Net-Zero America - connecticut state report

2021-03-15

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

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

Notes

- These data are all data from the study available at https://netzeroamerica.princeton.edu.
- The Net-Zero America study describes five pathways to reach net-zero emissions and one "no new policies" reference scenario. In this document, state-level results are grouped by scenario. For some scenarios, the study generated national, but not state-level results.
- Within results for a given scenario, data tables are organized into corresponding sections of the full net-zero study (e.g., Pillar 1, Pillar 2, etc.)
- For Pillar 6 (Land sinks), values shown are maximum carbon storage potentials.

Data by category and subcategory

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		7,080	7,732				
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 (%)	4.76	11	39.3	72.4	77.8	78.1	78.1
Sales of space heating units - Electric Resistance (%)	2.29	4.46	16.5	21.3	21.9	21.9	21.9
Sales of space heating units - Fossil (%)	42.2	31.2	5.99	0.253	0	0	0
Sales of space heating units - Gas Furnace (%)	50.7	53.4	38.2	6.11	0.363	0	0
Sales of water heating units - Electric Heat Pump (%)	2.81	3.52	15.9	41	45.5	45.9	45.9
Sales of water heating units - Electric Resistance (%)	13.8	12.6	24	48.1	52.3	52.5	52.5
Sales of water heating units - Gas Furnace (%)	78.2	80	58.2	9.28	0.549	0	0
Sales of water heating units - Other (%)	5.24	3.95	1.94	1.61	1.6	1.59	1.61

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)		1.3	1.34	3.78	4.11	3.37	3.57

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	120	114	109	101	93.4	88.1	84.9
Final energy use - Industry (PJ)	64.9	63.4	62.5	61.2	61.1	61.8	62.1
Final energy use - Residential (PJ)	155	143	130	112	94.5	81.6	73.9
Final energy use - Transportation (PJ)	228	212	186	152	122	104	95.6

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)		3.13	3.5				
Sales of cooking units - Electric Resistance (%)	71.8	77.8	96.2	99.8	100	100	100
Sales of cooking units - Gas (%)	28.2	22.2	3.79	0.191	0	0	0
Sales of space heating units - Electric Heat Pump (%)	7.5	14.9	62.3	88.8	92.4	92.6	92.6
Sales of space heating units - Electric Resistance (%)	4.92	6.44	5.03	2.19	1.67	1.64	1.81
Sales of space heating units - Fossil (%)	53.1	58.8	18.6	6.59	5.61	5.57	5.44
Sales of space heating units - Gas (%)	34.4	19.8	14	2.38	0.3	0.169	0.163
Sales of water heating units - Electric Heat Pump (%)	0	1.56	13.2	30.7	33.7	33.9	33.9
Sales of water heating units - Electric Resistance (%)	35.5	54.6	60.4	65.2	66	66	66
Sales of water heating units - Gas Furnace (%)	46.8	33.5	24.3	3.88	0.229	0	0
Sales of water heating units - Other (%)	17.6	10.3	2.05	0.206	0.126	0.127	0.126

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)		549	1,419	2,279	3,460	3,757	3,587
Public EV charging plugs - DC Fast (1000 units)	0.229		0.879		3.72		5.99
Public EV charging plugs - L2 (1000 units)	0.794		21.1		89.3		144
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 (%)	1.31	1.6	1.16	0.37	0.071	0.013	0
Vehicle sales - Light-duty - EV (%)	4.71	17.6	50.1	83.2	96.5	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88.6	75.2	45.1	15.1	3.1	0.584	0
Vehicle sales - Light-duty - hybrid (%)	5.19	5.1	3.47	1.26	0.312	0.069	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.109	0.326	0.184	0.056	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.091	0.086	0.054	0.019	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

Table 6: *E+ scenario - PILLAR 2: Clean Electricity - Generating capacity*

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion $2018)		0	3.53	1.92	1.05	1.09	0
Capital invested - Solar PV - Constrained (billion $2018)		0.09	2.85	0.72	0.909	1.6	0
Capital invested - Wind - Base (billion $2018)		0	0.755	0.336	0.169	0	0.073
Capital invested - Wind - Constrained (billion $2018)		0	0.822	0.087	0.108	0	0
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	770	1,341	1,570	1,838	2,141	2,479	2,857
Installed renewables - Solar - Base land use assumptions (MW)	92.9	92.9	3,547	5,583	6,764	8,065	8,065
Installed renewables - Solar - Constrained land use assumptions (MW)	61.9	172	4,177	6,855	8,835	9,679	9,827
Installed renewables - Wind - Base land use assumptions (MW)	5.8	5.8	321	472	551	551	590
Installed renewables - Wind - Constrained land use assumptions (MW)	5.8	5.8	349	388	438	438	438

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Base land use assumptions (GWh)	169	169	5,420	8,477	10,241	12,184	12,184
Solar - Constrained land use assumptions (GWh)	112	279	6,394	10,430	13,385	14,650	14,870
Wind - Base land use assumptions (GWh)	24	24	1,153	1,676	1,955	1,955	2,088
Wind - Constrained land use assumptions (GWh)	24	24	1,259	1,400	1,572	1,572	1,572

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	55
Conversion capital investment - Cumulative 5-yr (million $2018)		0	0	0	0	0	1,600
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	1
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	0	0	0.01
Annual - BECCS (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0	0	0	0.01
Cumulative - All (MMT)		0	0	0	0	0	0.01
Cumulative - BECCS (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0	0	0	0.01

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	146	146	146	146	146
Cumulative investment - All (million $2018)		0	262	262	262	262	262
Cumulative investment - Spur (million $2018)		0	0.702	0.702	0.702	0.702	0.703
Cumulative investment - Trunk (million $2018)		0	262	262	262	262	262
Spur (km)		0	1.21	1.21	1.21	1.21	1.21
Trunk (km)		0	145	145	145	145	145

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)							-79
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-3.14
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-82.1
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-41.5
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-1.57
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-43.1
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)							54.5
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							5.72
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							60.2
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)							28.7
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							2.86
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							31.5

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)							-54.6
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-3,043
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-768
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-1,158
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-10.4
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-360
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-224
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-325
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-27.4
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-902
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-128
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-445
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-5.3
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-120
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-50.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-17
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-109
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-41
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-1,973
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-448
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-801
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-7.77
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-240
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-96.7
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-121
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-217

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							8.94
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							104
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							591
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							3.84
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)							13.6
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6.37
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							108
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							835
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							4.47
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							97.6
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							226
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.92
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)							7.16
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							65.1
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							404
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							6.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							101
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							408
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							2.89
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)							10.4
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.98
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							131
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							668

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		215	181	145	109	68.9	47.8
Natural gas consumption - Cumulative (tcf)							4,381
Natural gas production - Annual (tcf)		0	0	0	0	0	0
Oil consumption - Annual (million bbls)		52.3	44.4	33	22.4	14.2	7.82
Oil consumption - Cumulative (million bbls)							1,024
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$)		361	0.581	0.58	0.562	0.335	0.01
Monetary damages from air pollution - Natural Gas (million 2019$)		224	119	82.9	82.1	54.6	23.3
Monetary damages from air pollution - Transportation (million 2019$)		995	923	697	399	179	67.5
Premature deaths from air pollution - Coal (deaths)		40.8	0.066	0.065	0.063	0.038	0.001
Premature deaths from air pollution - Natural Gas (deaths)		25.2	13.4	9.36	9.27	6.16	2.63
Premature deaths from air pollution - Transportation (deaths)		112	104	78.3	44.9	20.2	7.59

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		79.2	161	61.4	47.7	35	122
By economic sector - Construction (jobs)		4,586	5,887	5,803	5,929	5,614	7,066
By economic sector - Manufacturing (jobs)		2,163	3,528	3,391	3,758	4,876	7,051
By economic sector - Mining (jobs)		1,037	732	463	271	142	70.8

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		613	907	885	922	987	1,477
By economic sector - Pipeline (jobs)		262	252	171	124	77.9	50.3
By economic sector - Professional (jobs)		1,973	2,470	2,382	2,473	2,388	3,228
By economic sector - Trade (jobs)		1,461	1,702	1,627	1,647	1,616	2,201
By economic sector - Utilities (jobs)		3,810	4,406	5,113	5,821	5,367	6,156
By education level - All sectors - Associates degree or some college (jobs)		4,997	6,340	6,404	6,838	6,872	8,885
By education level - All sectors - Bachelors degree (jobs)		3,309	3,996	3,879	4,039	4,054	5,278
By education level - All sectors - Doctoral degree (jobs)		116	137	126	127	123	163
By education level - All sectors - High school diploma or less (jobs)		6,761	8,613	8,557	9,022	9,096	11,851
By education level - All sectors - Masters or professional degree (jobs)		800	958	932	969	957	1,245
By resource sector - Biomass (jobs)		340	443	175	143	128	520
By resource sector - CO2 (jobs)		0	258	0.7	1.78	1.77	1.31
By resource sector - Coal (jobs)		54.1	0	0	0	0	0
By resource sector - Grid (jobs)		3,873	5,650	8,553	10,078	9,742	11,892
By resource sector - Natural Gas (jobs)		2,665	2,096	1,726	2,137	1,482	950
By resource sector - Nuclear (jobs)		1,092	889	361	0	0	0
By resource sector - Oil (jobs)		2,327	1,811	1,242	785	463	240
By resource sector - Solar (jobs)		5,521	7,776	6,104	6,253	7,768	10,627
By resource sector - Wind (jobs)		111	1,120	1,735	1,597	1,519	3,191
Median wages - Annual - All ($2019 per job)		69,495	69,357	70,702	71,735	71,921	72,238
On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs)		2,614	3,286	3,307	3,513	3,505	4,507
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)		1,100	1,358	1,377	1,462	1,406	1,764
On-Site or In-Plant Training - Total jobs - None (jobs)		2,611	3,278	3,205	3,361	3,399	4,455
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)		134	171	176	191	189	240
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)		9,524	11,950	11,832	12,469	12,603	16,456
On-the-Job Training - All sectors - 1 to 4 years (jobs)		3,369	4,229	4,263	4,533	4,510	5,780
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,076	1,339	1,368	1,458	1,400	1,755
On-the-Job Training - All sectors - None (jobs)		891	1,101	1,066	1,104	1,112	1,463
On-the-Job Training - All sectors - Over 10 years (jobs)		162	206	197	204	210	277
On-the-Job Training - All sectors - Up to 1 year (jobs)		10,485	13,168	13,004	13,696	13,870	18,147
Related work experience - All sectors - 1 to 4 years (jobs)		5,753	7,164	7,115	7,504	7,518	9,742
Related work experience - All sectors - 4 to 10 years (jobs)		3,727	4,633	4,616	4,881	4,875	6,284
Related work experience - All sectors - None (jobs)		2,301	2,900	2,900	3,076	3,078	3,991
Related work experience - All sectors - Over 10 years (jobs)		992	1,238	1,227	1,296	1,318	1,713
Related work experience - All sectors - Up to 1 year (jobs)		3,210	4,110	4,040	4,238	4,314	5,692
Wage income - All (million $2019)		1,111	1,390	1,407	1,506	1,518	1,981

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)		7,079	7,740				
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 (%)	4.76	7.71	11	20.9	40.9	61.8	73
Sales of space heating units - Electric Resistance (%)	2.29	2.3	3.61	7.63	14.2	19.1	21
Sales of space heating units - Fossil (%)	42.2	36.1	33.8	25.4	12.4	3.94	1.03
Sales of space heating units - Gas Furnace (%)	50.7	53.9	51.7	46	32.5	15.2	4.94
Sales of water heating units - Electric Heat Pump (%)	2.81	2.92	4.33	9.01	20.1	33.9	42
Sales of water heating units - Electric Resistance (%)	13.8	12	13	17.7	28.2	41.2	48.8
Sales of water heating units - Gas Furnace (%)	78.2	80.8	78.7	69.9	49.2	23	7.51
Sales of water heating units - Other (%)	5.24	4.31	3.95	3.35	2.49	1.86	1.68

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)		0.975	0.97	1.63	1.7	3.09	3.32

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	120	114	111	108	105	101	96.5
Final energy use - Industry (PJ)	64.9	63.5	62.9	62.4	62.9	63.5	63.2
Final energy use - Residential (PJ)	155	144	135	128	118	105	91.1
Final energy use - Transportation (PJ)	228	214	195	179	167	152	134

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)		3.14	3.73				
Sales of cooking units - Electric Resistance (%)	71.7	72.5	75.1	81.9	91.4	97.2	99.2
Sales of cooking units - Gas (%)	28.3	27.5	24.9	18.1	8.64	2.79	0.75
Sales of space heating units - Electric Heat Pump (%)	7.5	7.1	12.5	28.5	55.7	78.2	88.3
Sales of space heating units - Electric Resistance (%)	4.92	6.49	6.23	5.8	4.6	2.99	2.13
Sales of space heating units - Fossil (%)	53.1	66.3	61.9	48.5	27.6	13.1	7.61
Sales of space heating units - Gas (%)	34.4	20.1	19.4	17.2	12.1	5.68	1.98
Sales of water heating units - Electric Heat Pump (%)	0	0.484	1.83	6.09	15.2	25.5	31.2
Sales of water heating units - Electric Resistance (%)	35.5	53.7	54.4	56.4	60.1	63.5	65.2
Sales of water heating units - Gas Furnace (%)	46.8	33.9	32.8	29.2	20.5	9.58	3.12
Sales of water heating units - Other (%)	17.6	11.9	11	8.3	4.13	1.41	0.461

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	91	186	634	1,979	2,888
Public EV charging plugs - DC Fast (1000 units)	0.229		0.29		1.39		3.84
Public EV charging plugs - L2 (1000 units)	0.794		6.97		33.5		92.2
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 (%)	1.33	1.78	2.01	1.59	0.999	0.509	0.219
Vehicle sales - Light-duty - EV (%)	2.17	5.3	13.1	27.8	50.5	73.4	88.1
Vehicle sales - Light-duty - gasoline (%)	90.9	86.3	77.7	64.2	43.8	23.4	10.4
Vehicle sales - Light-duty - hybrid (%)	5.4	6.17	6.83	6.1	4.45	2.56	1.22
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.373	0.312	0.234	0.163	0.089	0.042
Vehicle sales - Light-duty - other (%)	0.093	0.096	0.086	0.074	0.053	0.029	0.013
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen FC (%)	0.166	0.485	1.37	3.58	7.86	13.2	17
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-79
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-3.14
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-82.1
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-41.5
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-1.57
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-43.1
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)							54.5
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							5.72

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							60.2
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)							28.7
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							2.86
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							31.5

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)							-54.6
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-3,043
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-768
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-1,158
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-10.4
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-360
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-224
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-325
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-27.4
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-902
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-128
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-445
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-5.3
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-120
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-50.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-17
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-109
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-41

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-1,973
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-448
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-801
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-7.77
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-240
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-96.7
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-121
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-217
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							8.94
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							104
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							591
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							3.84
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)							13.6
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6.37
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							108
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							835
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							4.47
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							97.6
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							226
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.92
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							7.16
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							65.1
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							404
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							6.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							101
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							408
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							2.89
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)							10.4
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.98
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							131
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							668

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		361	0.581	0.58	0.562	0.335	0.01
Monetary damages from air pollution - Natural Gas (million 2019$)		221	95.2	40.4	16.6	4.81	5.98
Monetary damages from air pollution - Transportation (million 2019$)		1,013	1,020	985	880	695	473
Premature deaths from air pollution - Coal (deaths)		40.8	0.066	0.065	0.063	0.038	0.001
Premature deaths from air pollution - Natural Gas (deaths)		25	10.8	4.57	1.88	0.543	0.675
Premature deaths from air pollution - Transportation (deaths)		114	115	111	99	78.2	53.2

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)		7,080	7,732				
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 (%)	4.76	11	39.3	72.4	77.8	78.1	78.1
Sales of space heating units - Electric Resistance (%)	2.29	4.46	16.5	21.3	21.9	21.9	21.9
Sales of space heating units - Fossil (%)	42.2	31.2	5.99	0.253	0	0	0
Sales of space heating units - Gas Furnace (%)	50.7	53.4	38.2	6.11	0.363	0	0
Sales of water heating units - Electric Heat Pump (%)	2.81	3.52	15.9	41	45.5	45.9	45.9
Sales of water heating units - Electric Resistance (%)	13.8	12.6	24	48.1	52.3	52.5	52.5
Sales of water heating units - Gas Furnace (%)	78.2	80	58.2	9.28	0.549	0	0
Sales of water heating units - Other (%)	5.24	3.95	1.94	1.61	1.6	1.59	1.61

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)		1.3	1.34	3.78	4.11	3.37	3.57

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	120	114	109	101	93.4	88.1	84.9
Final energy use - Industry (PJ)	64.9	63.4	62.5	61.2	61.1	61.8	62.1
Final energy use - Residential (PJ)	155	143	130	112	94.5	81.6	73.9
Final energy use - Transportation (PJ)	228	212	186	152	122	104	95.6

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)		3.13	3.5				
Sales of cooking units - Electric Resistance (%)	71.8	77.8	96.2	99.8	100	100	100
Sales of cooking units - Gas (%)	28.2	22.2	3.79	0.191	0	0	0
Sales of space heating units - Electric Heat Pump (%)	7.5	14.9	62.3	88.8	92.4	92.6	92.6
Sales of space heating units - Electric Resistance (%)	4.92	6.44	5.03	2.19	1.67	1.64	1.81
Sales of space heating units - Fossil (%)	53.1	58.8	18.6	6.59	5.61	5.57	5.44
Sales of space heating units - Gas (%)	34.4	19.8	14	2.38	0.3	0.169	0.163
Sales of water heating units - Electric Heat Pump (%)	0	1.56	13.2	30.7	33.7	33.9	33.9
Sales of water heating units - Electric Resistance (%)	35.5	54.6	60.4	65.2	66	66	66
Sales of water heating units - Gas Furnace (%)	46.8	33.5	24.3	3.88	0.229	0	0
Sales of water heating units - Other (%)	17.6	10.3	2.05	0.206	0.126	0.127	0.126

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)		549	1,419	2,279	3,460	3,757	3,587
Public EV charging plugs - DC Fast (1000 units)	0.229		0.879		3.72		5.99
Public EV charging plugs - L2 (1000 units)	0.794		21.1		89.3		144
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 (%)	1.31	1.6	1.16	0.37	0.071	0.013	0
Vehicle sales - Light-duty - EV (%)	4.71	17.6	50.1	83.2	96.5	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88.6	75.2	45.1	15.1	3.1	0.584	0
Vehicle sales - Light-duty - hybrid (%)	5.19	5.1	3.47	1.26	0.312	0.069	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.109	0.326	0.184	0.056	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.091	0.086	0.054	0.019	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Base (billion $2018)		0	3.3	0.826	0.459	0	0
Capital invested - Wind - Base (billion $2018)		0	0.755	0.336	0.169	0	0.073
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Solar - Base land use assumptions (MW)	92.9	92.9	3,322	4,199	4,717	4,717	4,717
Installed renewables - Solar - Constrained land use assumptions (MW)	186	186	10,034	14,152	16,244	16,244	16,244
Installed renewables - Wind - Base land use assumptions (MW)	5.8	5.8	321	472	551	551	590
Installed renewables - Wind - Constrained land use assumptions (MW)	11.6	11.6	697	776	877	877	942

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

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Base land use assumptions (GWh)	169	169	5,099	6,409	7,180	7,180	7,180
Solar - Constrained land use assumptions (GWh)	337	337	15,298	21,470	24,597	24,597	24,597
Wind - Base land use assumptions (GWh)	24	24	1,153	1,676	1,955	1,955	2,088
Wind - Constrained land use assumptions (GWh)	48	48	2,519	2,800	3,144	3,144	3,371

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)							-79
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-3.14
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-82.1
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-41.5
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-1.57
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-43.1
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)							54.5
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							5.72
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							60.2
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)							28.7
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							2.86
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							31.5

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)							-54.6
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-3,043
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-768
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-1,158
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-10.4
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-360

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-224
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-325
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-27.4
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-902
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-128
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-445
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-5.3
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-120
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-50.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-17
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-109
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-41
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-1,973
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-448
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-801
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-7.77
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-240
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-96.7
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-121
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-217
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							8.94
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							104
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							591
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							3.84

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							13.6
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6.37
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							108
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							835
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							4.47
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							97.6
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							226
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.92
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)							7.16
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							65.1
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							404
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							6.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							101
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							408
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							2.89
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)							10.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.98
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							131
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							668

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		361	0.581	0.58	0.562	0.335	0.01
Monetary damages from air pollution - Natural Gas (million 2019$)		210	108	60.8	50.2	18.8	6.07
Monetary damages from air pollution - Transportation (million 2019$)		995	923	697	399	179	67.5
Premature deaths from air pollution - Coal (deaths)		40.8	0.066	0.065	0.063	0.038	0.001
Premature deaths from air pollution - Natural Gas (deaths)		23.8	12.1	6.86	5.66	2.12	0.685
Premature deaths from air pollution - Transportation (deaths)		112	104	78.3	44.9	20.2	7.59

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)		7,080	7,732				
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 (%)	4.76	11	39.3	72.4	77.8	78.1	78.1
Sales of space heating units - Electric Resistance (%)	2.29	4.46	16.5	21.3	21.9	21.9	21.9
Sales of space heating units - Fossil (%)	42.2	31.2	5.99	0.253	0	0	0
Sales of space heating units - Gas Furnace (%)	50.7	53.4	38.2	6.11	0.363	0	0
Sales of water heating units - Electric Heat Pump (%)	2.81	3.52	15.9	41	45.5	45.9	45.9
Sales of water heating units - Electric Resistance (%)	13.8	12.6	24	48.1	52.3	52.5	52.5
Sales of water heating units - Gas Furnace (%)	78.2	80	58.2	9.28	0.549	0	0
Sales of water heating units - Other (%)	5.24	3.95	1.94	1.61	1.6	1.59	1.61

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)		1.3	1.34	3.78	4.11	3.37	3.57

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	120	114	109	101	93.4	88.1	84.9

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	64.9	63.4	62.5	61.2	61.1	61.8	62.1
Final energy use - Residential (PJ)	155	143	130	112	94.5	81.6	73.9
Final energy use - Transportation (PJ)	228	212	186	152	122	104	95.6

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)		3.13	3.5				
Sales of cooking units - Electric Resistance (%)	71.8	77.8	96.2	99.8	100	100	100
Sales of cooking units - Gas (%)	28.2	22.2	3.79	0.191	0	0	0
Sales of space heating units - Electric Heat Pump (%)	7.5	14.9	62.3	88.8	92.4	92.6	92.6
Sales of space heating units - Electric Resistance (%)	4.92	6.44	5.03	2.19	1.67	1.64	1.81
Sales of space heating units - Fossil (%)	53.1	58.8	18.6	6.59	5.61	5.57	5.44
Sales of space heating units - Gas (%)	34.4	19.8	14	2.38	0.3	0.169	0.163
Sales of water heating units - Electric Heat Pump (%)	0	1.56	13.2	30.7	33.7	33.9	33.9
Sales of water heating units - Electric Resistance (%)	35.5	54.6	60.4	65.2	66	66	66
Sales of water heating units - Gas Furnace (%)	46.8	33.5	24.3	3.88	0.229	0	0
Sales of water heating units - Other (%)	17.6	10.3	2.05	0.206	0.126	0.127	0.126

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)		549	1,419	2,279	3,460	3,757	3,587
Public EV charging plugs - DC Fast (1000 units)	0.229		0.879		3.72		5.99
Public EV charging plugs - L2 (1000 units)	0.794		21.1		89.3		144
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 (%)	1.31	1.6	1.16	0.37	0.071	0.013	0
Vehicle sales - Light-duty - EV (%)	4.71	17.6	50.1	83.2	96.5	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88.6	75.2	45.1	15.1	3.1	0.584	0
Vehicle sales - Light-duty - hybrid (%)	5.19	5.1	3.47	1.26	0.312	0.069	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.109	0.326	0.184	0.056	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.091	0.086	0.054	0.019	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Base (billion $2018)		3.19	0	0	0.619	0	0
Capital invested - Solar PV - Constrained (billion $2018)		1.64	1.06	0	1.56	0	0.347
Capital invested - Wind - Base (billion $2018)		0	0.273	0	0	0.106	0.283
Capital invested - Wind - Constrained (billion $2018)		0	0.396	0	0	0	0.338
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Solar - Base land use assumptions (MW)	1,488	4,278	4,278	4,278	4,975	4,975	4,975
Installed renewables - Solar - Constrained land use assumptions (MW)	2,365	3,797	4,832	4,832	6,587	6,587	7,026
Installed renewables - Wind - Base land use assumptions (MW)	5.8	5.8	120	120	120	173	321
Installed renewables - Wind - Constrained land use assumptions (MW)	5.8	5.8	171	171	171	171	349

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

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Base land use assumptions (GWh)	2,320	6,549	6,549	6,549	7,589	7,589	7,589
Solar - Constrained land use assumptions (GWh)	3,653	5,825	7,405	7,405	10,045	10,045	10,707
Wind - Base land use assumptions (GWh)	24	24	433	433	433	625	1,153
Wind - Constrained land use assumptions (GWh)	24	24	628	628	628	628	1,259

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)							-79
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-3.14
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-82.1
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-41.5
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-1.57
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-43.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							54.5
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							5.72
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							60.2
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)							28.7
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							2.86
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							31.5

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)							-54.6
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-3,043
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-768
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-1,158
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-10.4
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-360
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-224
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-325
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-27.4
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-902
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-128
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-445
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-5.3
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-120
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-50.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-17
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-109
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-41
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-1,973
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-448
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-801
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-7.77
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-240
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-96.7
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-121
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-217
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							8.94
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							104
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							591
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							3.84
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)							13.6
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6.37
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							108
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							835
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							4.47
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							97.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							226
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.92
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)							7.16
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							65.1
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							404
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							6.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							101
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							408
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							2.89
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)							10.4
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.98
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							131
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							668

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		361	0.581	0.58	0.562	0.335	0.01
Monetary damages from air pollution - Natural Gas (million 2019$)		218	117	135	105	56.9	11.6
Monetary damages from air pollution - Transportation (million 2019$)		995	923	697	399	179	67.5
Premature deaths from air pollution - Coal (deaths)		40.8	0.066	0.065	0.063	0.038	0.001

Table 44: *E+RE- scenario - IMPACTS - Health (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Natural Gas (deaths)		24.6	13.2	15.2	11.9	6.42	1.31
Premature deaths from air pollution - Transportation (deaths)		112	104	78.3	44.9	20.2	7.59

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)		7,079	7,740				
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 (%)	4.76	7.71	11	20.9	40.9	61.8	73
Sales of space heating units - Electric Resistance (%)	2.29	2.3	3.61	7.63	14.2	19.1	21
Sales of space heating units - Fossil (%)	42.2	36.1	33.8	25.4	12.4	3.94	1.03
Sales of space heating units - Gas Furnace (%)	50.7	53.9	51.7	46	32.5	15.2	4.94
Sales of water heating units - Electric Heat Pump (%)	2.81	2.92	4.33	9.01	20.1	33.9	42
Sales of water heating units - Electric Resistance (%)	13.8	12	13	17.7	28.2	41.2	48.8
Sales of water heating units - Gas Furnace (%)	78.2	80.8	78.7	69.9	49.2	23	7.51
Sales of water heating units - Other (%)	5.24	4.31	3.95	3.35	2.49	1.86	1.68

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)		0.975	0.97	1.63	1.7	3.09	3.32

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	120	114	111	108	105	101	96.5
Final energy use - Industry (PJ)	64.9	63.5	62.9	62.4	62.9	63.5	63.2
Final energy use - Residential (PJ)	155	144	135	128	118	105	91.1
Final energy use - Transportation (PJ)	228	214	195	179	167	152	134

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)		3.14	3.73				
Sales of cooking units - Electric Resistance (%)	71.7	72.5	75.1	81.9	91.4	97.2	99.2
Sales of cooking units - Gas (%)	28.3	27.5	24.9	18.1	8.64	2.79	0.75
Sales of space heating units - Electric Heat Pump (%)	7.5	7.1	12.5	28.5	55.7	78.2	88.3
Sales of space heating units - Electric Resistance (%)	4.92	6.49	6.23	5.8	4.6	2.99	2.13
Sales of space heating units - Fossil (%)	53.1	66.3	61.9	48.5	27.6	13.1	7.61
Sales of space heating units - Gas (%)	34.4	20.1	19.4	17.2	12.1	5.68	1.98
Sales of water heating units - Electric Heat Pump (%)	0	0.484	1.83	6.09	15.2	25.5	31.2
Sales of water heating units - Electric Resistance (%)	35.5	53.7	54.4	56.4	60.1	63.5	65.2

Table 48: *E-B+ scenario - PILLAR 1: Efficiency/Electrification - Residential (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	46.8	33.9	32.8	29.2	20.5	9.58	3.12
Sales of water heating units - Other (%)	17.6	11.9	11	8.3	4.13	1.41	0.461

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	91	186	634	1,979	2,888
Public EV charging plugs - DC Fast (1000 units)	0.229		0.29		1.39		3.84
Public EV charging plugs - L2 (1000 units)	0.794		6.97		33.5		92.2
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 (%)	1.33	1.78	2.01	1.59	0.999	0.509	0.219
Vehicle sales - Light-duty - EV (%)	2.17	5.3	13.1	27.8	50.5	73.4	88.1
Vehicle sales - Light-duty - gasoline (%)	90.9	86.3	77.7	64.2	43.8	23.4	10.4
Vehicle sales - Light-duty - hybrid (%)	5.4	6.17	6.83	6.1	4.45	2.56	1.22
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.373	0.312	0.234	0.163	0.089	0.042
Vehicle sales - Light-duty - other (%)	0.093	0.096	0.086	0.074	0.053	0.029	0.013
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen FC (%)	0.166	0.485	1.37	3.58	7.86	13.2	17
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million $2018/year)		0	0	0	0	0	142
Conversion capital investment - Cumulative 5-yr (million $2018)		0	0	0	0	0	2,269
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	2
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	0.01
Annual - BECCS (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0	0	0	0.01
Cumulative - All (MMT)		0	0	0	0	0	0.01
Cumulative - BECCS (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0	0	0	0.01

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	146	146	146	146	146
Cumulative investment - All (million $2018)		0	262	262	262	262	262
Cumulative investment - Spur (million $2018)		0	0.702	0.702	0.702	0.702	0.703
Cumulative investment - Trunk (million $2018)		0	262	262	262	262	262
Spur (km)		0	1.21	1.21	1.21	1.21	1.21
Trunk (km)		0	145	145	145	145	145

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)							-79
Carbon sink potential - Aggressive deployment - Cropland to woody energy crops (1000 tCO2e/y)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Pasture to energy crops (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-3.14
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-82.1
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-41.5
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)							-1.57
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-43.1
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)							134
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)							0.313
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							5.72
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							141
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)							28.7
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)							0.313
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							2.86
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							31.8

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)							-54.6
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-3,043
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-768
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-1,158
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-10.4
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-360
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-224
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-325
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-27.4
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-902
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-128
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-445
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-5.3
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-120
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-50.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-17
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-109
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-41
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-1,973
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-448
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-801
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-7.77
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-240
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-96.7
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-121
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-217

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							8.94
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							104
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							591
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							3.84
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)							13.6
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6.37
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							108
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							835
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							4.47
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							97.6
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							226
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.92
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)							7.16
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							65.1
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							404
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							6.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							101
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							408
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							2.89
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)							10.4
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.98
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							131
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							668

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		361	0.581	0.58	0.562	0.335	0.01
Monetary damages from air pollution - Natural Gas (million 2019$)		222	90.9	47.2	37.1	23	8.13
Monetary damages from air pollution - Transportation (million 2019$)		1,013	1,020	985	880	695	473
Premature deaths from air pollution - Coal (deaths)		40.8	0.066	0.065	0.063	0.038	0.001
Premature deaths from air pollution - Natural Gas (deaths)		25.1	10.3	5.33	4.18	2.6	0.918
Premature deaths from air pollution - Transportation (deaths)		114	115	111	99	78.2	53.2

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)		6,993	7,196				
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 (%)	4.76	13	41.2	64.2	67.9	68.3	68.4
Sales of space heating units - Electric Resistance (%)	2.29	2.72	7.48	19.8	29.9	31.6	31.6
Sales of space heating units - Fossil (%)	42.2	34.8	24.4	9.58	1.37	0.108	0
Sales of space heating units - Gas Furnace (%)	50.7	49.5	26.9	6.44	0.813	0.044	0
Sales of water heating units - Electric Heat Pump (%)	2.81	2.41	2.38	2.38	2.36	2.39	2.38
Sales of water heating units - Electric Resistance (%)	13.8	11.5	11.2	11.4	11.4	11.2	11.3

Table 59: *REF scenario - PILLAR 1: Efficiency/Electrification - Commercial (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	78.2	81.7	82.2	82	82	82.3	82.2
Sales of water heating units - Other (%)	5.24	4.38	4.24	4.21	4.3	4.08	4.12

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)		1.02	1.02	2.7	2.9	2.76	2.92

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	120	116	117	116	115	117	121
Final energy use - Industry (PJ)	64.9	65.9	67.9	70.3	74.3	78.9	82.7
Final energy use - Residential (PJ)	155	145	139	135	132	130	128
Final energy use - Transportation (PJ)	228	214	197	187	187	193	200

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)		3.06	3.2				
Sales of cooking units - Electric Resistance (%)	71.5	71.5	71.5	71.5	71.5	71.5	71.5
Sales of cooking units - Gas (%)	28.5	28.5	28.5	28.5	28.5	28.5	28.5
Sales of space heating units - Electric Heat Pump (%)	7.29	8.79	9.1	9.58	9.77	9.98	10.3
Sales of space heating units - Electric Resistance (%)	4.95	6.28	6.15	6.11	6.12	5.85	5.64
Sales of space heating units - Fossil (%)	53.3	57.9	31.1	12.3	11.1	11	11
Sales of space heating units - Gas (%)	34.5	27.1	53.6	72	73	73.2	73.1
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	35.5	53.5	53.4	53.5	53.4	53.4	53.4
Sales of water heating units - Gas Furnace (%)	46.8	34.3	34.3	34.2	34.2	34.2	34.2
Sales of water heating units - Other (%)	17.6	12.3	12.3	12.3	12.3	12.3	12.3

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 (%)	1.32	1.76	2.14	2	1.79	1.67	1.58
Vehicle sales - Light-duty - EV (%)	4.35	6.62	7.45	9.21	11.1	12.7	13.9
Vehicle sales - Light-duty - gasoline (%)	88.9	85.1	82.7	80.6	78.3	76.5	75
Vehicle sales - Light-duty - hybrid (%)	5.22	6.03	7.31	7.85	8.36	8.82	9.12
Vehicle sales - Light-duty - hydrogen FC (%)	0.109	0.368	0.332	0.292	0.287	0.286	0.296
Vehicle sales - Light-duty - other (%)	0.091	0.095	0.091	0.092	0.091	0.09	0.092
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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)							-54.6
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-3,043
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-768
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-1,158
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-10.4
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-360
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-143
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-224
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-325
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-27.4
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-902
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-128
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-445
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-5.3
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-120
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-50.1
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-17
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-109
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-41
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-1,973
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-448
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-801
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-7.77
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-240

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-96.7
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-121
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-217
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							8.94
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							104
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							591
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							3.84
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)							13.6
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							6.37
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							108
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							835
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							4.47
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							97.6
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							226
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1.92
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)							7.16
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							1.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							65.1

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 - Total impacted (over 30 years) (1000 hectares)							404
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							6.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							101
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							408
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							2.89
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)							10.4
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							7.98
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							131
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							668

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)	-10.2		-1.57				-1.41
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.098		-0.176				-0.183
Business-as-usual carbon sink - Total (Mt CO2e/y)	-10.3		-1.75				-1.59

Table 66: *REF scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		996	649	609	593	582	521
Monetary damages from air pollution - Natural Gas (million 2019$)		149	122	158	173	182	172
Monetary damages from air pollution - Transportation (million 2019$)		1,011	1,031	1,048	1,068	1,088	1,109
Premature deaths from air pollution - Coal (deaths)		112	73.4	68.8	67	65.8	58.8
Premature deaths from air pollution - Natural Gas (deaths)		16.8	13.7	17.9	19.5	20.6	19.5
Premature deaths from air pollution - Transportation (deaths)		114	116	118	120	122	125