Net-Zero America - pennsylvania state report

2021-03-18

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

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Notes

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

Data by category and subcategory

1 E+ scenario - PILLAR 1: Efficiency/Electrification - Commercial 1
2 E+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand . . . 1
3 E+ scenario - PILLAR 1: Efficiency/Electrification - Overview 1
4 E+ scenario - PILLAR 1: Efficiency/Electrification - Residential 1
5 E+ scenario - PILLAR 1: Efficiency/Electrification - Transportation 2
6 E+ scenario - PILLAR 2: Clean Electricity - Generating capacity 2
7 E+ scenario - PILLAR 2: Clean Electricity - Generation 3
8 E+ scenario - PILLAR 3: Clean fuels - Bioenergy 3
9 E+ scenario - PILLAR 4: CCUS - CO2 capture 3
10 E+ scenario - PILLAR 4: CCUS - CO2 pipelines 3
11 E+ scenario - PILLAR 4: CCUS - CO2 storage 4
12 E+ scenario - PILLAR 6: Land sinks - Agriculture 4
13 E+ scenario - PILLAR 6: Land sinks - Forests 5
14 E+ scenario - IMPACTS - Fossil fuel industries 7
15 E+ scenario - IMPACTS - Health 7
16 E+ scenario - IMPACTS - Jobs 7
17 E- scenario - PILLAR 1: Efficiency/Electrification - Commercial 9
18 E- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand 9
19 E- scenario - PILLAR 1: Efficiency/Electrification - Overview 9
20 E- scenario - PILLAR 1: Efficiency/Electrification - Residential 9
21 E- scenario - PILLAR 1: Efficiency/Electrification - Transportation 10
22 E- scenario - PILLAR 6: Land sinks - Agriculture 10
23 E- scenario - PILLAR 6: Land sinks - Forests 11
24 E- scenario - IMPACTS - Health 13
25 E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Commercial 14
26 E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand . 14
27 E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Overview 14
28 E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Residential 14
29 E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Transportation . . . 15
30 E+RE+ scenario - PILLAR 2: Clean Electricity - Generating capacity 15
31 E+RE+ scenario - PILLAR 2: Clean Electricity - Generation 15
32 E+RE+ scenario - PILLAR 6: Land sinks - Agriculture 16
33 E+RE+ scenario - PILLAR 6: Land sinks - Forests 16
34 E+RE+ scenario - IMPACTS - Health 19
35 E+RE- scenario - PILLAR 1: Efficiency/Electrification - Commercial 19
36 E+RE- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand . . 19
37 E+RE- scenario - PILLAR 1: Efficiency/Electrification - Overview 19
38 E+RE- scenario - PILLAR 1: Efficiency/Electrification - Residential 20
39 E+RE- scenario - PILLAR 1: Efficiency/Electrification - Transportation 20
40 E+RE- scenario - PILLAR 2: Clean Electricity - Generating capacity 21
41 E+RE- scenario - PILLAR 2: Clean Electricity - Generation 21
42 E+RE- scenario - PILLAR 6: Land sinks - Agriculture 21
43 E+RE- scenario - PILLAR 6: Land sinks - Forests 22

44 E+RE- scenario - IMPACTS - Health 24
45 E-B+ scenario - PILLAR 1: Efficiency/Electrification - Commercial 25
46 E-B+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand . . 25
47 E-B+ scenario - PILLAR 1: Efficiency/Electrification - Overview 25
48 E-B+ scenario - PILLAR 1: Efficiency/Electrification - Residential 25
49 E-B+ scenario - PILLAR 1: Efficiency/Electrification - Transportation 26
50 E-B+ scenario - PILLAR 2: Clean Electricity - Generating capacity 26
51 E-B+ scenario - PILLAR 2: Clean Electricity - Generation 26
52 E-B+ scenario - PILLAR 3: Clean fuels - Bioenergy 26
53 E-B+ scenario - PILLAR 4: CCUS - CO2 capture 27
54 E-B+ scenario - PILLAR 4: CCUS - CO2 pipelines 27
55 E-B+ scenario - PILLAR 4: CCUS - CO2 storage 27
56 E-B+ scenario - PILLAR 6: Land sinks - Agriculture 27
57 E-B+ scenario - PILLAR 6: Land sinks - Forests 29
58 E-B+ scenario - IMPACTS - Health 31
59 REF scenario - PILLAR 1: Efficiency/Electrification - Commercial 31
60 REF scenario - PILLAR 1: Efficiency/Electrification - Electricity demand . . . 32
61 REF scenario - PILLAR 1: Efficiency/Electrification - Overview 32
62 REF scenario - PILLAR 1: Efficiency/Electrification - Residential 32
63 REF scenario - PILLAR 1: Efficiency/Electrification - Transportation 32
64 REF scenario - PILLAR 6: Land sinks - Forests 33
65 REF scenario - PILLAR 6: Land sinks - Forests - REF only 35
66 REF scenario - IMPACTS - Health 35

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)		59,163	64,630				
Sales of cooking units - Electric Resistance (%)	18.5	33.7	75.3	83.5	83.9	84	84
Sales of cooking units - Gas (%)	81.5	66.3	24.7	16.5	16.1	16	16
Sales of space heating units - Electric Heat Pump (%)	2.56	11.7	42	73.7	78.6	79.2	79.1
Sales of space heating units - Electric Resistance (%)	5.59	4.8	13.3	19	20.2	19.9	20
Sales of space heating units - Fossil (%)	19.4	14.8	2.91	0.126	0	0	0
Sales of space heating units - Gas Furnace (%)	72.4	68.7	41.8	7.14	1.21	0.873	0.87
Sales of water heating units - Electric Heat Pump (%)	0.624	4.78	29.6	52.2	55.8	56	56
Sales of water heating units - Electric Resistance (%)	3.49	4.26	19.8	40.2	43.6	43.8	43.8
Sales of water heating units - Gas Furnace (%)	94.2	89.8	50.2	7.42	0.426	0	0
Sales of water heating units - Other (%)	1.74	1.19	0.379	0.186	0.177	0.178	0.178

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)		6.13	6.27	11.6	12.4	12.4	13.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	388	381	368	346	323	310	307
Final energy use - Industry (PJ)	791	783	767	757	724	706	669
Final energy use - Residential (PJ)	467	427	389	337	289	255	236
Final energy use - Transportation (PJ)	816	765	673	560	457	393	364

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)		10.8	12.5				
Sales of cooking units - Electric Resistance (%)	55.4	64.9	94	99.7	100	100	100
Sales of cooking units - Gas (%)	44.6	35.1	6.01	0.303	0	0	0
Sales of space heating units - Electric Heat Pump (%)	8.42	19.7	58.8	85.6	89.5	89.7	89.7
Sales of space heating units - Electric Resistance (%)	9.49	11.8	7.94	3.83	3.14	3.17	3.29
Sales of space heating units - Fossil (%)	24.2	31.3	12.5	6.86	6.43	6.34	6.23
Sales of space heating units - Gas (%)	57.9	37.3	20.7	3.68	0.918	0.75	0.749
Sales of water heating units - Electric Heat Pump (%)	0	3.85	24.2	40.2	42.6	42.8	42.8
Sales of water heating units - Electric Resistance (%)	35.5	52.4	52.4	56.3	57.1	57.1	57.1
Sales of water heating units - Gas Furnace (%)	58.8	40.5	22.7	3.36	0.193	0	0
Sales of water heating units - Other (%)	5.73	3.25	0.692	0.122	0.097	0.097	0.098

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)		2,057	5,276	8,545	12,946	14,088	13,433
Public EV charging plugs - DC Fast (1000 units)	0.267		3.52		15.4		24.9
Public EV charging plugs - L2 (1000 units)	1.32		84.6		370		599
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 (%)	1.43	1.71	1.21	0.386	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.31	16.4	48.3	82.5	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.2	76.6	46.9	15.8	3.2	0.587	0
Vehicle sales - Light-duty - hybrid (%)	4.8	4.82	3.34	1.23	0.301	0.066	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.333	0.194	0.06	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.096	0.092	0.059	0.021	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0	0	0	0.031
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Solar PV - Base (billion $2018)		1.23	2.29	11.7	18.8	27.7	33.5
Capital invested - Solar PV - Constrained (billion $2018)		0.076	2.55	12.2	15.2	34.6	27.8
Capital invested - Wind - Base (billion $2018)		0	0	0	0	0	0
Capital invested - Wind - Constrained (billion $2018)		0	0	15.8	85.7	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)	415	623	828	1,094	1,416	1,782	2,202
Installed renewables - Solar - Base land use assumptions (MW)	93.6	1,174	3,412	15,866	37,030	70,125	112,448
Installed renewables - Solar - Constrained land use assumptions (MW)	40	3,741	8,736	22,113	41,148	89,554	123,134
Installed renewables - Wind - Base land use assumptions (MW)	1,619	1,619	1,619	1,619	1,619	1,619	1,619
Installed renewables - Wind - Constrained land use assumptions (MW)	1,619	1,619	1,619	7,092	59,157	61,314	61,314

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	30.7
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	1,829	5,236	23,739	54,746	102,925	164,663
Solar - Constrained land use assumptions (GWh)	72.1	5,753	13,458	33,323	61,312	131,716	180,658
Wind - Base land use assumptions (GWh)	6,912	6,912	6,912	6,912	6,912	6,912	6,912
Wind - Constrained land use assumptions (GWh)	6,912	6,912	6,912	27,090	188,236	193,048	193,048

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	446
Conversion capital investment - Cumulative 5-yr (million $2018)		0	0	0	0	0	9,012
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	9
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	1
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	3.35	3.32	6.84	18.6
Annual - BECCS (MMT)		0	0	0	0	0	11.5
Annual - Cement and lime (MMT)		0	0	3.35	3.32	6.84	7.07
Annual - NGCC (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	3.35	6.67	13.5	32.1
Cumulative - BECCS (MMT)		0	0	0	0	0	11.5
Cumulative - Cement and lime (MMT)		0	0	3.35	6.67	13.5	20.6
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	622	1,001	826	909	2,002
Cumulative investment - All (million $2018)		0	1,668	2,719	2,627	2,709	3,539
Cumulative investment - Spur (million $2018)		0	54.5	190	97.7	180	1,010
Cumulative investment - Trunk (million $2018)		0	1,614	2,529	2,529	2,529	2,529
Spur (km)		0	107	332	157	241	1,333
Trunk (km)		0	515	669	669	669	669

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)							-304
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,059
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-95.2
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-2,458
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-304
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,086
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-47.6
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,437
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							139
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,571
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							173
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,884
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							139
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							829
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							86.6
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,055

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)							-291
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-27,852
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,104
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-8,777
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-440
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-5,935
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,121
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-186
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-4,122
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,875
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-146
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-8,341
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-517
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,371
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-224
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1,978
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-392
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-93.2
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-312
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,306
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-218
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-18,092
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,811
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,074
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-328
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-3,957
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-757
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-140
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,217
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,591

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)							47.6
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							420
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,476
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							162
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)							107
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							12.3
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							117
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,285
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,626
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							23.8
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							395
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,715
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							81
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)							56.1
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							6.16
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							20.3
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							777
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,074
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							35.7

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)							407
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,095
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							122
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)							81.3
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							9.24
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							147
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,565
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,463

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		1,128	951	763	574	361	251
Natural gas consumption - Cumulative (tcf)							22,977
Natural gas production - Annual (tcf)		7,475	7,066	6,154	5,204	4,126	3,205
Oil consumption - Annual (million bbls)		181	162	132	104	81	62
Oil consumption - Cumulative (million bbls)							4,048
Oil production - Annual (million bbls)		8.39	8.42	8.41	6.66	5.42	3.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		2,374	1.62	1.6	1.47	1	0.081
Monetary damages from air pollution - Natural Gas (million 2019$)		615	453	294	268	170	68
Monetary damages from air pollution - Transportation (million 2019$)		4,170	3,868	2,927	1,689	768	300
Premature deaths from air pollution - Coal (deaths)		268	0.183	0.181	0.166	0.113	0.009
Premature deaths from air pollution - Natural Gas (deaths)		69.4	51.1	33.2	30.3	19.2	7.67
Premature deaths from air pollution - Transportation (deaths)		469	435	329	190	86.4	33.7

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		375	568	326	211	97.7	632
By economic sector - Construction (jobs)		16,338	16,396	22,401	28,171	34,355	45,295
By economic sector - Manufacturing (jobs)		19,602	22,640	28,984	28,119	23,357	29,915
By economic sector - Mining (jobs)		13,345	9,256	6,636	4,454	2,850	1,740

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		840	1,025	2,668	4,597	6,936	10,799
By economic sector - Pipeline (jobs)		2,600	2,426	1,920	1,378	931	741
By economic sector - Professional (jobs)		7,981	7,156	9,193	11,823	14,796	20,938
By economic sector - Trade (jobs)		6,468	5,545	6,817	8,520	10,749	15,134
By economic sector - Utilities (jobs)		22,849	21,083	22,795	24,713	26,600	31,661
By education level - All sectors - Associates degree or some college (jobs)		28,277	27,133	32,433	36,054	39,103	50,749
By education level - All sectors - Bachelors degree (jobs)		19,136	17,876	20,440	22,007	23,331	30,187
By education level - All sectors - Doctoral degree (jobs)		573	512	590	672	768	1,034
By education level - All sectors - High school diploma or less (jobs)		37,948	36,483	43,620	48,135	51,879	67,564
By education level - All sectors - Masters or professional degree (jobs)		4,461	4,091	4,658	5,117	5,591	7,319
By resource sector - Biomass (jobs)		1,243	1,475	817	568	365	2,730
By resource sector - CO2 (jobs)		0	1,596	1,020	136	246	1,446
By resource sector - Coal (jobs)		5,457	2,203	1,748	1,519	1,367	1,211
By resource sector - Grid (jobs)		17,018	17,049	25,485	33,636	43,359	57,865
By resource sector - Natural Gas (jobs)		34,052	28,380	22,686	19,157	13,137	7,603
By resource sector - Nuclear (jobs)		4,428	3,817	3,179	1,814	636	0
By resource sector - Oil (jobs)		11,169	9,436	7,556	5,500	4,056	2,774
By resource sector - Solar (jobs)		9,472	12,101	26,280	37,790	48,918	72,736
By resource sector - Wind (jobs)		7,559	10,039	12,969	11,865	8,587	10,490
Median wages - Annual - All ($2019 per job)		62,196	62,443	62,390	63,104	64,136	64,668
On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs)		14,758	14,077	16,683	18,469	20,011	25,828
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)		5,839	5,485	6,450	7,325	8,213	10,550
On-Site or In-Plant Training - Total jobs - None (jobs)		14,411	13,811	16,423	18,119	19,532	25,569
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)		743	719	863	971	1,066	1,377
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)		54,645	52,002	61,322	67,102	71,851	93,531
On-the-Job Training - All sectors - 1 to 4 years (jobs)		19,018	18,116	21,429	23,745	25,759	33,185
On-the-Job Training - All sectors - 4 to 10 years (jobs)		5,582	5,257	6,258	7,204	8,176	10,545
On-the-Job Training - All sectors - None (jobs)		4,761	4,505	5,356	5,945	6,494	8,561
On-the-Job Training - All sectors - Over 10 years (jobs)		894	880	1,065	1,157	1,211	1,566
On-the-Job Training - All sectors - Up to 1 year (jobs)		60,141	57,337	67,632	73,934	79,031	102,997
Related work experience - All sectors - 1 to 4 years (jobs)		32,879	31,090	36,443	40,009	43,099	55,874
Related work experience - All sectors - 4 to 10 years (jobs)		21,167	20,095	23,574	25,901	27,874	35,975
Related work experience - All sectors - None (jobs)		12,873	12,326	14,603	16,190	17,586	22,930
Related work experience - All sectors - Over 10 years (jobs)		5,876	5,616	6,574	7,083	7,435	9,555
Related work experience - All sectors - Up to 1 year (jobs)		17,602	16,968	20,547	22,802	24,678	32,520
Wage income - All (million $2019)		5,622	5,376	6,348	7,067	7,741	10,145

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)		59,150	64,632				
Sales of cooking units - Electric Resistance (%)	18.5	21.6	27.5	43	64.5	77.7	82.3
Sales of cooking units - Gas (%)	81.5	78.4	72.5	57	35.5	22.3	17.7
Sales of space heating units - Electric Heat Pump (%)	2.56	7.82	11.2	21.8	42.1	62.6	73.2
Sales of space heating units - Electric Resistance (%)	5.59	3.46	4.4	7.36	12.7	16.8	19
Sales of space heating units - Fossil (%)	19.4	17.2	16.4	12.8	6.63	2.21	0.78
Sales of space heating units - Gas Furnace (%)	72.4	71.6	67.9	58.1	38.6	18.3	7.04
Sales of water heating units - Electric Heat Pump (%)	0.624	1.34	4.16	12.7	28.8	44.1	51.9
Sales of water heating units - Electric Resistance (%)	3.49	2.59	4.34	9.88	21.2	33.5	40.1
Sales of water heating units - Gas Furnace (%)	94.2	94.7	90.2	76.4	49.4	22.1	7.82
Sales of water heating units - Other (%)	1.74	1.35	1.32	1.03	0.608	0.33	0.23

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)		5.07	5.09	7.06	7.31	10.1	10.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	388	381	378	375	368	359	349
Final energy use - Industry (PJ)	791	783	769	764	735	716	676
Final energy use - Residential (PJ)	467	428	403	379	349	315	281
Final energy use - Transportation (PJ)	817	772	705	650	607	555	495

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)		10.8	13				
Sales of cooking units - Electric Resistance (%)	55.2	56.3	60.5	71.3	86.3	95.6	98.8
Sales of cooking units - Gas (%)	44.8	43.7	39.5	28.7	13.7	4.42	1.19
Sales of space heating units - Electric Heat Pump (%)	8.42	13.6	18	31.2	54.5	74.9	84.5
Sales of space heating units - Electric Resistance (%)	9.49	12.2	11.8	10.4	7.78	5.17	3.89
Sales of space heating units - Fossil (%)	24.2	34.8	32.7	26.6	17	10.3	7.7
Sales of space heating units - Gas (%)	57.9	39.4	37.5	31.8	20.7	9.65	3.89
Sales of water heating units - Electric Heat Pump (%)	0	0.823	3.14	10.1	22.7	34.2	39.8
Sales of water heating units - Electric Resistance (%)	35.5	52.7	52.6	52.6	53.5	55.2	56.4
Sales of water heating units - Gas Furnace (%)	58.8	42.8	40.8	34.6	22.4	10	3.56
Sales of water heating units - Other (%)	5.73	3.74	3.46	2.63	1.37	0.535	0.247

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	333	699	2,363	7,431	10,827
Public EV charging plugs - DC Fast (1000 units)	0.267		1.09		5.72		16
Public EV charging plugs - L2 (1000 units)	1.32		26.2		137		383
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 (%)	1.45	1.88	2.04	1.61	1.02	0.523	0.225
Vehicle sales - Light-duty - EV (%)	2.03	4.99	12.5	26.8	49.4	72.7	87.8
Vehicle sales - Light-duty - gasoline (%)	91.3	86.9	78.6	65.4	45	24.1	10.7
Vehicle sales - Light-duty - hybrid (%)	4.99	5.77	6.44	5.8	4.29	2.5	1.2
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.377	0.319	0.241	0.17	0.094	0.044
Vehicle sales - Light-duty - other (%)	0.098	0.101	0.091	0.079	0.057	0.031	0.014
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)							-304
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,059
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-95.2
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-2,458
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-304
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,086
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-47.6
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,437
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							139
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,571
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							173

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)							1,884
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							139
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							829
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							86.6
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,055

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)							-291
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-27,852
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,104
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-8,777
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-440
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-5,935
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,121
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-186
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-4,122
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,875
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-146
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-8,341
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-517
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,371
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-224
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1,978
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-392
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-93.2
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-312
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,306
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-218

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)							-18,092
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,811
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,074
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-328
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-3,957
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-757
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-140
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,217
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,591
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							47.6
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							420
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,476
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							162
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)							107
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							12.3
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							117
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,285
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,626
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							23.8
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							395
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,715
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							81
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)							56.1
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							6.16
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							20.3
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							777
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,074
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							35.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							407
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,095
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							122
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)							81.3
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							9.24
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							147
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,565
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,463

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		2,374	1.62	1.6	1.47	1	0.081
Monetary damages from air pollution - Natural Gas (million 2019$)		589	376	166	77.4	25.1	16.2
Monetary damages from air pollution - Transportation (million 2019$)		4,245	4,272	4,139	3,715	2,952	2,023
Premature deaths from air pollution - Coal (deaths)		268	0.183	0.181	0.166	0.113	0.009
Premature deaths from air pollution - Natural Gas (deaths)		66.5	42.4	18.8	8.74	2.84	1.83
Premature deaths from air pollution - Transportation (deaths)		477	480	466	418	332	228

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)		59,163	64,630				
Sales of cooking units - Electric Resistance (%)	18.5	33.7	75.3	83.5	83.9	84	84
Sales of cooking units - Gas (%)	81.5	66.3	24.7	16.5	16.1	16	16
Sales of space heating units - Electric Heat Pump (%)	2.56	11.7	42	73.7	78.6	79.2	79.1
Sales of space heating units - Electric Resistance (%)	5.59	4.8	13.3	19	20.2	19.9	20
Sales of space heating units - Fossil (%)	19.4	14.8	2.91	0.126	0	0	0
Sales of space heating units - Gas Furnace (%)	72.4	68.7	41.8	7.14	1.21	0.873	0.87
Sales of water heating units - Electric Heat Pump (%)	0.624	4.78	29.6	52.2	55.8	56	56
Sales of water heating units - Electric Resistance (%)	3.49	4.26	19.8	40.2	43.6	43.8	43.8
Sales of water heating units - Gas Furnace (%)	94.2	89.8	50.2	7.42	0.426	0	0
Sales of water heating units - Other (%)	1.74	1.19	0.379	0.186	0.177	0.178	0.178

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)		6.13	6.27	11.6	12.4	12.4	13.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	388	381	368	346	323	310	307
Final energy use - Industry (PJ)	791	783	767	757	724	706	669
Final energy use - Residential (PJ)	467	427	389	337	289	255	236
Final energy use - Transportation (PJ)	816	765	673	560	457	393	364

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)		10.8	12.5				
Sales of cooking units - Electric Resistance (%)	55.4	64.9	94	99.7	100	100	100
Sales of cooking units - Gas (%)	44.6	35.1	6.01	0.303	0	0	0
Sales of space heating units - Electric Heat Pump (%)	8.42	19.7	58.8	85.6	89.5	89.7	89.7
Sales of space heating units - Electric Resistance (%)	9.49	11.8	7.94	3.83	3.14	3.17	3.29
Sales of space heating units - Fossil (%)	24.2	31.3	12.5	6.86	6.43	6.34	6.23
Sales of space heating units - Gas (%)	57.9	37.3	20.7	3.68	0.918	0.75	0.749
Sales of water heating units - Electric Heat Pump (%)	0	3.85	24.2	40.2	42.6	42.8	42.8
Sales of water heating units - Electric Resistance (%)	35.5	52.4	52.4	56.3	57.1	57.1	57.1
Sales of water heating units - Gas Furnace (%)	58.8	40.5	22.7	3.36	0.193	0	0
Sales of water heating units - Other (%)	5.73	3.25	0.692	0.122	0.097	0.097	0.098

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)		2,057	5,276	8,545	12,946	14,088	13,433
Public EV charging plugs - DC Fast (1000 units)	0.267		3.52		15.4		24.9
Public EV charging plugs - L2 (1000 units)	1.32		84.6		370		599
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 (%)	1.43	1.71	1.21	0.386	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.31	16.4	48.3	82.5	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.2	76.6	46.9	15.8	3.2	0.587	0
Vehicle sales - Light-duty - hybrid (%)	4.8	4.82	3.34	1.23	0.301	0.066	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.333	0.194	0.06	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.096	0.092	0.059	0.021	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Base (billion $2018)		3.22	5.38	30.1	47.8	37.4	20.4
Capital invested - Wind - Base (billion $2018)		0	0	0	0	53	92.8
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)	93.6	2,906	8,171	40,113	93,933	138,575	164,416
Installed renewables - Solar - Constrained land use assumptions (MW)	187	7,815	25,680	121,507	218,837	261,025	334,257
Installed renewables - Wind - Base land use assumptions (MW)	1,619	1,619	1,619	1,619	1,619	27,886	76,561
Installed renewables - Wind - Constrained land use assumptions (MW)	3,238	3,238	3,238	79,098	122,628	122,628	122,628

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	4,440	12,355	59,174	137,449	201,306	240,508
Solar - Constrained land use assumptions (GWh)	338	12,023	38,750	179,024	319,962	379,989	490,835
Wind - Base land use assumptions (GWh)	6,912	6,912	6,912	6,912	6,912	99,062	239,521
Wind - Constrained land use assumptions (GWh)	13,823	13,823	13,823	269,647	386,096	386,096	386,096

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)							-304
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,059
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-95.2
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-2,458
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-304
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,086
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-47.6
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,437
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							139
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,571
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							173
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,884
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							139
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							829
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							86.6
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,055

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)							-291
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-27,852
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,104
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-8,777
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-440
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-5,935

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)							-1,121
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-186
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-4,122
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,875
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-146
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-8,341
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-517
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,371
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-224
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1,978
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-392
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-93.2
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-312
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,306
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-218
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-18,092
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,811
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,074
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-328
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-3,957
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-757
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-140
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,217
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,591
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							47.6
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							420
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,476
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							162

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)							107
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							12.3
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							117
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,285
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,626
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							23.8
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							395
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,715
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							81
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)							56.1
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							6.16
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							20.3
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							777
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,074
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							35.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							407
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,095
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							122
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)							81.3

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)							9.24
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							147
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,565
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,463

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		2,374	1.62	1.6	1.47	1	0.081
Monetary damages from air pollution - Natural Gas (million 2019$)		548	388	233	167	59.1	11.4
Monetary damages from air pollution - Transportation (million 2019$)		4,170	3,868	2,927	1,689	768	300
Premature deaths from air pollution - Coal (deaths)		268	0.183	0.181	0.166	0.113	0.009
Premature deaths from air pollution - Natural Gas (deaths)		61.8	43.8	26.3	18.8	6.67	1.29
Premature deaths from air pollution - Transportation (deaths)		469	435	329	190	86.4	33.7

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)		59,163	64,630				
Sales of cooking units - Electric Resistance (%)	18.5	33.7	75.3	83.5	83.9	84	84
Sales of cooking units - Gas (%)	81.5	66.3	24.7	16.5	16.1	16	16
Sales of space heating units - Electric Heat Pump (%)	2.56	11.7	42	73.7	78.6	79.2	79.1
Sales of space heating units - Electric Resistance (%)	5.59	4.8	13.3	19	20.2	19.9	20
Sales of space heating units - Fossil (%)	19.4	14.8	2.91	0.126	0	0	0
Sales of space heating units - Gas Furnace (%)	72.4	68.7	41.8	7.14	1.21	0.873	0.87
Sales of water heating units - Electric Heat Pump (%)	0.624	4.78	29.6	52.2	55.8	56	56
Sales of water heating units - Electric Resistance (%)	3.49	4.26	19.8	40.2	43.6	43.8	43.8
Sales of water heating units - Gas Furnace (%)	94.2	89.8	50.2	7.42	0.426	0	0
Sales of water heating units - Other (%)	1.74	1.19	0.379	0.186	0.177	0.178	0.178

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)		6.13	6.27	11.6	12.4	12.4	13.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	388	381	368	346	323	310	307

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	791	783	767	757	724	706	669
Final energy use - Residential (PJ)	467	427	389	337	289	255	236
Final energy use - Transportation (PJ)	816	765	673	560	457	393	364

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)		10.8	12.5				
Sales of cooking units - Electric Resistance (%)	55.4	64.9	94	99.7	100	100	100
Sales of cooking units - Gas (%)	44.6	35.1	6.01	0.303	0	0	0
Sales of space heating units - Electric Heat Pump (%)	8.42	19.7	58.8	85.6	89.5	89.7	89.7
Sales of space heating units - Electric Resistance (%)	9.49	11.8	7.94	3.83	3.14	3.17	3.29
Sales of space heating units - Fossil (%)	24.2	31.3	12.5	6.86	6.43	6.34	6.23
Sales of space heating units - Gas (%)	57.9	37.3	20.7	3.68	0.918	0.75	0.749
Sales of water heating units - Electric Heat Pump (%)	0	3.85	24.2	40.2	42.6	42.8	42.8
Sales of water heating units - Electric Resistance (%)	35.5	52.4	52.4	56.3	57.1	57.1	57.1
Sales of water heating units - Gas Furnace (%)	58.8	40.5	22.7	3.36	0.193	0	0
Sales of water heating units - Other (%)	5.73	3.25	0.692	0.122	0.097	0.097	0.098

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)		2,057	5,276	8,545	12,946	14,088	13,433
Public EV charging plugs - DC Fast (1000 units)	0.267		3.52		15.4		24.9
Public EV charging plugs - L2 (1000 units)	1.32		84.6		370		599
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 (%)	1.43	1.71	1.21	0.386	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.31	16.4	48.3	82.5	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.2	76.6	46.9	15.8	3.2	0.587	0
Vehicle sales - Light-duty - hybrid (%)	4.8	4.82	3.34	1.23	0.301	0.066	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.333	0.194	0.06	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.096	0.092	0.059	0.021	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Base (billion $2018)		0	0.794	0.689	1.23	1.11	0
Capital invested - Solar PV - Constrained (billion $2018)		0.746	2.35	1.42	1.73	4.6	0.659
Capital invested - Wind - Base (billion $2018)		0	0	0	0	0	0
Capital invested - Wind - Constrained (billion $2018)		0	0	0	0	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 - Solar - Base land use assumptions (MW)	93.6	93.6	870	1,601	2,985	4,312	4,312
Installed renewables - Solar - Constrained land use assumptions (MW)	93.6	746	3,041	4,549	6,495	11,985	12,817
Installed renewables - Wind - Base land use assumptions (MW)	1,619	1,619	1,619	1,619	1,619	1,619	1,619
Installed renewables - Wind - Constrained land use assumptions (MW)	1,619	1,619	1,619	1,619	1,619	1,619	1,619

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)	169	169	1,359	2,465	4,576	6,564	6,564
Solar - Constrained land use assumptions (GWh)	169	1,166	4,672	6,963	9,894	18,163	19,405
Wind - Base land use assumptions (GWh)	6,912	6,912	6,912	6,912	6,912	6,912	6,912
Wind - Constrained land use assumptions (GWh)	6,912	6,912	6,912	6,912	6,912	6,912	6,912

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)							-304
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,059
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-95.2
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-2,458
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-304
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,086
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-47.6
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,437

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)							139
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,571
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							173
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,884
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							139
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							829
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							86.6
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,055

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)							-291
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-27,852
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,104
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-8,777
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-440
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-5,935
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,121
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-186
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-4,122
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,875
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-146
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-8,341
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-517
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,371
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-224
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1,978
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-392

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)							-93.2
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-312
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,306
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-218
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-18,092
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,811
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,074
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-328
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-3,957
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-757
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-140
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,217
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,591
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							47.6
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							420
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,476
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							162
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)							107
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							12.3
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							117
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,285
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,626
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							23.8
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							395

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)							1,715
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							81
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)							56.1
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							6.16
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							20.3
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							777
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,074
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							35.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							407
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,095
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							122
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)							81.3
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							9.24
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							147
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,565
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,463

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		2,374	1.62	1.6	1.47	1	0.081
Monetary damages from air pollution - Natural Gas (million 2019$)		621	483	573	436	166	51.7
Monetary damages from air pollution - Transportation (million 2019$)		4,170	3,868	2,927	1,689	768	300
Premature deaths from air pollution - Coal (deaths)		268	0.183	0.181	0.166	0.113	0.009

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Natural Gas (deaths)		70.1	54.5	64.6	49.2	18.8	5.84
Premature deaths from air pollution - Transportation (deaths)		469	435	329	190	86.4	33.7

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)		59,150	64,632				
Sales of cooking units - Electric Resistance (%)	18.5	21.6	27.5	43	64.5	77.7	82.3
Sales of cooking units - Gas (%)	81.5	78.4	72.5	57	35.5	22.3	17.7
Sales of space heating units - Electric Heat Pump (%)	2.56	7.82	11.2	21.8	42.1	62.6	73.2
Sales of space heating units - Electric Resistance (%)	5.59	3.46	4.4	7.36	12.7	16.8	19
Sales of space heating units - Fossil (%)	19.4	17.2	16.4	12.8	6.63	2.21	0.78
Sales of space heating units - Gas Furnace (%)	72.4	71.6	67.9	58.1	38.6	18.3	7.04
Sales of water heating units - Electric Heat Pump (%)	0.624	1.34	4.16	12.7	28.8	44.1	51.9
Sales of water heating units - Electric Resistance (%)	3.49	2.59	4.34	9.88	21.2	33.5	40.1
Sales of water heating units - Gas Furnace (%)	94.2	94.7	90.2	76.4	49.4	22.1	7.82
Sales of water heating units - Other (%)	1.74	1.35	1.32	1.03	0.608	0.33	0.23

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)		5.07	5.09	7.06	7.31	10.1	10.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	388	381	378	375	368	359	349
Final energy use - Industry (PJ)	791	783	769	764	735	716	676
Final energy use - Residential (PJ)	467	428	403	379	349	315	281
Final energy use - Transportation (PJ)	817	772	705	650	607	555	495

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)		10.8	13				
Sales of cooking units - Electric Resistance (%)	55.2	56.3	60.5	71.3	86.3	95.6	98.8
Sales of cooking units - Gas (%)	44.8	43.7	39.5	28.7	13.7	4.42	1.19
Sales of space heating units - Electric Heat Pump (%)	8.42	13.6	18	31.2	54.5	74.9	84.5
Sales of space heating units - Electric Resistance (%)	9.49	12.2	11.8	10.4	7.78	5.17	3.89
Sales of space heating units - Fossil (%)	24.2	34.8	32.7	26.6	17	10.3	7.7
Sales of space heating units - Gas (%)	57.9	39.4	37.5	31.8	20.7	9.65	3.89
Sales of water heating units - Electric Heat Pump (%)	0	0.823	3.14	10.1	22.7	34.2	39.8
Sales of water heating units - Electric Resistance (%)	35.5	52.7	52.6	52.6	53.5	55.2	56.4

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 (%)	58.8	42.8	40.8	34.6	22.4	10	3.56
Sales of water heating units - Other (%)	5.73	3.74	3.46	2.63	1.37	0.535	0.247

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	333	699	2,363	7,431	10,827
Public EV charging plugs - DC Fast (1000 units)	0.267		1.09		5.72		16
Public EV charging plugs - L2 (1000 units)	1.32		26.2		137		383
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 (%)	1.45	1.88	2.04	1.61	1.02	0.523	0.225
Vehicle sales - Light-duty - EV (%)	2.03	4.99	12.5	26.8	49.4	72.7	87.8
Vehicle sales - Light-duty - gasoline (%)	91.3	86.9	78.6	65.4	45	24.1	10.7
Vehicle sales - Light-duty - hybrid (%)	4.99	5.77	6.44	5.8	4.29	2.5	1.2
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.377	0.319	0.241	0.17	0.094	0.044
Vehicle sales - Light-duty - other (%)	0.098	0.101	0.091	0.079	0.057	0.031	0.014
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	1,316
Conversion capital investment - Cumulative 5-yr (million $2018)		0	0	0	0	0	14,912
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	15
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	3.35	3.32	6.84	7.07
Annual - BECCS (MMT)		0	0	0	0	0	0
Annual - Cement and lime (MMT)		0	0	3.35	3.32	6.84	7.07
Annual - NGCC (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	3.35	6.67	13.5	20.6
Cumulative - BECCS (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	3.35	6.67	13.5	20.6
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	622	826	826	1,084	909
Cumulative investment - All (million $2018)		0	1,668	2,627	2,627	3,210	3,121
Cumulative investment - Spur (million $2018)		0	54.5	97.9	97.7	272	183
Cumulative investment - Trunk (million $2018)		0	1,614	2,529	2,529	2,938	2,938
Spur (km)		0	107	157	157	416	241
Trunk (km)		0	515	669	669	669	669

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)							-627
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,912
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)							-88.1
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-2,627
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-627
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,009
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)							-44.1
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,680
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							253
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							3,594
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							14.8
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							58.1
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							160
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							4,080
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							253
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							768
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							14.8
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							58.1
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							80.2
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,174

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)							-291
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-27,852
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,104
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-8,777
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-440
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-5,935
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,121
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-186
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-4,122
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,875
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-146
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-8,341
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-517
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,371
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-224
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1,978
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-392
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-93.2
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-312
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,306
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-218
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-18,092
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,811
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,074
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-328
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-3,957
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-757
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-140
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,217
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,591

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)							47.6
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							420
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,476
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							162
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)							107
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							12.3
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							117
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,285
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,626
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							23.8
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							395
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,715
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							81
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)							56.1
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							6.16
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							20.3
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							777
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,074
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							35.7

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)							407
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,095
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							122
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)							81.3
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							9.24
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							147
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,565
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,463

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		2,374	1.62	1.6	1.47	1	0.081
Monetary damages from air pollution - Natural Gas (million 2019$)		599	357	206	160	92.3	25.3
Monetary damages from air pollution - Transportation (million 2019$)		4,245	4,272	4,139	3,715	2,952	2,023
Premature deaths from air pollution - Coal (deaths)		268	0.183	0.181	0.166	0.113	0.009
Premature deaths from air pollution - Natural Gas (deaths)		67.6	40.3	23.3	18.1	10.4	2.85
Premature deaths from air pollution - Transportation (deaths)		477	480	466	418	332	228

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)		58,459	60,226				
Sales of cooking units - Electric Resistance (%)	18.5	19.4	19.4	19.6	19.7	19.8	19.9
Sales of cooking units - Gas (%)	81.5	80.6	80.6	80.4	80.3	80.2	80.1
Sales of space heating units - Electric Heat Pump (%)	2.56	12.8	39.8	61.7	65	65.6	65.5
Sales of space heating units - Electric Resistance (%)	5.59	4.04	8.87	21.3	31.9	33.3	33.6
Sales of space heating units - Fossil (%)	19.4	16.7	13	5.8	0.885	0.071	0
Sales of space heating units - Gas Furnace (%)	72.4	66.4	38.4	11.1	2.19	0.955	0.868
Sales of water heating units - Electric Heat Pump (%)	0.624	0.33	0.331	0.332	0.331	0.334	0.334
Sales of water heating units - Electric Resistance (%)	3.49	1.96	1.94	1.95	1.94	1.94	1.94

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 (%)	94.2	96.3	96.3	96.3	96.3	96.2	96.2
Sales of water heating units - Other (%)	1.74	1.38	1.45	1.44	1.45	1.49	1.49

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)		5.28	5.32	8.01	8.36	9.84	10.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	388	385	387	386	389	402	426
Final energy use - Industry (PJ)	792	798	821	830	852	875	887
Final energy use - Residential (PJ)	467	430	411	398	391	386	383
Final energy use - Transportation (PJ)	816	774	716	682	684	705	733

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)		10.4	10.9				
Sales of cooking units - Electric Resistance (%)	54.8	54.8	54.8	54.8	54.8	54.8	54.8
Sales of cooking units - Gas (%)	45.2	45.2	45.2	45.2	45.2	45.2	45.2
Sales of space heating units - Electric Heat Pump (%)	6.94	20.6	21.2	22	22.5	23	23.7
Sales of space heating units - Electric Resistance (%)	9.71	11.3	11.1	10.9	10.7	10.1	9.42
Sales of space heating units - Fossil (%)	24.6	29.7	17.7	10.2	9.79	9.79	9.79
Sales of space heating units - Gas (%)	58.8	38.5	50	56.9	57	57	57.1
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	35.5	52.7	52.6	52.5	52.4	52.4	52.3
Sales of water heating units - Gas Furnace (%)	58.8	43.5	43.6	43.7	43.7	43.8	43.9
Sales of water heating units - Other (%)	5.73	3.84	3.85	3.85	3.86	3.86	3.87

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 (%)	1.44	1.87	2.16	2.02	1.81	1.69	1.6
Vehicle sales - Light-duty - EV (%)	3.95	6.1	6.91	8.53	10.3	11.9	13.1
Vehicle sales - Light-duty - gasoline (%)	89.6	85.9	83.6	81.6	79.5	77.5	76
Vehicle sales - Light-duty - hybrid (%)	4.82	5.65	6.89	7.44	7.98	8.5	8.88
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.373	0.339	0.3	0.296	0.295	0.306
Vehicle sales - Light-duty - other (%)	0.097	0.101	0.097	0.097	0.097	0.095	0.098
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)							-291
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-27,852
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,104
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-8,777
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-440
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-5,935
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,121
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-186
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-4,122
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,875
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-146
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-8,341
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-517
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,371
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-224
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-1,978
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-392
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-93.2
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-312
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,306
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-218
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-18,092
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,811
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,074
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-328
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-3,957

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)							-757
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-140
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,217
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,591
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							47.6
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							420
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,476
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							162
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)							107
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							12.3
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							117
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,285
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							6,626
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							23.8
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							395
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,715
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							81
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)							56.1
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							6.16
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							20.3
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							777

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)							3,074
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							35.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							407
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,095
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							122
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)							81.3
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							9.24
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							147
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,565
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							5,463

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)	-32.9		-14.7				-13.1
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-1.61		-2.91				-3.02
Business-as-usual carbon sink - Total (Mt CO2e/y)	-34.5		-17.6				-16.2

Table 66: *REF scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		6,216	3,922	3,657	3,539	3,467	3,151
Monetary damages from air pollution - Natural Gas (million 2019$)		453	501	643	656	647	588
Monetary damages from air pollution - Transportation (million 2019$)		4,236	4,322	4,405	4,511	4,620	4,736
Premature deaths from air pollution - Coal (deaths)		702	443	413	400	392	356
Premature deaths from air pollution - Natural Gas (deaths)		51.1	56.6	72.5	74	73	66.4
Premature deaths from air pollution - Transportation (deaths)		476	486	495	507	520	533