Net-Zero America - florida 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

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)		66,758	74,510				
Sales of cooking units - Electric Resistance (%)	32	46	79.9	86.5	86.9	86.9	86.9
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Sales of space heating units - Electric Heat Pump (%)	23.9	27	70.6	83.8	84.8	85	85.1
Sales of space heating units - Electric Resistance (%)	22.7	8.53	10.3	12.4	13.2	13	12.8
Sales of space heating units - Fossil (%)	0	3.82	0.711	0.031	0	0	0
Sales of space heating units - Gas Furnace (%)	53.5	60.7	18.4	3.73	1.99	2	2.02
Sales of water heating units - Electric Heat Pump (%)	0.849	10.5	54.3	64	64.4	64.5	64.5
Sales of water heating units - Electric Resistance (%)	20.9	11.5	28.7	32.5	32.7	32.7	32.7
Sales of water heating units - Gas Furnace (%)	69.5	73.9	14	0.589	0	0	0
Sales of water heating units - Other (%)	8.69	4.13	3.09	2.85	2.86	2.83	2.82

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)		7.9	7.56	13.5	13.9	16.3	17

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	434	437	427	413	402	400	406
Final energy use - Industry (PJ)	555	584	599	624	651	665	684
Final energy use - Residential (PJ)	511	493	475	450	430	422	425
Final energy use - Transportation (PJ)	1,917	1,804	1,617	1,384	1,172	1,037	974

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)		16.2	21.3				
Sales of cooking units - Electric Resistance (%)	96	96.9	99.5	100	100	100	100
Sales of cooking units - Gas (%)	3.99	3.14	0.538	0.027	0	0	0
Sales of space heating units - Electric Heat Pump (%)	51.7	60.3	83.9	89.2	89.3	89.1	89
Sales of space heating units - Electric Resistance (%)	40	35.5	15	10.4	10.3	10.5	10.6
Sales of space heating units - Fossil (%)	0.822	0.7	0.133	0.006	0	0	0
Sales of space heating units - Gas (%)	7.51	3.51	0.99	0.435	0.414	0.413	0.412
Sales of water heating units - Electric Heat Pump (%)	0	12.3	65.2	77	77.6	77.6	77.6
Sales of water heating units - Electric Resistance (%)	88.4	81.8	31.6	20.4	19.9	19.9	19.9
Sales of water heating units - Gas Furnace (%)	6.88	3.27	0.619	0.026	0	0	0
Sales of water heating units - Other (%)	4.69	2.6	2.57	2.58	2.57	2.54	2.53

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)		3,333	8,621	13,843	21,020	22,822	21,789
Public EV charging plugs - DC Fast (1000 units)	0.717		5.18		21.9		35.3
Public EV charging plugs - L2 (1000 units)	3.3		124		526		848
Vehicle sales - Heavy-duty - diesel (%)	97.2	92.1	67	23.3	4.22	0.628	0
Vehicle sales - Heavy-duty - EV (%)	0.588	3.81	19	45.6	57.4	59.6	60
Vehicle sales - Heavy-duty - gasoline (%)	0.227	0.227	0.176	0.066	0.013	0.002	0
Vehicle sales - Heavy-duty - hybrid (%)	0.082	0.09	0.077	0.031	0.007	0.001	0
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.392	2.54	12.7	30.4	38.2	39.7	40
Vehicle sales - Heavy-duty - other (%)	1.5	1.23	1.07	0.568	0.163	0.038	0
Vehicle sales - Light-duty - diesel (%)	1.29	1.58	1.16	0.367	0.07	0.013	0
Vehicle sales - Light-duty - EV (%)	4.79	17.9	50.4	83.4	96.5	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88.5	75	44.7	14.9	3.08	0.584	0
Vehicle sales - Light-duty - hybrid (%)	5.27	5.16	3.5	1.27	0.314	0.07	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.109	0.325	0.182	0.055	0.011	0.002	0
Vehicle sales - Light-duty - other (%)	0.09	0.085	0.053	0.019	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant (billion $2018)	0	0.003	0.163	0.013	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0.02	0.005	0.002	0.019
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0.043	0	0.006	2.06	0.012
Capital invested - Offshore Wind - Base (billion $2018)		0.266	0	0	1.43	0.916	9.44
Capital invested - Solar PV - Base (billion $2018)		12.2	26.3	41.1	26.3	22	0
Capital invested - Solar PV - Constrained (billion $2018)		13.8	28.1	31.2	32.4	20.3	0
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	93.8	93.8	93.8	920	1,541	9,078
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	93.8	93.8	93.8	920	1,541	9,078
Installed renewables - Rooftop PV (MW)	723	1,179	1,661	2,333	3,256	4,426	5,903
Installed renewables - Solar - Base land use assumptions (MW)	3,072	13,748	39,484	83,145	112,759	139,025	139,025
Installed renewables - Solar - Constrained land use assumptions (MW)	2,996	10,804	38,344	71,601	103,101	132,894	189,932
Installed renewables - Wind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	5.92	326	351	351	351	351
Biomass w/ccu allam power plant (GWh)	0	0	0	20.2	24.9	26.9	45.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass w/ccu power plant (GWh)	0	0	48.5	48.5	55.5	2,368	2,382
OffshoreWind - Base land use assumptions (GWh)	0	285	285	285	2,790	4,681	27,587
OffshoreWind - Constrained land use assumptions (GWh)	0	285	285	285	2,790	4,681	27,587
Solar - Base land use assumptions (GWh)	6,248	24,952	69,352	144,033	194,716	239,156	239,156
Solar - Constrained land use assumptions (GWh)	6,093	19,784	67,349	124,210	178,091	228,553	328,145
Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0

Table 8: *E+ scenario - PILLAR 3: Clean fuels - Bioenergy*

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million $2018/year)		7.28	21.8	58.6	333	579	700
Conversion capital investment - Cumulative 5-yr (million $2018)		3.4	221	785	5,743	5,424	2,560
Number of facilities - Allam power w ccu (quantity)	0	0	0	1	2	3	4
Number of facilities - Beccs hydrogen (quantity)	0	0	0	1	7	9	12
Number of facilities - Diesel (quantity)	0	0	0	1	1	1	1
Number of facilities - Diesel ccu (quantity)	0	0	0	1	2	3	4
Number of facilities - Power (quantity)	0	1	1	1	1	1	1
Number of facilities - Power ccu (quantity)	0	0	1	1	2	4	5
Number of facilities - Pyrolysis (quantity)	0	0	0	1	1	1	1
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	1	2	3	4
Number of facilities - Sng (quantity)	0	1	1	1	1	1	1
Number of facilities - Sng ccu (quantity)	0	0	1	1	1	1	1

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0.08	3.73	14.5	24.6	31.4
Annual - BECCS (MMT)		0	0.05	0.98	8.35	15.1	18.4
Annual - Cement and lime (MMT)		0	0	0	3.32	6.84	7.07
Annual - NGCC (MMT)		0	0.03	2.75	2.87	2.62	5.94
Cumulative - All (MMT)		0	0.08	3.81	18.3	42.9	74.3
Cumulative - BECCS (MMT)		0	0.05	1.03	9.38	24.5	42.8
Cumulative - Cement and lime (MMT)		0	0	0	3.32	10.2	17.2
Cumulative - NGCC (MMT)		0	0.03	2.78	5.65	8.27	14.2

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	739	1,095	1,533	2,279	3,321
Cumulative investment - All (million $2018)		0	3,102	3,325	3,600	4,157	4,755
Cumulative investment - Spur (million $2018)		0	55	278	553	1,109	1,708
Cumulative investment - Trunk (million $2018)		0	3,047	3,047	3,047	3,047	3,047
Spur (km)		0	104	460	897	1,644	2,685
Trunk (km)		0	636	636	636	636	636

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

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	4.39	10.6	19.9	31	42.9
Injection wells (wells)		0	8	32	56	92	116
Resource characterization, appraisal, permitting costs (million $2020)		159	552	785	785	785	785
Wells and facilities construction costs (million $2020)		0	245	955	1,702	2,846	3,533

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,077
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-29.6
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-2,107
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,066
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.8
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,081
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,091
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							53.8
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,144
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							559
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							26.9
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							586

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)							-1,328
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-38,862
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,923
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-6,195
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-9,304
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-983
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-462
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-8,095
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,781
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-665
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-11,529
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-654
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,380
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,929
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,101
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-344
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-231
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-613
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,612
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-997
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-25,162
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-2,289
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,287
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,827
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-6,203
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-664
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-346
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-4,354
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,196

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)							217
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							531
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,159
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,397
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)							93.4
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							30.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							230
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,585
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,243
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							109
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							499
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,210
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							698
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)							49.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							15.3
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							39.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							959
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,579
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							163

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)							515
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,185
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,051
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)							71.3
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							22.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							288
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,931
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,227

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		1,143	964	773	582	366	254
Natural gas consumption - Cumulative (tcf)							23,282
Natural gas production - Annual (tcf)		0.703	0.665	0.579	0.49	0.388	0.302
Oil consumption - Annual (million bbls)		251	213	161	113	74.7	44.5
Oil consumption - Cumulative (million bbls)							4,994
Oil production - Annual (million bbls)		2.38	2.39	2.39	1.89	1.54	1.02

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		524	2.32	1.71	0.784	0.369	0.022
Monetary damages from air pollution - Natural Gas (million 2019$)		741	692	577	515	242	48.8
Monetary damages from air pollution - Transportation (million 2019$)		5,828	5,517	4,260	2,502	1,148	438
Premature deaths from air pollution - Coal (deaths)		59.2	0.262	0.193	0.088	0.042	0.002
Premature deaths from air pollution - Natural Gas (deaths)		83.7	78.1	65.2	58.1	27.3	5.51
Premature deaths from air pollution - Transportation (deaths)		655	621	479	281	129	49.3

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		441	914	474	917	1,127	1,077
By economic sector - Construction (jobs)		23,021	35,821	49,347	48,665	48,605	43,930
By economic sector - Manufacturing (jobs)		24,447	45,256	46,005	37,098	42,104	34,014
By economic sector - Mining (jobs)		5,402	3,987	2,732	1,719	1,176	734

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		2,780	5,563	9,110	9,284	9,894	8,443
By economic sector - Pipeline (jobs)		1,350	1,447	948	737	544	481
By economic sector - Professional (jobs)		10,172	14,469	19,882	20,821	21,996	21,481
By economic sector - Trade (jobs)		7,298	9,870	13,623	13,902	14,675	13,914
By economic sector - Utilities (jobs)		21,345	26,089	33,401	37,627	39,598	39,980
By education level - All sectors - Associates degree or some college (jobs)		30,512	45,799	56,567	55,218	58,114	53,112
By education level - All sectors - Bachelors degree (jobs)		19,613	28,143	33,852	32,816	34,634	31,824
By education level - All sectors - Doctoral degree (jobs)		601	834	1,066	1,065	1,112	1,047
By education level - All sectors - High school diploma or less (jobs)		41,000	62,278	76,175	73,863	77,628	70,372
By education level - All sectors - Masters or professional degree (jobs)		4,531	6,361	7,863	7,810	8,231	7,700
By resource sector - Biomass (jobs)		1,893	2,520	1,351	2,761	4,109	4,599
By resource sector - CO2 (jobs)		82	2,816	892	1,078	1,646	2,234
By resource sector - Coal (jobs)		1,089	0	0	0	0	0
By resource sector - Grid (jobs)		25,278	35,441	55,390	65,497	70,923	74,895
By resource sector - Natural Gas (jobs)		16,891	14,613	12,227	11,292	9,629	6,185
By resource sector - Nuclear (jobs)		1,917	1,707	1,058	520	302	0.792
By resource sector - Oil (jobs)		11,673	9,194	6,500	4,263	2,686	1,516
By resource sector - Solar (jobs)		37,316	75,398	96,770	80,832	79,408	58,456
By resource sector - Wind (jobs)		117	1,727	1,334	4,528	11,015	16,170
Median wages - Annual - All ($2019 per job)		53,711	53,020	53,538	54,596	55,319	56,620
On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs)		15,713	23,361	28,856	28,205	29,563	27,056
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)		6,192	8,882	11,382	11,417	11,790	10,959
On-Site or In-Plant Training - Total jobs - None (jobs)		15,682	23,565	28,751	27,791	29,270	26,568
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)		814	1,210	1,516	1,503	1,577	1,459
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)		57,855	86,398	105,017	101,854	107,518	98,013
On-the-Job Training - All sectors - 1 to 4 years (jobs)		20,187	29,911	37,029	36,265	37,968	34,809
On-the-Job Training - All sectors - 4 to 10 years (jobs)		6,024	8,699	11,283	11,375	11,734	10,921
On-the-Job Training - All sectors - None (jobs)		5,170	7,689	9,484	9,179	9,645	8,745
On-the-Job Training - All sectors - Over 10 years (jobs)		1,000	1,561	1,867	1,738	1,821	1,605
On-the-Job Training - All sectors - Up to 1 year (jobs)		63,876	95,555	115,859	112,215	118,551	107,975
Related work experience - All sectors - 1 to 4 years (jobs)		34,489	50,873	62,242	60,724	63,879	58,467
Related work experience - All sectors - 4 to 10 years (jobs)		22,355	32,886	40,298	39,289	41,252	37,817
Related work experience - All sectors - None (jobs)		13,844	20,624	25,395	24,891	26,193	23,942
Related work experience - All sectors - Over 10 years (jobs)		6,133	9,149	10,989	10,544	11,139	10,136
Related work experience - All sectors - Up to 1 year (jobs)		19,435	29,884	36,599	35,324	37,257	33,693
Wage income - All (million $2019)		5,170	7,605	9,398	9,325	9,943	9,290

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)		66,742	74,583				
Sales of cooking units - Electric Resistance (%)	32	36.2	40.9	53.4	71	81.7	85.5
Sales of cooking units - Gas (%)	68	63.8	59.1	46.6	29	18.3	14.5
Sales of space heating units - Electric Heat Pump (%)	23.9	18.7	23.8	38	60.4	76.6	82.8
Sales of space heating units - Electric Resistance (%)	22.7	8.23	8.33	9.11	10.8	11.9	12.5
Sales of space heating units - Fossil (%)	0	4.41	4	3.07	1.56	0.485	0.126
Sales of space heating units - Gas Furnace (%)	53.5	68.6	63.8	49.8	27.3	11	4.53
Sales of water heating units - Electric Heat Pump (%)	0.849	2.05	7.03	21.4	43.4	57.8	62.8
Sales of water heating units - Electric Resistance (%)	20.9	8.16	9.94	15.6	24.4	30	32
Sales of water heating units - Gas Furnace (%)	69.5	85.5	78.7	59.1	28.9	9.24	2.41
Sales of water heating units - Other (%)	8.69	4.32	4.29	3.91	3.39	3	2.87

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)		6.42	5.91	9.28	9.23	14.5	15.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	434	438	434	430	423	419	420
Final energy use - Industry (PJ)	555	584	600	630	661	675	696
Final energy use - Residential (PJ)	511	494	487	477	464	448	440
Final energy use - Transportation (PJ)	1,919	1,820	1,686	1,572	1,479	1,369	1,239

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)		16	20				
Sales of cooking units - Electric Resistance (%)	96	96.1	96.5	97.4	98.8	99.6	99.9
Sales of cooking units - Gas (%)	4.01	3.91	3.54	2.57	1.23	0.395	0.106
Sales of space heating units - Electric Heat Pump (%)	51.7	55.7	58.3	66.2	77.9	85.5	88.2
Sales of space heating units - Electric Resistance (%)	40	39.5	37.2	30.4	20.2	13.6	11.3
Sales of space heating units - Fossil (%)	0.822	0.81	0.749	0.558	0.266	0.083	0.021
Sales of space heating units - Gas (%)	7.51	3.99	3.69	2.89	1.63	0.801	0.513
Sales of water heating units - Electric Heat Pump (%)	0	2.12	8.14	25.5	52.1	69.4	75.5
Sales of water heating units - Electric Resistance (%)	88.4	91.5	85.8	69.3	44.1	27.6	21.9
Sales of water heating units - Gas Furnace (%)	6.88	3.79	3.49	2.63	1.29	0.412	0.107
Sales of water heating units - Other (%)	4.69	2.6	2.57	2.58	2.57	2.54	2.52

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	553	1,131	3,850	12,021	17,546
Public EV charging plugs - DC Fast (1000 units)	0.717		1.71		8.21		22.6
Public EV charging plugs - L2 (1000 units)	3.3		41.1		197		543
Vehicle sales - Heavy-duty - diesel (%)	97.4	96	91.3	79.8	58.2	32.1	13.7
Vehicle sales - Heavy-duty - EV (%)	0.498	1.45	4.11	10.8	23.6	39.5	51
Vehicle sales - Heavy-duty - gasoline (%)	0.228	0.236	0.239	0.225	0.179	0.109	0.051
Vehicle sales - Heavy-duty - hybrid (%)	0.083	0.094	0.104	0.107	0.092	0.06	0.03
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.332	0.969	2.74	7.17	15.7	26.3	34
Vehicle sales - Heavy-duty - other (%)	1.5	1.28	1.46	1.95	2.25	1.96	1.14
Vehicle sales - Light-duty - diesel (%)	1.3	1.76	2.01	1.59	0.995	0.506	0.218
Vehicle sales - Light-duty - EV (%)	2.19	5.36	13.2	28	50.7	73.5	88.2
Vehicle sales - Light-duty - gasoline (%)	90.8	86.2	77.5	63.9	43.6	23.3	10.3
Vehicle sales - Light-duty - hybrid (%)	5.48	6.25	6.9	6.15	4.49	2.58	1.22
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.373	0.311	0.232	0.161	0.088	0.041
Vehicle sales - Light-duty - other (%)	0.092	0.095	0.085	0.073	0.052	0.028	0.013
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen FC (%)	0.166	0.485	1.37	3.58	7.86	13.2	17
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,077
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-29.6
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-2,107
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,066
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.8
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,081
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,091
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							53.8

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)							1,144
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							559
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							26.9
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							586

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)							-1,328
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-38,862
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,923
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-6,195
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-9,304
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-983
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-462
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-8,095
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,781
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-665
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-11,529
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-654
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,380
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,929
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,101
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-344
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-231
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-613
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,612
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-997

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)							-25,162
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-2,289
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,287
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,827
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-6,203
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-664
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-346
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-4,354
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,196
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							217
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							531
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,159
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,397
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)							93.4
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							30.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							230
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,585
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,243
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							109
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							499
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,210
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							698
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)							49.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							15.3
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							39.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							959
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,579
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							163
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							515
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,185
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,051
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)							71.3
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							22.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							288
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,931
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,227

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		524	2.32	1.71	0.784	0.369	0.022
Monetary damages from air pollution - Natural Gas (million 2019$)		743	587	329	119	26.1	12.1
Monetary damages from air pollution - Transportation (million 2019$)		5,938	6,110	6,052	5,549	4,499	3,142
Premature deaths from air pollution - Coal (deaths)		59.2	0.262	0.193	0.088	0.042	0.002
Premature deaths from air pollution - Natural Gas (deaths)		83.8	66.2	37.2	13.5	2.94	1.37
Premature deaths from air pollution - Transportation (deaths)		668	687	681	624	506	353

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)		66,758	74,510				
Sales of cooking units - Electric Resistance (%)	32	46	79.9	86.5	86.9	86.9	86.9
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Sales of space heating units - Electric Heat Pump (%)	23.9	27	70.6	83.8	84.8	85	85.1
Sales of space heating units - Electric Resistance (%)	22.7	8.53	10.3	12.4	13.2	13	12.8
Sales of space heating units - Fossil (%)	0	3.82	0.711	0.031	0	0	0
Sales of space heating units - Gas Furnace (%)	53.5	60.7	18.4	3.73	1.99	2	2.02
Sales of water heating units - Electric Heat Pump (%)	0.849	10.5	54.3	64	64.4	64.5	64.5
Sales of water heating units - Electric Resistance (%)	20.9	11.5	28.7	32.5	32.7	32.7	32.7
Sales of water heating units - Gas Furnace (%)	69.5	73.9	14	0.589	0	0	0
Sales of water heating units - Other (%)	8.69	4.13	3.09	2.85	2.86	2.83	2.82

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)		7.9	7.56	13.5	13.9	16.3	17

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	434	437	427	413	402	400	406
Final energy use - Industry (PJ)	555	584	599	624	651	665	684
Final energy use - Residential (PJ)	511	493	475	450	430	422	425
Final energy use - Transportation (PJ)	1,917	1,804	1,617	1,384	1,172	1,037	974

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)		16.2	21.3				
Sales of cooking units - Electric Resistance (%)	96	96.9	99.5	100	100	100	100
Sales of cooking units - Gas (%)	3.99	3.14	0.538	0.027	0	0	0
Sales of space heating units - Electric Heat Pump (%)	51.7	60.3	83.9	89.2	89.3	89.1	89
Sales of space heating units - Electric Resistance (%)	40	35.5	15	10.4	10.3	10.5	10.6
Sales of space heating units - Fossil (%)	0.822	0.7	0.133	0.006	0	0	0
Sales of space heating units - Gas (%)	7.51	3.51	0.99	0.435	0.414	0.413	0.412
Sales of water heating units - Electric Heat Pump (%)	0	12.3	65.2	77	77.6	77.6	77.6
Sales of water heating units - Electric Resistance (%)	88.4	81.8	31.6	20.4	19.9	19.9	19.9
Sales of water heating units - Gas Furnace (%)	6.88	3.27	0.619	0.026	0	0	0
Sales of water heating units - Other (%)	4.69	2.6	2.57	2.58	2.57	2.54	2.53

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)		3,333	8,621	13,843	21,020	22,822	21,789
Public EV charging plugs - DC Fast (1000 units)	0.717		5.18		21.9		35.3
Public EV charging plugs - L2 (1000 units)	3.3		124		526		848
Vehicle sales - Heavy-duty - diesel (%)	97.2	92.1	67	23.3	4.22	0.628	0
Vehicle sales - Heavy-duty - EV (%)	0.588	3.81	19	45.6	57.4	59.6	60
Vehicle sales - Heavy-duty - gasoline (%)	0.227	0.227	0.176	0.066	0.013	0.002	0
Vehicle sales - Heavy-duty - hybrid (%)	0.082	0.09	0.077	0.031	0.007	0.001	0
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.392	2.54	12.7	30.4	38.2	39.7	40
Vehicle sales - Heavy-duty - other (%)	1.5	1.23	1.07	0.568	0.163	0.038	0
Vehicle sales - Light-duty - diesel (%)	1.29	1.58	1.16	0.367	0.07	0.013	0
Vehicle sales - Light-duty - EV (%)	4.79	17.9	50.4	83.4	96.5	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88.5	75	44.7	14.9	3.08	0.584	0
Vehicle sales - Light-duty - hybrid (%)	5.27	5.16	3.5	1.27	0.314	0.07	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.109	0.325	0.182	0.055	0.011	0.002	0
Vehicle sales - Light-duty - other (%)	0.09	0.085	0.053	0.019	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Offshore Wind - Base (billion $2018)		0.266	0	1.45	8.16	5.68	5.24
Capital invested - Solar PV - Base (billion $2018)		5.09	34.1	59.5	23.6	0	136
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	93.8	93.8	801	5,502	9,350	13,530
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	0	0	0	0	0	18,155
Installed renewables - Solar - Base land use assumptions (MW)	3,072	7,526	40,882	104,079	130,618	130,618	302,518
Installed renewables - Solar - Constrained land use assumptions (MW)	6,144	17,372	99,159	225,614	261,291	261,291	617,489
Installed renewables - Wind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0

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	285	285	2,430	16,673	28,401	41,096
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	55,174
Solar - Base land use assumptions (GWh)	6,248	14,014	71,600	179,721	224,672	224,672	522,445
Solar - Constrained land use assumptions (GWh)	12,496	32,171	173,230	389,409	449,632	449,632	1,066,188
Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,077
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-29.6
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-2,107
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,066
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.8
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,081
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,091
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							53.8
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,144
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							559
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							26.9
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							586

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)							-1,328
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-38,862
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,923
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-6,195
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-9,304

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)							-983
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-462
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-8,095
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,781
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-665
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-11,529
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-654
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,380
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,929
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,101
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-344
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-231
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-613
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,612
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-997
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-25,162
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-2,289
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,287
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,827
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-6,203
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-664
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-346
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-4,354
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,196
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							217
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							531
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,159
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,397

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)							93.4
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							30.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							230
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,585
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,243
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							109
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							499
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,210
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							698
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)							49.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							15.3
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							39.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							959
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,579
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							163
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							515
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,185
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,051
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)							71.3

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)							22.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							288
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,931
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,227

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		524	2.32	1.71	0.784	0.369	0.022
Monetary damages from air pollution - Natural Gas (million 2019$)		739	642	469	288	58.6	24.8
Monetary damages from air pollution - Transportation (million 2019$)		5,828	5,517	4,260	2,502	1,148	438
Premature deaths from air pollution - Coal (deaths)		59.2	0.262	0.193	0.088	0.042	0.002
Premature deaths from air pollution - Natural Gas (deaths)		83.4	72.5	52.9	32.5	6.61	2.8
Premature deaths from air pollution - Transportation (deaths)		655	621	479	281	129	49.3

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)		66,758	74,510				
Sales of cooking units - Electric Resistance (%)	32	46	79.9	86.5	86.9	86.9	86.9
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Sales of space heating units - Electric Heat Pump (%)	23.9	27	70.6	83.8	84.8	85	85.1
Sales of space heating units - Electric Resistance (%)	22.7	8.53	10.3	12.4	13.2	13	12.8
Sales of space heating units - Fossil (%)	0	3.82	0.711	0.031	0	0	0
Sales of space heating units - Gas Furnace (%)	53.5	60.7	18.4	3.73	1.99	2	2.02
Sales of water heating units - Electric Heat Pump (%)	0.849	10.5	54.3	64	64.4	64.5	64.5
Sales of water heating units - Electric Resistance (%)	20.9	11.5	28.7	32.5	32.7	32.7	32.7
Sales of water heating units - Gas Furnace (%)	69.5	73.9	14	0.589	0	0	0
Sales of water heating units - Other (%)	8.69	4.13	3.09	2.85	2.86	2.83	2.82

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)		7.9	7.56	13.5	13.9	16.3	17

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	434	437	427	413	402	400	406

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	555	584	599	624	651	665	684
Final energy use - Residential (PJ)	511	493	475	450	430	422	425
Final energy use - Transportation (PJ)	1,917	1,804	1,617	1,384	1,172	1,037	974

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)		16.2	21.3				
Sales of cooking units - Electric Resistance (%)	96	96.9	99.5	100	100	100	100
Sales of cooking units - Gas (%)	3.99	3.14	0.538	0.027	0	0	0
Sales of space heating units - Electric Heat Pump (%)	51.7	60.3	83.9	89.2	89.3	89.1	89
Sales of space heating units - Electric Resistance (%)	40	35.5	15	10.4	10.3	10.5	10.6
Sales of space heating units - Fossil (%)	0.822	0.7	0.133	0.006	0	0	0
Sales of space heating units - Gas (%)	7.51	3.51	0.99	0.435	0.414	0.413	0.412
Sales of water heating units - Electric Heat Pump (%)	0	12.3	65.2	77	77.6	77.6	77.6
Sales of water heating units - Electric Resistance (%)	88.4	81.8	31.6	20.4	19.9	19.9	19.9
Sales of water heating units - Gas Furnace (%)	6.88	3.27	0.619	0.026	0	0	0
Sales of water heating units - Other (%)	4.69	2.6	2.57	2.58	2.57	2.54	2.53

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)		3,333	8,621	13,843	21,020	22,822	21,789
Public EV charging plugs - DC Fast (1000 units)	0.717		5.18		21.9		35.3
Public EV charging plugs - L2 (1000 units)	3.3		124		526		848
Vehicle sales - Heavy-duty - diesel (%)	97.2	92.1	67	23.3	4.22	0.628	0
Vehicle sales - Heavy-duty - EV (%)	0.588	3.81	19	45.6	57.4	59.6	60
Vehicle sales - Heavy-duty - gasoline (%)	0.227	0.227	0.176	0.066	0.013	0.002	0
Vehicle sales - Heavy-duty - hybrid (%)	0.082	0.09	0.077	0.031	0.007	0.001	0
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.392	2.54	12.7	30.4	38.2	39.7	40
Vehicle sales - Heavy-duty - other (%)	1.5	1.23	1.07	0.568	0.163	0.038	0
Vehicle sales - Light-duty - diesel (%)	1.29	1.58	1.16	0.367	0.07	0.013	0
Vehicle sales - Light-duty - EV (%)	4.79	17.9	50.4	83.4	96.5	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88.5	75	44.7	14.9	3.08	0.584	0
Vehicle sales - Light-duty - hybrid (%)	5.27	5.16	3.5	1.27	0.314	0.07	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.109	0.325	0.182	0.055	0.011	0.002	0
Vehicle sales - Light-duty - other (%)	0.09	0.085	0.053	0.019	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Offshore Wind - Base (billion $2018)		0.266	0	0	0	0	0
Capital invested - Solar PV - Base (billion $2018)		14.6	17.6	1.46	0	0	0
Capital invested - Solar PV - Constrained (billion $2018)		14.8	16.7	1.56	0	0.104	0
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	93.8	93.8	93.8	93.8	93.8	93.8
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Solar - Base land use assumptions (MW)	3,072	15,852	33,098	34,651	34,651	34,651	34,651
Installed renewables - Solar - Constrained land use assumptions (MW)	3,072	16,010	32,390	34,043	34,043	34,167	34,167
Installed renewables - Wind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Wind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use assumptions (GWh)	0	285	285	285	285	285	285
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Base land use assumptions (GWh)	6,248	28,551	58,304	60,985	60,985	60,985	60,985
Solar - Constrained land use assumptions (GWh)	6,248	28,832	57,133	59,957	59,957	60,169	60,169
Wind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,077
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-29.6
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-2,107
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,066
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.8
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,081
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0

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 - Cropland measures (1000 hectares)							1,091
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							53.8
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,144
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							559
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							26.9
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							586

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)							-1,328
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-38,862
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,923
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-6,195
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-9,304
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-983
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-462
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-8,095
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,781
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-665
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-11,529
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-654
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,380
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,929
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,101
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-344
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-231

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-613
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,612
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-997
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-25,162
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-2,289
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,287
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,827
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-6,203
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-664
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-346
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-4,354
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,196
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							217
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							531
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,159
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,397
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)							93.4
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							30.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							230
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,585
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,243
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							109
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							499
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,210

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 - Improve plantations (1000 hectares)							698
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)							49.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							15.3
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							39.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							959
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,579
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							163
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							515
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,185
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,051
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)							71.3
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							22.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							288
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,931
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,227

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		524	2.32	1.71	0.784	0.369	0.022
Monetary damages from air pollution - Natural Gas (million 2019$)		732	705	536	481	218	32.4
Monetary damages from air pollution - Transportation (million 2019$)		5,828	5,517	4,260	2,502	1,148	438
Premature deaths from air pollution - Coal (deaths)		59.2	0.262	0.193	0.088	0.042	0.002
Premature deaths from air pollution - Natural Gas (deaths)		82.6	79.6	60.5	54.3	24.6	3.65
Premature deaths from air pollution - Transportation (deaths)		655	621	479	281	129	49.3

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)		66,742	74,583				
Sales of cooking units - Electric Resistance (%)	32	36.2	40.9	53.4	71	81.7	85.5
Sales of cooking units - Gas (%)	68	63.8	59.1	46.6	29	18.3	14.5
Sales of space heating units - Electric Heat Pump (%)	23.9	18.7	23.8	38	60.4	76.6	82.8
Sales of space heating units - Electric Resistance (%)	22.7	8.23	8.33	9.11	10.8	11.9	12.5
Sales of space heating units - Fossil (%)	0	4.41	4	3.07	1.56	0.485	0.126
Sales of space heating units - Gas Furnace (%)	53.5	68.6	63.8	49.8	27.3	11	4.53
Sales of water heating units - Electric Heat Pump (%)	0.849	2.05	7.03	21.4	43.4	57.8	62.8
Sales of water heating units - Electric Resistance (%)	20.9	8.16	9.94	15.6	24.4	30	32
Sales of water heating units - Gas Furnace (%)	69.5	85.5	78.7	59.1	28.9	9.24	2.41
Sales of water heating units - Other (%)	8.69	4.32	4.29	3.91	3.39	3	2.87

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)		6.42	5.91	9.28	9.23	14.5	15.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	434	438	434	430	423	419	420
Final energy use - Industry (PJ)	555	584	600	630	661	675	696
Final energy use - Residential (PJ)	511	494	487	477	464	448	440
Final energy use - Transportation (PJ)	1,919	1,820	1,686	1,572	1,479	1,369	1,239

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)		16	20				
Sales of cooking units - Electric Resistance (%)	96	96.1	96.5	97.4	98.8	99.6	99.9
Sales of cooking units - Gas (%)	4.01	3.91	3.54	2.57	1.23	0.395	0.106
Sales of space heating units - Electric Heat Pump (%)	51.7	55.7	58.3	66.2	77.9	85.5	88.2
Sales of space heating units - Electric Resistance (%)	40	39.5	37.2	30.4	20.2	13.6	11.3
Sales of space heating units - Fossil (%)	0.822	0.81	0.749	0.558	0.266	0.083	0.021
Sales of space heating units - Gas (%)	7.51	3.99	3.69	2.89	1.63	0.801	0.513
Sales of water heating units - Electric Heat Pump (%)	0	2.12	8.14	25.5	52.1	69.4	75.5
Sales of water heating units - Electric Resistance (%)	88.4	91.5	85.8	69.3	44.1	27.6	21.9
Sales of water heating units - Gas Furnace (%)	6.88	3.79	3.49	2.63	1.29	0.412	0.107
Sales of water heating units - Other (%)	4.69	2.6	2.57	2.58	2.57	2.54	2.52

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	553	1,131	3,850	12,021	17,546
Public EV charging plugs - DC Fast (1000 units)	0.717		1.71		8.21		22.6
Public EV charging plugs - L2 (1000 units)	3.3		41.1		197		543
Vehicle sales - Heavy-duty - diesel (%)	97.4	96	91.3	79.8	58.2	32.1	13.7
Vehicle sales - Heavy-duty - EV (%)	0.498	1.45	4.11	10.8	23.6	39.5	51
Vehicle sales - Heavy-duty - gasoline (%)	0.228	0.236	0.239	0.225	0.179	0.109	0.051
Vehicle sales - Heavy-duty - hybrid (%)	0.083	0.094	0.104	0.107	0.092	0.06	0.03
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.332	0.969	2.74	7.17	15.7	26.3	34
Vehicle sales - Heavy-duty - other (%)	1.5	1.28	1.46	1.95	2.25	1.96	1.14
Vehicle sales - Light-duty - diesel (%)	1.3	1.76	2.01	1.59	0.995	0.506	0.218
Vehicle sales - Light-duty - EV (%)	2.19	5.36	13.2	28	50.7	73.5	88.2
Vehicle sales - Light-duty - gasoline (%)	90.8	86.2	77.5	63.9	43.6	23.3	10.3
Vehicle sales - Light-duty - hybrid (%)	5.48	6.25	6.9	6.15	4.49	2.58	1.22
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.373	0.311	0.232	0.161	0.088	0.041
Vehicle sales - Light-duty - other (%)	0.092	0.095	0.085	0.073	0.052	0.028	0.013
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen FC (%)	0.166	0.485	1.37	3.58	7.86	13.2	17
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant (billion $2018)	0	0.004	0.523	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0.038	0.007	0.016	0.021
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0.049	11.5	2.18	5.85	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	7.52	1,035	1,035	1,035	1,035	1,035
Biomass w/ccu allam power plant (GWh)	0	0	0	37.7	44.2	60.6	81.5
Biomass w/ccu power plant (GWh)	0	0	55.3	12,921	15,365	21,928	21,928

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million $2018/year)		1.01	80.4	1,065	1,523	2,465	2,875
Conversion capital investment - Cumulative 5-yr (million $2018)		4.32	629	12,720	5,513	11,510	4,739
Number of facilities - Allam power w ccu (quantity)	0	0	0	1	2	3	4
Number of facilities - Beccs hydrogen (quantity)	0	0	0	2	6	13	18
Number of facilities - Diesel (quantity)	0	0	0	1	1	1	1
Number of facilities - Diesel ccu (quantity)	0	0	0	1	2	3	3
Number of facilities - Power (quantity)	0	1	1	1	1	1	1
Number of facilities - Power ccu (quantity)	0	0	1	10	12	17	17
Number of facilities - Pyrolysis (quantity)	0	0	0	1	1	1	1

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	1	2	4	5
Number of facilities - Sng (quantity)	0	1	1	1	1	1	1
Number of facilities - Sng ccu (quantity)	0	0	1	1	1	1	1

Table 53: *E-B+ scenario - PILLAR 4: CCUS - CO2 capture*

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0.07	17.3	27.8	45.3	53
Annual - BECCS (MMT)		0	0.06	15.5	22.4	36.8	42.7
Annual - Cement and lime (MMT)		0	0	0	3.32	6.84	7.07
Annual - NGCC (MMT)		0	0.02	1.74	2.06	1.65	3.24
Cumulative - All (MMT)		0	0.07	17.3	45.1	90.4	144
Cumulative - BECCS (MMT)		0	0.06	15.6	38	74.8	118
Cumulative - Cement and lime (MMT)		0	0	0	3.32	10.2	17.2
Cumulative - NGCC (MMT)		0	0.02	1.76	3.82	5.47	8.71

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	886	1,358	1,622	2,448	3,203
Cumulative investment - All (million $2018)		0	3,177	3,655	4,152	4,884	5,383
Cumulative investment - Spur (million $2018)		0	129	608	902	1,634	2,133
Cumulative investment - Trunk (million $2018)		0	3,047	3,047	3,250	3,250	3,250
Spur (km)		0	251	722	986	1,813	2,568
Trunk (km)		0	636	636	636	636	636

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

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	3.69	15	33.3	45.3	48.5
Injection wells (wells)		0	8	34	62	102	128
Resource characterization, appraisal, permitting costs (million $2020)		159	625	906	906	906	906
Wells and facilities construction costs (million $2020)		0	270	1,053	1,877	3,138	3,896

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)							-12.5
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,056
Carbon sink potential - Aggressive deployment - Cropland to woody energy crops (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Pasture to energy crops (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-29.1
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-2,098

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-12.5
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,055
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)							-14.6
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,082
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							7.89
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							2,674
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							5.31
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							365
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							52.9
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							3,105
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							7.89
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							555
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							5.31
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							365
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							26.5
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							960

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)							-1,328
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-38,862
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,923

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-6,195
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-9,304
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-983
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-462
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-8,095
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,781
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-665
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-11,529
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-654
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,380
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,929
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,101
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-344
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-231
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-613
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,612
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-997
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-25,162
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-2,289
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,287
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,827
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-6,203
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-664
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-346
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-4,354
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,196
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							217
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							531

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 - Extend rotation length (1000 hectares)							3,159
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,397
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)							93.4
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							30.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							230
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,585
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,243
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							109
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							499
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,210
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							698
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)							49.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							15.3
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							39.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							959
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,579
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							163
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							515
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,185
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,051

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 - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							71.3
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							22.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							288
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,931
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,227

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		524	2.32	1.71	0.784	0.369	0.022
Monetary damages from air pollution - Natural Gas (million 2019$)		758	617	449	255	130	43.3
Monetary damages from air pollution - Transportation (million 2019$)		5,938	6,110	6,052	5,549	4,499	3,142
Premature deaths from air pollution - Coal (deaths)		59.2	0.262	0.193	0.088	0.042	0.002
Premature deaths from air pollution - Natural Gas (deaths)		85.6	69.7	50.7	28.7	14.7	4.89
Premature deaths from air pollution - Transportation (deaths)		668	687	681	624	506	353

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)		65,779	68,382				
Sales of cooking units - Electric Resistance (%)	32	34.3	34.3	34.3	34.4	34.3	34.3
Sales of cooking units - Gas (%)	68	65.7	65.7	65.7	65.6	65.7	65.7
Sales of space heating units - Electric Heat Pump (%)	23.9	29.3	65.2	72.1	72.1	72.3	72.4
Sales of space heating units - Electric Resistance (%)	22.7	9.78	14.9	20.3	25.2	25.6	25.6
Sales of space heating units - Fossil (%)	0	4.02	2.38	1.17	0.182	0.016	0
Sales of space heating units - Gas Furnace (%)	53.5	56.8	17.5	6.48	2.56	2.06	2.02
Sales of water heating units - Electric Heat Pump (%)	0.849	0.3	0.292	0.292	0.293	0.29	0.29
Sales of water heating units - Electric Resistance (%)	20.9	7.47	7.27	7.29	7.31	7.22	7.19
Sales of water heating units - Gas Furnace (%)	69.5	87.9	88	88	87.9	88	88.1
Sales of water heating units - Other (%)	8.69	4.37	4.46	4.43	4.48	4.48	4.46

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)		8.36	8.08	14.3	14.8	14.9	15.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	434	444	452	461	471	489	515
Final energy use - Industry (PJ)	555	597	628	656	683	707	739
Final energy use - Residential (PJ)	511	502	512	530	554	579	605
Final energy use - Transportation (PJ)	1,917	1,833	1,727	1,667	1,682	1,736	1,802

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)		15.8	16.2				
Sales of cooking units - Electric Resistance (%)	96	96	96	96	96	96	96
Sales of cooking units - Gas (%)	4.04	4.04	4.04	4.04	4.04	4.04	4.04
Sales of space heating units - Electric Heat Pump (%)	51.1	66.6	66.9	67.9	68.8	70.5	73.6
Sales of space heating units - Electric Resistance (%)	40.4	30.3	30.1	29.2	28.4	26.7	23.6
Sales of space heating units - Fossil (%)	0.826	0.333	0.334	0.332	0.321	0.314	0.316
Sales of space heating units - Gas (%)	7.6	2.83	2.7	2.57	2.51	2.48	2.48
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	88.4	93.5	93.5	93.5	93.5	93.5	93.5
Sales of water heating units - Gas Furnace (%)	6.88	3.89	3.9	3.92	3.93	3.93	3.93
Sales of water heating units - Other (%)	4.69	2.6	2.57	2.58	2.57	2.54	2.53

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Heavy-duty - diesel (%)	98.1	98.2	97.9	97	95.6	93.5	91.6
Vehicle sales - Heavy-duty - EV (%)	0	0	0	0	0	0	0
Vehicle sales - Heavy-duty - gasoline (%)	0.229	0.242	0.257	0.274	0.294	0.317	0.343
Vehicle sales - Heavy-duty - hybrid (%)	0.083	0.096	0.112	0.13	0.15	0.174	0.202
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.119	0.138	0.16	0.186	0.216	0.25	0.29
Vehicle sales - Heavy-duty - other (%)	1.51	1.31	1.57	2.37	3.69	5.71	7.57
Vehicle sales - Light-duty - diesel (%)	1.29	1.74	2.14	2	1.79	1.66	1.58
Vehicle sales - Light-duty - EV (%)	4.42	6.72	7.55	9.34	11.3	12.8	14.1
Vehicle sales - Light-duty - gasoline (%)	88.8	85	82.5	80.4	78.1	76.3	74.8
Vehicle sales - Light-duty - hybrid (%)	5.29	6.1	7.39	7.93	8.43	8.88	9.17
Vehicle sales - Light-duty - hydrogen FC (%)	0.109	0.367	0.331	0.29	0.285	0.285	0.294
Vehicle sales - Light-duty - other (%)	0.09	0.094	0.09	0.091	0.09	0.088	0.09
Vehicle sales - Medium-duty - diesel (%)	65.2	63.5	61.6	59.6	58	56.5	55.2
Vehicle sales - Medium-duty - EV (%)	0.027	0.105	0.329	0.671	0.895	0.973	0.993
Vehicle sales - Medium-duty - gasoline (%)	34	35.5	37	38.5	39.7	40.8	41.7
Vehicle sales - Medium-duty - hybrid (%)	0.365	0.427	0.496	0.577	0.674	0.793	0.929
Vehicle sales - Medium-duty - hydrogen FC (%)	0.175	0.208	0.242	0.285	0.339	0.409	0.487
Vehicle sales - Medium-duty - other (%)	0.255	0.271	0.298	0.345	0.42	0.528	0.671

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,328
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-38,862
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,923
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-6,195
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,791
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-9,304
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-983
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-462
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-8,095
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,781
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-665
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-11,529
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-654
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-2,380
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,929
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-3,101
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-344
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-231
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-613
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,612
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-997
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-25,162
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-2,289
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-4,287
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,827
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-6,203
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-664
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-346
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-4,354
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,196

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							217
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							531
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							3,159
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,397
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)							93.4
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							30.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							230
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,585
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							7,243
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							109
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							499
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,210
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							698
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)							49.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							15.3
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							39.9
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							959
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,579
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							163

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							515
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							2,185
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,051
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)							71.3
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							22.9
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							288
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,931
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,227

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)	-24.6		-13.3				-10.8
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-2.53		-4.22				-4.44
Business-as-usual carbon sink - Total (Mt CO2e/y)	-27.1		-17.5				-15.2

Table 66: *REF scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		1,997	1,381	985	861	785	768
Monetary damages from air pollution - Natural Gas (million 2019$)		785	831	885	1,027	1,024	986
Monetary damages from air pollution - Transportation (million 2019$)		5,924	6,179	6,441	6,746	7,065	7,402
Premature deaths from air pollution - Coal (deaths)		226	156	111	97.2	88.6	86.7
Premature deaths from air pollution - Natural Gas (deaths)		88.6	93.9	99.9	116	116	111
Premature deaths from air pollution - Transportation (deaths)		666	695	724	759	795	832