - Spur (million $2018)		0	0	0	0	0	122
Cumulative investment - Trunk (million $2018)		0	101	101	101	101	101
Spur (km)		0	0	0	0	0	180
Trunk (km)		0	55.8	55.8	55.8	55.8	55.8

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

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)							-34.7
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-6,916
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-471
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-3,082
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-15
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-2,147

Table 13: *E+ 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)							-89.2
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-211
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-866
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-17.4
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-2,342
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-78.4
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-1,184
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-7.66
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-716
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-31.2
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-16
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-292
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-26
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-4,629
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-2,133
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-11.2
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-1,431
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-60.2
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-114
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-579
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							5.68
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							63.7
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,572
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							5.54

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.52
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							350
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,521

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		38.6	32.6	26.1	19.7	12.4	8.58
Natural gas consumption - Cumulative (tcf)		0	0	0	0	0	787
Natural gas production - Annual (tcf)		0	0	0	0	0	0
Oil consumption - Annual (million bbls)		32.9	30.2	25.6	21.2	17.8	15.1
Oil consumption - Cumulative (million bbls)		0	0	0	0	0	783
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$)		128	0.148	0.148	0.141	0.084	0.004
Monetary damages from air pollution - Natural Gas (million 2019$)		44.4	25.7	17.7	16.4	10.4	4.62
Monetary damages from air pollution - Transportation (million 2019$)		237	222	169	97.6	43.6	15.8
Premature deaths from air pollution - Coal (deaths)		14.4	0.017	0.017	0.016	0.01	0
Premature deaths from air pollution - Natural Gas (deaths)		5.02	2.9	2	1.85	1.17	0.522
Premature deaths from air pollution - Transportation (deaths)		26.6	25	19	11	4.91	1.78

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		86.2	175	66.9	51.9	38.1	124
By economic sector - Construction (jobs)		1,488	1,683	2,535	1,965	4,286	13,179
By economic sector - Manufacturing (jobs)		1,078	1,750	1,648	1,759	2,522	4,943
By economic sector - Mining (jobs)		522	395	278	191	130	91.3
By economic sector - Other (jobs)		162	149	366	249	853	2,402
By economic sector - Pipeline (jobs)		86	89	63.9	51.5	40.1	56.1
By economic sector - Professional (jobs)		919	1,145	1,366	1,171	2,142	5,798
By economic sector - Trade (jobs)		657	694	884	727	1,437	3,883
By economic sector - Utilities (jobs)		1,539	1,872	2,225	2,143	3,361	12,884
By education level - All sectors - Associates degree or some college (jobs)		1,970	2,424	2,957	2,613	4,758	14,138
By education level - All sectors - Bachelors degree (jobs)		1,447	1,718	1,955	1,741	2,933	8,251
By education level - All sectors - Doctoral degree (jobs)		52.5	61.2	71	61	105	277
By education level - All sectors - High school diploma or less (jobs)		2,716	3,333	3,970	3,468	6,291	18,638

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

Item	2020	2025	2030	2035	2040	2045	2050
By education level - All sectors - Masters or professional degree (jobs)		352	417	479	424	722	2,058
By resource sector - Biomass (jobs)		370	483	191	156	139	529
By resource sector - CO2 (jobs)		0	101	0	0	0	196
By resource sector - Coal (jobs)		62.1	0	0	0	0	0
By resource sector - Grid (jobs)		1,673	2,307	3,181	2,966	5,971	26,704
By resource sector - Natural Gas (jobs)		517	450	385	438	335	68.9
By resource sector - Nuclear (jobs)		627	617	607	598	347	0
By resource sector - Oil (jobs)		1,464	1,230	963	743	581	463
By resource sector - Solar (jobs)		1,509	1,264	2,337	1,631	5,749	12,794
By resource sector - Wind (jobs)		316	1,501	1,769	1,777	1,688	2,606
Median wages - Annual - All ($2019 per job)		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)		1,033	1,258	1,530	1,345	2,436	7,281
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)		414	491	626	537	1,007	3,112
On-Site or In-Plant Training - Total jobs - None (jobs)		1,077	1,312	1,548	1,361	2,418	6,895
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)		50.9	63.3	79.1	69.7	129	399
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)		3,963	4,828	5,650	4,996	8,819	25,673
On-the-Job Training - All sectors - 1 to 4 years (jobs)		1,323	1,612	1,969	1,731	3,137	9,400
On-the-Job Training - All sectors - 4 to 10 years (jobs)		395	471	613	523	1,002	3,132
On-the-Job Training - All sectors - None (jobs)		370	436	521	452	811	2,298
On-the-Job Training - All sectors - Over 10 years (jobs)		64.2	78.5	94.2	82.7	147	397
On-the-Job Training - All sectors - Up to 1 year (jobs)		4,385	5,355	6,236	5,519	9,713	28,133
Related work experience - All sectors - 1 to 4 years (jobs)		2,374	2,872	3,389	2,988	5,293	15,519
Related work experience - All sectors - 4 to 10 years (jobs)		1,516	1,836	2,190	1,934	3,426	10,052
Related work experience - All sectors - None (jobs)		926	1,129	1,350	1,185	2,147	6,390
Related work experience - All sectors - Over 10 years (jobs)		412	504	589	528	910	2,617
Related work experience - All sectors - Up to 1 year (jobs)		1,309	1,611	1,915	1,672	3,033	8,782
Wage income - All (million $2019)		411	503	600	539	957	2,870

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	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

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

Item	2020	2025	2030	2035	2040	2045	2050
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 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)		0.401	0.397	0.601	0.621	0.904	0.955

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 - 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 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	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

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

Item	2020	2025	2030	2035	2040	2045	2050
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 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)							-68.9
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-2.36
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-71.3
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-36.3
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-1.18
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-37.5
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)							39.5
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							4.28
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							43.7
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)							20.8
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							2.14

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							22.9

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-114
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-579
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							5.68
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							63.7
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,572
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							5.54
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)							8.48
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							287
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,948
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							2.84
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							59.8
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							602
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							2.77
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)							4.46
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.04
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							174

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 - Total impacted (over 30 years) (1000 hectares)							847
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							4.26
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							61.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							1,087
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							4.17
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)							6.47
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.52
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							350
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,521

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		128	0.148	0.148	0.141	0.084	0.004
Monetary damages from air pollution - Natural Gas (million 2019$)		43.4	20.8	8.37	3.57	1.1	1.21
Monetary damages from air pollution - Transportation (million 2019$)		241	245	239	215	171	117
Premature deaths from air pollution - Coal (deaths)		14.4	0.017	0.017	0.016	0.01	0
Premature deaths from air pollution - Natural Gas (deaths)		4.9	2.35	0.944	0.403	0.124	0.137
Premature deaths from air pollution - Transportation (deaths)		27.1	27.5	26.8	24.1	19.2	13.2

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	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 25: *E+RE+ 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 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)		0.537	0.548	1.07	1.14	1.01	1.05

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 - 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 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	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

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

Item	2020	2025	2030	2035	2040	2045	2050
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 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
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed (cumulative) - Solar - Base land use assumptions (MW)	0	0	721	2,901	2,901	8,772	14,113
Installed (cumulative) - Wind - Base land use assumptions (MW)	214	356	1,604	1,807	2,141	2,211	2,660

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	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)							-68.9
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-2.36
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-71.3
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-36.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-1.18
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-37.5
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)							39.5
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							4.28
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							43.7
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)							20.8
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							2.14
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							22.9

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-7.66
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-716
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-31.2
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-16
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-292
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-26
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-4,629
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-2,133
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-11.2
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-1,431
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-60.2
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-114
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-579
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							5.68
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							63.7
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,572
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							5.54
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)							8.48
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							287
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,948

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 - Low - Accelerate regeneration (1000 hectares)							2.84
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							59.8
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							602
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							2.77
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)							4.46
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.04
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							174
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							847
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							4.26
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							61.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							1,087
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							4.17
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)							6.47
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.52
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							350
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							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$)		128	0.148	0.148	0.141	0.084	0.004

Table 34: *E+RE+ scenario - IMPACTS - Health (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Natural Gas (million 2019$)		41.4	22.9	12.9	10.4	3.69	1.27
Monetary damages from air pollution - Transportation (million 2019$)		237	222	169	97.6	43.6	15.8
Premature deaths from air pollution - Coal (deaths)		14.4	0.017	0.017	0.016	0.01	0
Premature deaths from air pollution - Natural Gas (deaths)		4.67	2.59	1.46	1.17	0.417	0.144
Premature deaths from air pollution - Transportation (deaths)		26.6	25	19	11	4.91	1.78

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	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 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)		0.537	0.548	1.07	1.14	1.01	1.05

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 - 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

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

Item	2020	2025	2030	2035	2040	2045	2050
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 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	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 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	0.424	0	0	0.436
Capital invested - Solar PV - Constrained (billion $2018)		0	0.104	0	0.589	0	0
Capital invested - Wind - Base (billion $2018)		0.282	1.51	0	0	0.47	0.738
Capital invested - Wind - Constrained (billion $2018)		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	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)							-68.9
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-2.36
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-71.3
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-36.3
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-1.18
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-37.5
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)							39.5
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							4.28
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							43.7
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)							20.8
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							2.14
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							22.9

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)							-34.7
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-6,916
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-471
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-3,082
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-15
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-2,147

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-89.2
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-211
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-866
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-17.4
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-2,342
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-78.4
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-1,184
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-7.66
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-716
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-31.2
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-16
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-292
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-26
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-4,629
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-2,133
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-11.2
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-1,431
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-60.2
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-114
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-579
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							5.68
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							63.7
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,572
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							5.54

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							8.48
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							287
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,948
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							2.84
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							59.8
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							602
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							2.77
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)							4.46
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.04
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							174
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							847
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							4.26
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							61.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							1,087
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							4.17
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)							6.47

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.52
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							350
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							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$)		128	0.148	0.148	0.141	0.084	0.004
Monetary damages from air pollution - Natural Gas (million 2019$)		43.7	25.2	28	21.7	10.9	2.47
Monetary damages from air pollution - Transportation (million 2019$)		237	222	169	97.6	43.6	15.8
Premature deaths from air pollution - Coal (deaths)		14.4	0.017	0.017	0.016	0.01	0
Premature deaths from air pollution - Natural Gas (deaths)		4.94	2.85	3.16	2.44	1.23	0.279
Premature deaths from air pollution - Transportation (deaths)		26.6	25	19	11	4.91	1.78

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	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 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)		0.401	0.397	0.601	0.621	0.904	0.955

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

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

Item	2020	2025	2030	2035	2040	2045	2050
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 - 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 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	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 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	4.05
Annual - BECCS (MMT)		0	0	0	0	0	4.05
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	0	0	4.05
Cumulative - BECCS (MMT)		0	0	0	0	0	4.05
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
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	55.8	55.8	55.8	55.8	236
Cumulative investment - All (million $2018)		0	101	101	101	101	252
Cumulative investment - Spur (million $2018)		0	0	0	0	0	151
Cumulative investment - Trunk (million $2018)		0	101	101	101	101	101
Spur (km)		0	0	0	0	0	180
Trunk (km)		0	55.8	55.8	55.8	55.8	55.8

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							20.8
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							0.272
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							2.14
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							23.2

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-26
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-4,629
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-2,133
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-11.2
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-1,431
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-60.2
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-114
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-579
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							5.68
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							63.7
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,572
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							5.54
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)							8.48
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							287
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,948
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							2.84
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							59.8
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							602
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							2.77

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							4.46
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.04
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							174
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							847
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							4.26
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							61.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							1,087
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							4.17
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)							6.47
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.52
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							350
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,521

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		128	0.148	0.148	0.141	0.084	0.004
Monetary damages from air pollution - Natural Gas (million 2019$)		43.5	19.6	9.81	7.62	4.64	1.74
Monetary damages from air pollution - Transportation (million 2019$)		241	245	239	215	171	117
Premature deaths from air pollution - Coal (deaths)		14.4	0.017	0.017	0.016	0.01	0
Premature deaths from air pollution - Natural Gas (deaths)		4.92	2.22	1.11	0.86	0.523	0.197
Premature deaths from air pollution - Transportation (deaths)		27.1	27.5	26.8	24.1	19.2	13.2

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	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
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 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)		0.457	0.459	0.61	0.629	0.612	0.627

Table 61: *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 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	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 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 (%)	1.56	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 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)							-34.7
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-6,916
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-471
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-3,082
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-15
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-2,147
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-89.2
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-211
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-866
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-17.4
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-2,342
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-78.4
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-1,184
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-7.66
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-716
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-31.2
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-16
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-292
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-26
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-4,629
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-274
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-2,133
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-11.2
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-1,431
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-60.2
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-114
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-579
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							5.68
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							63.7
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,572
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							5.54
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)							8.48
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							287
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,948
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							2.84
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							59.8
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							602

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							2.77
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)							4.46
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.04
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							174
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							847
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							4.26
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							61.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							1,087
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							4.17
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)							6.47
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.52
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							350
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,521

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)	1.14		-4.14				-3.7
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.584		-1.05				-1.09
Business-as-usual carbon sink - Total (Mt CO2e/y)	0.556		-5.19				-4.8

Table 66: *REF scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		420	287	270	265	260	224
Monetary damages from air pollution - Natural Gas (million 2019$)		32.9	27.6	35.4	37.3	36	34.2
Monetary damages from air pollution - Transportation (million 2019$)		241	248	254	260	267	274
Premature deaths from air pollution - Coal (deaths)		47.4	32.4	30.5	29.9	29.4	25.3
Premature deaths from air pollution - Natural Gas (deaths)		3.72	3.11	3.99	4.21	4.06	3.86
Premature deaths from air pollution - Transportation (deaths)		27.1	27.9	28.5	29.3	30	30.8