Net-Zero America - north carolina state report

2021-03-15

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)		34,334	38,227				
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 (%)	8.09	27.7	70	83.7	85	85.1	85.1
Sales of space heating units - Electric Resistance (%)	7.4	8.38	10.5	12.6	13	13	13
Sales of space heating units - Fossil (%)	6.11	4.04	0.768	0.033	0	0	0
Sales of space heating units - Gas Furnace (%)	78.4	59.9	18.7	3.71	1.95	1.9	1.9
Sales of water heating units - Electric Heat Pump (%)	0.257	10.4	53.9	64	64.5	64.5	64.5
Sales of water heating units - Electric Resistance (%)	6.38	10.9	28.3	32.5	32.8	32.8	32.8
Sales of water heating units - Gas Furnace (%)	88.8	74.6	14.8	0.738	0.009	0	0
Sales of water heating units - Other (%)	4.56	4.13	3.01	2.74	2.74	2.73	2.73

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)		6.1	6.25	10.2	10.8	10.4	10.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	253	254	245	233	223	220	224
Final energy use - Industry (PJ)	343	347	348	344	341	338	339
Final energy use - Residential (PJ)	355	335	313	283	260	247	242
Final energy use - Transportation (PJ)	917	853	749	620	504	431	398

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)		7.62	7.56				
Sales of cooking units - Electric Resistance (%)	75.4	80.6	96.7	99.8	100	100	100
Sales of cooking units - Gas (%)	24.6	19.4	3.31	0.167	0	0	0
Sales of space heating units - Electric Heat Pump (%)	32.3	47.7	81.1	88.9	89.3	89.3	89.2
Sales of space heating units - Electric Resistance (%)	22.7	22.3	9.54	6.48	6.3	6.42	6.45
Sales of space heating units - Fossil (%)	11.5	13.1	4.52	2.55	2.46	2.42	2.41
Sales of space heating units - Gas (%)	33.5	16.9	4.84	2.03	1.91	1.91	1.9
Sales of water heating units - Electric Heat Pump (%)	0	10	53.3	63.1	63.6	63.6	63.6
Sales of water heating units - Electric Resistance (%)	61.4	68.3	40.5	34.3	34	34	34
Sales of water heating units - Gas Furnace (%)	34.3	18.9	3.74	0.187	0.002	0	0
Sales of water heating units - Other (%)	4.29	2.81	2.47	2.4	2.41	2.42	2.43

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)		1,572	4,040	6,528	9,896	10,763	10,266
Public EV charging plugs - DC Fast (1000 units)	0.286		3.07		13.3		21.5
Public EV charging plugs - L2 (1000 units)	1.4		73.8		320		517
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 (%)	1.48	1.75	1.23	0.393	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.15	15.9	47.5	82.2	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.5	77.2	47.7	16.1	3.23	0.588	0
Vehicle sales - Light-duty - hybrid (%)	4.65	4.71	3.29	1.21	0.297	0.065	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.336	0.197	0.061	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.099	0.094	0.061	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	0.041
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Offshore Wind - Base (billion $2018)		0	0	0	7.29	3.33	0
Capital invested - Offshore Wind - Constrained (billion $2018)		0	0	0	6.79	2.75	0
Capital invested - Solar PV - Base (billion $2018)		0.319	11.5	13.4	8.86	6.87	4.82
Capital invested - Solar PV - Constrained (billion $2018)		2.3	9.86	12.9	9.89	4.44	3.52
Capital invested - Wind - Base (billion $2018)		0	0.15	0	0.121	0	0
Capital invested - Wind - Constrained (billion $2018)		0	0.252	0	0	0	0.037
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	4,197	6,452	6,452
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	0	0	0	4,197	6,452	6,452
Installed renewables - Rooftop PV (MW)	299	482	682	972	1,379	1,906	2,581
Installed renewables - Solar - Base land use assumptions (MW)	2,315	2,594	13,855	28,086	38,065	46,266	52,364
Installed renewables - Solar - Constrained land use assumptions (MW)	802	1,495	10,776	25,929	33,804	40,014	50,521
Installed renewables - Wind - Base land use assumptions (MW)	208	208	320	320	423	423	423
Installed renewables - Wind - Constrained land use assumptions (MW)	208	208	398	398	398	398	433

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	41.1
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	17,825	26,721	26,721
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	17,825	26,721	26,721
Solar - Base land use assumptions (GWh)	4,358	4,814	23,450	47,034	63,567	77,168	87,246
Solar - Constrained land use assumptions (GWh)	1,582	2,734	18,158	43,284	56,333	66,651	83,952
Wind - Base land use assumptions (GWh)	734	734	1,115	1,115	1,397	1,397	1,397
Wind - Constrained land use assumptions (GWh)	734	734	1,305	1,305	1,305	1,305	1,432

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million $2018/year)		0	218	218	218	218	920
Conversion capital investment - Cumulative 5-yr (million $2018)		0	0	0	0	0	14,438
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	16
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	1
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0.55	4.91	0.67	24.7
Annual - BECCS (MMT)		0	0	0	0	0	18.5
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0.55	4.91	0.67	6.19
Cumulative - All (MMT)		0	0	0.55	5.46	6.13	30.9
Cumulative - BECCS (MMT)		0	0	0	0	0	18.5
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0.55	5.46	6.13	12.3

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	0	243	245	374	1,682
Cumulative investment - All (million $2018)		0	0	1,364	1,366	1,458	2,604
Cumulative investment - Spur (million $2018)		0	0	9.11	11.6	104	1,250
Cumulative investment - Trunk (million $2018)		0	0	1,354	1,354	1,354	1,354
Spur (km)		0	0	15.4	17.9	146	1,455
Trunk (km)		0	0	227	227	227	227

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)							-207
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,978
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-102
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-3,287
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-207
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,569
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-51
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,827
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							117
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,723
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							186
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							2,025
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							117
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							908
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							92.8
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,118

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)							-370
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-44,532
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,061
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-10,827
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,556
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-17,779
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,133
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-567
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-4,291
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,947
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-186
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-14,417
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-510
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,159
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,300
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,926
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-397
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-284
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-325
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,331
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-278
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-29,452
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,785
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-7,493
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1,906
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-11,852
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-765
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-426
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,308
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,639

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)							60.6
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							414
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							5,521
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							942
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)							108
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							37.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							122
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,308
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,513
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							30.3
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							389
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,115
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							471
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)							56.7
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							18.8
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							21.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							792
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,894
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							45.5

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)							402
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,818
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							708
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)							82.2
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							28.1
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							153
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,594
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,831

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		451	380	305	229	144	100
Natural gas consumption - Cumulative (tcf)							9,180
Natural gas production - Annual (tcf)		0	0	0	0	0	0
Oil consumption - Annual (million bbls)		155	134	102	73.3	50.5	33.8
Oil consumption - Cumulative (million bbls)							3,171
Oil production - Annual (million bbls)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		694	0.947	0.916	0.765	0.543	0.048
Monetary damages from air pollution - Natural Gas (million 2019$)		506	354	208	162	83.8	31.3
Monetary damages from air pollution - Transportation (million 2019$)		2,831	2,683	2,069	1,209	552	210
Premature deaths from air pollution - Coal (deaths)		78.4	0.107	0.103	0.086	0.061	0.005
Premature deaths from air pollution - Natural Gas (deaths)		57.1	39.9	23.5	18.2	9.46	3.53
Premature deaths from air pollution - Transportation (deaths)		318	302	233	136	62	23.6

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		197	583	636	538	432	1,266
By economic sector - Construction (jobs)		7,710	15,129	19,400	20,839	20,299	21,048
By economic sector - Manufacturing (jobs)		12,055	22,072	22,363	18,103	20,209	16,696
By economic sector - Mining (jobs)		2,824	2,017	1,298	785	442	248

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		606	2,321	3,208	3,534	3,697	4,221
By economic sector - Pipeline (jobs)		624	529	580	306	214	266
By economic sector - Professional (jobs)		4,232	6,771	8,277	9,663	9,830	11,785
By economic sector - Trade (jobs)		3,119	4,611	5,448	6,161	6,321	7,179
By economic sector - Utilities (jobs)		11,455	12,267	15,939	18,359	17,676	17,594
By education level - All sectors - Associates degree or some college (jobs)		13,392	20,878	24,615	25,196	25,524	25,661
By education level - All sectors - Bachelors degree (jobs)		9,152	13,335	15,121	15,273	15,436	15,777
By education level - All sectors - Doctoral degree (jobs)		270	400	460	492	492	555
By education level - All sectors - High school diploma or less (jobs)		17,902	28,670	33,470	33,694	34,012	34,450
By education level - All sectors - Masters or professional degree (jobs)		2,107	3,018	3,481	3,634	3,656	3,861
By resource sector - Biomass (jobs)		846	1,607	1,811	1,621	1,574	5,404
By resource sector - CO2 (jobs)		0	0	1,361	15.5	132	1,102
By resource sector - Coal (jobs)		1,272	0	0	0	0	0
By resource sector - Grid (jobs)		12,301	16,441	24,419	32,083	32,774	31,857
By resource sector - Natural Gas (jobs)		6,808	5,312	4,485	4,655	3,135	3,014
By resource sector - Nuclear (jobs)		2,723	2,679	1,990	804	265	0
By resource sector - Oil (jobs)		6,905	5,452	3,846	2,563	1,651	1,037
By resource sector - Solar (jobs)		11,788	33,795	38,427	31,805	30,735	29,173
By resource sector - Wind (jobs)		178	1,013	810	4,744	8,853	8,715
Median wages - Annual - All ($2019 per job)		58,191	56,638	57,274	58,525	59,152	60,278
On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs)		6,898	10,660	12,567	12,874	12,975	13,046
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)		2,612	3,938	4,823	5,147	5,102	5,264
On-Site or In-Plant Training - Total jobs - None (jobs)		6,966	10,945	12,640	12,725	12,884	13,129
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)		350	540	653	685	691	702
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)		25,996	40,218	46,465	46,857	47,467	48,162
On-the-Job Training - All sectors - 1 to 4 years (jobs)		8,849	13,610	16,096	16,548	16,660	16,751
On-the-Job Training - All sectors - 4 to 10 years (jobs)		2,495	3,821	4,741	5,104	5,057	5,228
On-the-Job Training - All sectors - None (jobs)		2,295	3,591	4,141	4,176	4,216	4,337
On-the-Job Training - All sectors - Over 10 years (jobs)		435	722	818	789	802	784
On-the-Job Training - All sectors - Up to 1 year (jobs)		28,748	44,557	51,353	51,671	52,383	53,203
Related work experience - All sectors - 1 to 4 years (jobs)		15,457	23,564	27,397	27,890	28,148	28,581
Related work experience - All sectors - 4 to 10 years (jobs)		9,983	15,144	17,664	18,040	18,200	18,395
Related work experience - All sectors - None (jobs)		6,102	9,462	11,124	11,363	11,463	11,716
Related work experience - All sectors - Over 10 years (jobs)		2,800	4,272	4,887	4,881	4,960	4,918
Related work experience - All sectors - Up to 1 year (jobs)		8,481	13,858	16,077	16,115	16,347	16,693
Wage income - All (million $2019)		2,492	3,756	4,419	4,582	4,681	4,841

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)		34,313	38,231				
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 (%)	8.09	19.7	24.6	38.6	60.7	76.6	82.8
Sales of space heating units - Electric Resistance (%)	7.4	8.06	8.29	9.07	10.5	11.9	12.7
Sales of space heating units - Fossil (%)	6.11	4.68	4.33	3.28	1.62	0.513	0.134
Sales of space heating units - Gas Furnace (%)	78.4	67.5	62.8	49.1	27.1	11	4.45
Sales of water heating units - Electric Heat Pump (%)	0.257	2.02	6.97	21.3	43.2	57.6	62.7
Sales of water heating units - Electric Resistance (%)	6.38	7.55	9.45	15.2	24.1	29.9	32
Sales of water heating units - Gas Furnace (%)	88.8	86.1	79.3	59.7	29.4	9.53	2.51
Sales of water heating units - Other (%)	4.56	4.35	4.31	3.87	3.3	2.91	2.77

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)		5.28	5.33	6.71	6.92	9.8	10.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	253	255	252	248	242	237	235
Final energy use - Industry (PJ)	343	348	349	349	350	347	346
Final energy use - Residential (PJ)	355	336	326	315	300	282	265
Final energy use - Transportation (PJ)	918	861	785	722	672	613	544

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)		7.58	7.45				
Sales of cooking units - Electric Resistance (%)	75.3	75.9	78.2	84.2	92.5	97.6	99.3
Sales of cooking units - Gas (%)	24.7	24.1	21.8	15.8	7.55	2.44	0.656
Sales of space heating units - Electric Heat Pump (%)	32.3	41.3	45.1	56.1	73	84	87.9
Sales of space heating units - Electric Resistance (%)	22.7	24.7	23.3	18.9	12.4	8.34	6.89
Sales of space heating units - Fossil (%)	11.5	14.8	13.8	11	6.65	3.78	2.79
Sales of space heating units - Gas (%)	33.5	19.2	17.8	13.9	7.91	3.85	2.41
Sales of water heating units - Electric Heat Pump (%)	0	1.73	6.65	20.8	42.6	56.9	61.8
Sales of water heating units - Electric Resistance (%)	61.4	73.6	70.5	61.3	47.3	38.2	35.1
Sales of water heating units - Gas Furnace (%)	34.3	21.8	20	15.2	7.52	2.43	0.641
Sales of water heating units - Other (%)	4.29	2.87	2.83	2.74	2.59	2.48	2.44

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	256	534	1,808	5,675	8,272
Public EV charging plugs - DC Fast (1000 units)	0.286		0.97		4.96		13.8
Public EV charging plugs - L2 (1000 units)	1.4		23.3		119		331
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 (%)	1.49	1.92	2.04	1.62	1.03	0.529	0.227
Vehicle sales - Light-duty - EV (%)	1.97	4.86	12.2	26.4	49	72.4	87.7
Vehicle sales - Light-duty - gasoline (%)	91.5	87.1	79	65.9	45.5	24.4	10.8
Vehicle sales - Light-duty - hybrid (%)	4.83	5.62	6.28	5.69	4.23	2.48	1.19
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.378	0.322	0.244	0.172	0.095	0.044
Vehicle sales - Light-duty - other (%)	0.1	0.103	0.094	0.081	0.058	0.032	0.015
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen FC (%)	0.166	0.485	1.37	3.58	7.86	13.2	17
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-207
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,978
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-102
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-3,287
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-207
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,569
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-51
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,827
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							117
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,723
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							186

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)							2,025
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							117
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							908
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							92.8
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,118

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)							-370
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-44,532
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,061
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-10,827
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,556
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-17,779
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,133
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-567
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-4,291
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,947
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-186
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-14,417
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-510
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,159
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,300
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,926
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-397
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-284
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-325
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,331
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-278

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)							-29,452
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,785
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-7,493
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1,906
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-11,852
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-765
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-426
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,308
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,639
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							60.6
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							414
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							5,521
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							942
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)							108
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							37.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							122
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,308
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,513
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							30.3
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							389
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,115
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							471
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)							56.7
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							18.8
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							21.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							792
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,894
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							45.5
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							402
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,818
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							708
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)							82.2
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							28.1
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							153
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,594
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,831

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		694	0.947	0.916	0.765	0.543	0.048
Monetary damages from air pollution - Natural Gas (million 2019$)		474	317	122	48.4	17.2	9.11
Monetary damages from air pollution - Transportation (million 2019$)		2,881	2,959	2,922	2,667	2,149	1,488
Premature deaths from air pollution - Coal (deaths)		78.4	0.107	0.103	0.086	0.061	0.005
Premature deaths from air pollution - Natural Gas (deaths)		53.5	35.8	13.7	5.46	1.94	1.03
Premature deaths from air pollution - Transportation (deaths)		324	333	329	300	242	167

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)		34,334	38,227				
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 (%)	8.09	27.7	70	83.7	85	85.1	85.1
Sales of space heating units - Electric Resistance (%)	7.4	8.38	10.5	12.6	13	13	13
Sales of space heating units - Fossil (%)	6.11	4.04	0.768	0.033	0	0	0
Sales of space heating units - Gas Furnace (%)	78.4	59.9	18.7	3.71	1.95	1.9	1.9
Sales of water heating units - Electric Heat Pump (%)	0.257	10.4	53.9	64	64.5	64.5	64.5
Sales of water heating units - Electric Resistance (%)	6.38	10.9	28.3	32.5	32.8	32.8	32.8
Sales of water heating units - Gas Furnace (%)	88.8	74.6	14.8	0.738	0.009	0	0
Sales of water heating units - Other (%)	4.56	4.13	3.01	2.74	2.74	2.73	2.73

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)		6.1	6.25	10.2	10.8	10.4	10.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	253	254	245	233	223	220	224
Final energy use - Industry (PJ)	343	347	348	344	341	338	339
Final energy use - Residential (PJ)	355	335	313	283	260	247	242
Final energy use - Transportation (PJ)	917	853	749	620	504	431	398

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)		7.62	7.56				
Sales of cooking units - Electric Resistance (%)	75.4	80.6	96.7	99.8	100	100	100
Sales of cooking units - Gas (%)	24.6	19.4	3.31	0.167	0	0	0
Sales of space heating units - Electric Heat Pump (%)	32.3	47.7	81.1	88.9	89.3	89.3	89.2
Sales of space heating units - Electric Resistance (%)	22.7	22.3	9.54	6.48	6.3	6.42	6.45
Sales of space heating units - Fossil (%)	11.5	13.1	4.52	2.55	2.46	2.42	2.41
Sales of space heating units - Gas (%)	33.5	16.9	4.84	2.03	1.91	1.91	1.9
Sales of water heating units - Electric Heat Pump (%)	0	10	53.3	63.1	63.6	63.6	63.6
Sales of water heating units - Electric Resistance (%)	61.4	68.3	40.5	34.3	34	34	34
Sales of water heating units - Gas Furnace (%)	34.3	18.9	3.74	0.187	0.002	0	0
Sales of water heating units - Other (%)	4.29	2.81	2.47	2.4	2.41	2.42	2.43

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)		1,572	4,040	6,528	9,896	10,763	10,266
Public EV charging plugs - DC Fast (1000 units)	0.286		3.07		13.3		21.5
Public EV charging plugs - L2 (1000 units)	1.4		73.8		320		517
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 (%)	1.48	1.75	1.23	0.393	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.15	15.9	47.5	82.2	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.5	77.2	47.7	16.1	3.23	0.588	0
Vehicle sales - Light-duty - hybrid (%)	4.65	4.71	3.29	1.21	0.297	0.065	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.336	0.197	0.061	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.099	0.094	0.061	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 - Offshore Wind - Base (billion $2018)		0	0	11.4	17.2	57.9	14.5
Capital invested - Solar PV - Base (billion $2018)		4.49	12.2	19	6.47	9.14	7.8
Capital invested - Wind - Base (billion $2018)		0	0.15	0.078	0.046	0	0
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	0	0	5,570	15,458	54,728	66,260
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	0	0	9,491	12,903	12,903	130,643
Installed renewables - Solar - Base land use assumptions (MW)	2,514	6,440	18,331	38,477	45,767	56,668	66,527
Installed renewables - Solar - Constrained land use assumptions (MW)	4,176	9,734	34,639	81,664	100,676	129,341	155,191
Installed renewables - Wind - Base land use assumptions (MW)	208	208	320	384	423	423	423
Installed renewables - Wind - Constrained land use assumptions (MW)	416	416	795	795	795	795	1,146

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	23,197	65,591	228,715	276,814
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	39,833	53,442	53,442	546,001
Solar - Base land use assumptions (GWh)	4,688	11,220	31,035	64,392	76,535	94,582	110,804
Solar - Constrained land use assumptions (GWh)	7,980	17,215	58,470	136,511	168,080	215,434	258,069
Wind - Base land use assumptions (GWh)	734	734	1,115	1,287	1,397	1,397	1,397

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

Item	2020	2025	2030	2035	2040	2045	2050
Wind - Constrained land use assumptions (GWh)	1,469	1,469	2,609	2,609	2,609	2,609	3,714

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)							-207
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,978
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-102
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-3,287
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-207
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,569
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-51
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,827
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							117
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,723
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							186
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							2,025
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							117
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							908
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							92.8
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,118

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)							-370
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-44,532
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,061

Table 33: *E+RE+ 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)							-10,827
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,556
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-17,779
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,133
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-567
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-4,291
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,947
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-186
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-14,417
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-510
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,159
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,300
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,926
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-397
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-284
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-325
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,331
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-278
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-29,452
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,785
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-7,493
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1,906
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-11,852
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-765
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-426
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,308
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,639
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							60.6
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							414

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 - Extend rotation length (1000 hectares)							5,521
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							942
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)							108
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							37.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							122
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,308
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,513
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							30.3
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							389
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,115
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							471
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)							56.7
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							18.8
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							21.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							792
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,894
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							45.5
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							402
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,818
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							708

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 - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							82.2
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							28.1
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							153
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,594
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,831

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		694	0.947	0.916	0.765	0.543	0.048
Monetary damages from air pollution - Natural Gas (million 2019$)		419	347	198	120	32	9.24
Monetary damages from air pollution - Transportation (million 2019$)		2,831	2,683	2,069	1,209	552	210
Premature deaths from air pollution - Coal (deaths)		78.4	0.107	0.103	0.086	0.061	0.005
Premature deaths from air pollution - Natural Gas (deaths)		47.3	39.2	22.3	13.6	3.61	1.04
Premature deaths from air pollution - Transportation (deaths)		318	302	233	136	62	23.6

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)		34,334	38,227				
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 (%)	8.09	27.7	70	83.7	85	85.1	85.1
Sales of space heating units - Electric Resistance (%)	7.4	8.38	10.5	12.6	13	13	13
Sales of space heating units - Fossil (%)	6.11	4.04	0.768	0.033	0	0	0
Sales of space heating units - Gas Furnace (%)	78.4	59.9	18.7	3.71	1.95	1.9	1.9
Sales of water heating units - Electric Heat Pump (%)	0.257	10.4	53.9	64	64.5	64.5	64.5
Sales of water heating units - Electric Resistance (%)	6.38	10.9	28.3	32.5	32.8	32.8	32.8
Sales of water heating units - Gas Furnace (%)	88.8	74.6	14.8	0.738	0.009	0	0
Sales of water heating units - Other (%)	4.56	4.13	3.01	2.74	2.74	2.73	2.73

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)		6.1	6.25	10.2	10.8	10.4	10.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	253	254	245	233	223	220	224
Final energy use - Industry (PJ)	343	347	348	344	341	338	339
Final energy use - Residential (PJ)	355	335	313	283	260	247	242
Final energy use - Transportation (PJ)	917	853	749	620	504	431	398

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)		7.62	7.56				
Sales of cooking units - Electric Resistance (%)	75.4	80.6	96.7	99.8	100	100	100
Sales of cooking units - Gas (%)	24.6	19.4	3.31	0.167	0	0	0
Sales of space heating units - Electric Heat Pump (%)	32.3	47.7	81.1	88.9	89.3	89.3	89.2
Sales of space heating units - Electric Resistance (%)	22.7	22.3	9.54	6.48	6.3	6.42	6.45
Sales of space heating units - Fossil (%)	11.5	13.1	4.52	2.55	2.46	2.42	2.41
Sales of space heating units - Gas (%)	33.5	16.9	4.84	2.03	1.91	1.91	1.9
Sales of water heating units - Electric Heat Pump (%)	0	10	53.3	63.1	63.6	63.6	63.6
Sales of water heating units - Electric Resistance (%)	61.4	68.3	40.5	34.3	34	34	34
Sales of water heating units - Gas Furnace (%)	34.3	18.9	3.74	0.187	0.002	0	0
Sales of water heating units - Other (%)	4.29	2.81	2.47	2.4	2.41	2.42	2.43

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)		1,572	4,040	6,528	9,896	10,763	10,266
Public EV charging plugs - DC Fast (1000 units)	0.286		3.07		13.3		21.5
Public EV charging plugs - L2 (1000 units)	1.4		73.8		320		517
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 (%)	1.48	1.75	1.23	0.393	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.15	15.9	47.5	82.2	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.5	77.2	47.7	16.1	3.23	0.588	0
Vehicle sales - Light-duty - hybrid (%)	4.65	4.71	3.29	1.21	0.297	0.065	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.336	0.197	0.061	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.099	0.094	0.061	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

Table 39: *E+RE- scenario - PILLAR 1: Efficiency/Electrification - Transportation (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
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)		0.351	0.989	7.64	7.58	5.7	1.48
Capital invested - Solar PV - Constrained (billion $2018)		1.15	0.299	6.56	6.89	6.54	0
Capital invested - Wind - Base (billion $2018)		0.052	0	0	0.056	0	0
Capital invested - Wind - Constrained (billion $2018)		0.049	0.06	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)	1,997	2,304	3,271	11,382	19,921	26,727	28,595
Installed renewables - Solar - Constrained land use assumptions (MW)	1,701	2,705	2,998	9,961	17,724	25,531	25,531
Installed renewables - Wind - Base land use assumptions (MW)	208	243	243	243	290	290	290
Installed renewables - Wind - Constrained land use assumptions (MW)	208	241	286	286	286	286	286

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)	3,833	4,343	5,952	19,453	33,552	44,837	47,907
Solar - Constrained land use assumptions (GWh)	3,350	5,000	5,486	17,082	29,911	42,873	42,873
Wind - Base land use assumptions (GWh)	734	862	862	862	1,013	1,013	1,013
Wind - Constrained land use assumptions (GWh)	734	854	999	999	999	999	999

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)							-207
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,978
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-102
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-3,287
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-207

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,569
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-51
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-1,827
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							117
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,723
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							186
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							2,025
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							117
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							908
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							92.8
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,118

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)							-370
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-44,532
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,061
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-10,827
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,556
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-17,779
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,133
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-567
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-4,291
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,947
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-186
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-14,417
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-510

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,159
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,300
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,926
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-397
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-284
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-325
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,331
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-278
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-29,452
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,785
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-7,493
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1,906
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-11,852
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-765
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-426
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,308
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,639
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							60.6
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							414
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							5,521
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							942
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)							108
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							37.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							122
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,308

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,513
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							30.3
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							389
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,115
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							471
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)							56.7
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							18.8
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							21.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							792
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,894
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							45.5
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							402
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,818
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							708
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)							82.2
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							28.1
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							153
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,594
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,831

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		694	0.947	0.916	0.765	0.543	0.048
Monetary damages from air pollution - Natural Gas (million 2019$)		579	457	461	351	107	36.1
Monetary damages from air pollution - Transportation (million 2019$)		2,831	2,683	2,069	1,209	552	210
Premature deaths from air pollution - Coal (deaths)		78.4	0.107	0.103	0.086	0.061	0.005
Premature deaths from air pollution - Natural Gas (deaths)		65.3	51.6	52	39.6	12.1	4.07
Premature deaths from air pollution - Transportation (deaths)		318	302	233	136	62	23.6

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)		34,313	38,231				
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 (%)	8.09	19.7	24.6	38.6	60.7	76.6	82.8
Sales of space heating units - Electric Resistance (%)	7.4	8.06	8.29	9.07	10.5	11.9	12.7
Sales of space heating units - Fossil (%)	6.11	4.68	4.33	3.28	1.62	0.513	0.134
Sales of space heating units - Gas Furnace (%)	78.4	67.5	62.8	49.1	27.1	11	4.45
Sales of water heating units - Electric Heat Pump (%)	0.257	2.02	6.97	21.3	43.2	57.6	62.7
Sales of water heating units - Electric Resistance (%)	6.38	7.55	9.45	15.2	24.1	29.9	32
Sales of water heating units - Gas Furnace (%)	88.8	86.1	79.3	59.7	29.4	9.53	2.51
Sales of water heating units - Other (%)	4.56	4.35	4.31	3.87	3.3	2.91	2.77

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)		5.28	5.33	6.71	6.92	9.8	10.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	253	255	252	248	242	237	235
Final energy use - Industry (PJ)	343	348	349	349	350	347	346
Final energy use - Residential (PJ)	355	336	326	315	300	282	265
Final energy use - Transportation (PJ)	918	861	785	722	672	613	544

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)		7.58	7.45				
Sales of cooking units - Electric Resistance (%)	75.3	75.9	78.2	84.2	92.5	97.6	99.3
Sales of cooking units - Gas (%)	24.7	24.1	21.8	15.8	7.55	2.44	0.656
Sales of space heating units - Electric Heat Pump (%)	32.3	41.3	45.1	56.1	73	84	87.9

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Resistance (%)	22.7	24.7	23.3	18.9	12.4	8.34	6.89
Sales of space heating units - Fossil (%)	11.5	14.8	13.8	11	6.65	3.78	2.79
Sales of space heating units - Gas (%)	33.5	19.2	17.8	13.9	7.91	3.85	2.41
Sales of water heating units - Electric Heat Pump (%)	0	1.73	6.65	20.8	42.6	56.9	61.8
Sales of water heating units - Electric Resistance (%)	61.4	73.6	70.5	61.3	47.3	38.2	35.1
Sales of water heating units - Gas Furnace (%)	34.3	21.8	20	15.2	7.52	2.43	0.641
Sales of water heating units - Other (%)	4.29	2.87	2.83	2.74	2.59	2.48	2.44

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	256	534	1,808	5,675	8,272
Public EV charging plugs - DC Fast (1000 units)	0.286		0.97		4.96		13.8
Public EV charging plugs - L2 (1000 units)	1.4		23.3		119		331
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 (%)	1.49	1.92	2.04	1.62	1.03	0.529	0.227
Vehicle sales - Light-duty - EV (%)	1.97	4.86	12.2	26.4	49	72.4	87.7
Vehicle sales - Light-duty - gasoline (%)	91.5	87.1	79	65.9	45.5	24.4	10.8
Vehicle sales - Light-duty - hybrid (%)	4.83	5.62	6.28	5.69	4.23	2.48	1.19
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.378	0.322	0.244	0.172	0.095	0.044
Vehicle sales - Light-duty - other (%)	0.1	0.103	0.094	0.081	0.058	0.032	0.015
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen FC (%)	0.166	0.485	1.37	3.58	7.86	13.2	17
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant (billion $2018)	0	0.006	0.925	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	11.5	1,827	1,827	1,827	1,827	1,827
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)		314	656	656	656	656	656
Conversion capital investment - Cumulative 5-yr (million $2018)		6.65	0	0	0	0	0
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel (quantity)	0	0	0	1	1	1	1
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Power (quantity)	0	1	1	1	1	1	1
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	1	1	1	1
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	1	1	1	1	1	1
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	0	227	227	227	358
Cumulative investment - All (million $2018)		0	0	1,354	1,354	1,354	1,459
Cumulative investment - Spur (million $2018)		0	0	0	0	0	105
Cumulative investment - Trunk (million $2018)		0	0	1,354	1,354	1,354	1,354
Spur (km)		0	0	0	0	0	130
Trunk (km)		0	0	227	227	227	227

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)							-639

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-2,559
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)							-86.7
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-3,285
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-639
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-1,348
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)							-43.3
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-2,030
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							379
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							3,635
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							104
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							134
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							158
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							4,410
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							379
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							775
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							104
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							134

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							78.8
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,472

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)							-370
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-44,532
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,061
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-10,827
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,556
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-17,779
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,133
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-567
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-4,291
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,947
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-186
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-14,417
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-510
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,159
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,300
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,926
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-397
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-284
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-325
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,331
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-278
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-29,452
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,785
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-7,493
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1,906
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-11,852

Table 57: *E-B+ 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)							-765
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-426
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,308
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,639
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							60.6
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							414
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							5,521
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							942
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)							108
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							37.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							122
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,308
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,513
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							30.3
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							389
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,115
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							471
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)							56.7
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							18.8
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							21.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							792

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,894
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							45.5
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							402
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,818
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							708
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)							82.2
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							28.1
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							153
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,594
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,831

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		694	0.947	0.916	0.765	0.543	0.048
Monetary damages from air pollution - Natural Gas (million 2019$)		448	307	144	92.8	50.4	21.5
Monetary damages from air pollution - Transportation (million 2019$)		2,881	2,959	2,922	2,667	2,149	1,488
Premature deaths from air pollution - Coal (deaths)		78.4	0.107	0.103	0.086	0.061	0.005
Premature deaths from air pollution - Natural Gas (deaths)		50.5	34.7	16.2	10.5	5.69	2.42
Premature deaths from air pollution - Transportation (deaths)		324	333	329	300	242	167

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)		33,829	35,143				
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 (%)	8.09	26.8	56.4	70.2	72	72.2	72.3
Sales of space heating units - Electric Resistance (%)	7.4	9.19	13.8	20.2	25.1	25.8	25.8
Sales of space heating units - Fossil (%)	6.11	4.41	2.99	1.35	0.201	0.017	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Gas Furnace (%)	78.4	59.6	26.8	8.28	2.71	1.96	1.9
Sales of water heating units - Electric Heat Pump (%)	0.257	0.277	0.272	0.274	0.275	0.273	0.274
Sales of water heating units - Electric Resistance (%)	6.38	6.85	6.76	6.78	6.8	6.76	6.77
Sales of water heating units - Gas Furnace (%)	88.8	88.5	88.5	88.5	88.5	88.5	88.5
Sales of water heating units - Other (%)	4.56	4.4	4.5	4.42	4.47	4.48	4.45

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)		6.29	6.46	8.19	8.55	7.99	8.24

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	253	258	261	264	267	276	291
Final energy use - Industry (PJ)	344	359	375	389	406	422	442
Final energy use - Residential (PJ)	355	338	334	334	339	348	357
Final energy use - Transportation (PJ)	917	863	796	756	756	778	806

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)		7.46	6.79				
Sales of cooking units - Electric Resistance (%)	75.1	75.1	75.1	75.1	75.1	75.1	75.1
Sales of cooking units - Gas (%)	24.9	24.9	24.9	24.9	24.9	24.9	24.9
Sales of space heating units - Electric Heat Pump (%)	30.3	53.9	54.7	55.8	56.8	58.1	60.1
Sales of space heating units - Electric Resistance (%)	23.3	20.2	19.9	19.3	18.5	17.3	15.2
Sales of space heating units - Fossil (%)	11.8	10.1	7.34	6.13	5.97	5.93	5.99
Sales of space heating units - Gas (%)	34.5	15.8	18.1	18.8	18.7	18.7	18.7
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	61.4	74.7	74.8	74.6	74.5	74.5	74.4
Sales of water heating units - Gas Furnace (%)	34.3	22.4	22.4	22.5	22.6	22.6	22.7
Sales of water heating units - Other (%)	4.29	2.88	2.88	2.9	2.93	2.93	2.94

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 (%)	1.48	1.91	2.17	2.02	1.82	1.69	1.61
Vehicle sales - Light-duty - EV (%)	3.79	5.9	6.7	8.25	10	11.5	12.7
Vehicle sales - Light-duty - gasoline (%)	89.8	86.2	84	82	79.9	78	76.5
Vehicle sales - Light-duty - hybrid (%)	4.67	5.5	6.72	7.28	7.83	8.38	8.78

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.374	0.342	0.303	0.299	0.299	0.31
Vehicle sales - Light-duty - other (%)	0.099	0.103	0.099	0.099	0.099	0.098	0.1
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)							-370
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-44,532
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-3,061
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-10,827
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-2,556
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-17,779
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,133
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-567
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-4,291
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,947
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-186
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-14,417
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-510
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,159
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,300
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-5,926
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-397
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-284
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-325
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,331
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-278
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-29,452
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,785

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-7,493
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-1,906
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-11,852
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-765
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-426
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,308
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,639
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							60.6
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							414
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							5,521
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							942
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)							108
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							37.5
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							122
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,308
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,513
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							30.3
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							389
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,115
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							471
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)							56.7

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 - Reforest cropland (1000 hectares)							18.8
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							21.1
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							792
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,894
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							45.5
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							402
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,818
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							708
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)							82.2
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							28.1
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							153
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,594
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,831

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)	-30.9		-14.5				-11.7
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-4.84		-8.07				-8.49
Business-as-usual carbon sink - Total (Mt CO2e/y)	-35.8		-22.6				-20.2

Table 66: *REF scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		2,275	1,484	1,291	1,204	1,168	1,112
Monetary damages from air pollution - Natural Gas (million 2019$)		397	445	518	510	562	542
Monetary damages from air pollution - Transportation (million 2019$)		2,876	2,995	3,110	3,238	3,364	3,495
Premature deaths from air pollution - Coal (deaths)		257	168	146	136	132	126
Premature deaths from air pollution - Natural Gas (deaths)		44.9	50.3	58.5	57.6	63.5	61.2

Table 66: *REF scenario - IMPACTS - Health (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Transportation (deaths)		323	337	350	364	378	393