Net-Zero America - arkansas state report

2021-03-05

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)	0	10,539	12,307	0	0	0	0
Sales of cooking units - Electric Resistance (%)	30.1	44.4	79.2	86.1	86.5	86.5	86.5
Sales of cooking units - Gas (%)	69.9	55.6	20.8	13.9	13.5	13.5	13.5
Sales of space heating units - Electric Heat Pump (%)	2.92	27.3	77.1	91.1	92.3	92.3	92.3
Sales of space heating units - Electric Resistance (%)	2.74	4.44	4.73	6.05	6.35	6.37	6.39
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace (%)	94.3	68.3	18.2	2.83	1.38	1.34	1.33
Sales of water heating units - Electric Heat Pump (%)	0.08	10.7	56.3	66.5	66.9	66.9	66.9
Sales of water heating units - Electric Resistance (%)	2.31	8.07	26.9	31.1	31.3	31.3	31.3
Sales of water heating units - Gas Furnace (%)	96.5	79.4	15	0.632	0	0	0
Sales of water heating units - Other (%)	1.07	1.78	1.78	1.78	1.79	1.79	1.8

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)		2.42	2.48	3.87	4.09	4.01	4.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	90	90.4	87	81.6	77.4	76.4	78.1
Final energy use - Industry (PJ)	236	242	246	246	250	250	255
Final energy use - Residential (PJ)	123	117	108	95.6	85.1	78.9	76.1
Final energy use - Transportation (PJ)	324	303	265	220	179	155	146

Table 4: *E+ scenario - PILLAR 1: Efficiency/Electrification - Residential*

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)	0	2.31	2.82	0	0	0	0
Sales of cooking units - Electric Resistance (%)	52.7	62.8	93.6	99.7	100	100	100
Sales of cooking units - Gas (%)	47.3	37.2	6.37	0.321	0	0	0
Sales of space heating units - Electric Heat Pump (%)	11.9	27.2	74.3	84.8	85.3	85.2	85.2
Sales of space heating units - Electric Resistance (%)	34.9	33.8	14.2	9.82	9.65	9.82	9.86
Sales of space heating units - Fossil (%)	8.14	11.9	5.59	4.18	4.11	4.04	4.03
Sales of space heating units - Gas (%)	45.1	27.1	5.9	1.18	0.978	0.957	0.954
Sales of water heating units - Electric Heat Pump (%)	0	11.3	59.7	70.6	71.1	71.1	71.1
Sales of water heating units - Electric Resistance (%)	44.5	51.9	32.1	27.6	27.4	27.4	27.4
Sales of water heating units - Gas Furnace (%)	53.7	35.3	6.65	0.277	0	0	0
Sales of water heating units - Other (%)	1.86	1.52	1.52	1.49	1.49	1.5	1.5

Table 5: *E+ scenario - PILLAR 1: Efficiency/Electrification - Transportation*

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million $2018)	0	542	1,384	2,253	3,409	3,714	3,539
Public EV charging plugs - DC Fast (1000 units)	0.043	0	1.12	0	5.01	0	8.11
Public EV charging plugs - L2 (1000 units)	0.243	0	26.9	0	120	0	195
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 (%)	1.81	2.04	1.36	0.439	0.079	0.013	0
Vehicle sales - Light-duty - EV (%)	3.04	12.5	42.3	80.1	96.1	99.3	100
Vehicle sales - Light-duty - gasoline (%)	91.3	81	53.1	18.2	3.51	0.597	0
Vehicle sales - Light-duty - hybrid (%)	3.57	3.93	2.92	1.11	0.266	0.056	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.354	0.224	0.071	0.014	0.002	0
Vehicle sales - Light-duty - other (%)	0.113	0.11	0.074	0.026	0.005	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	0.022	0	0	0.032
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	4.37	0	0.029
Capital invested - Solar PV - Base (billion $2018)	0	1.14	0.219	3.29	4.23	0.151	0
Capital invested - Solar PV - Constrained (billion $2018)	0	0.354	1.18	3.58	3.11	0.641	0
Capital invested - Wind - Base (billion $2018)	0	3.48	8.29	10.5	12.8	10.5	21.2
Capital invested - Wind - Constrained (billion $2018)	0	7.97	11.9	18.7	25.5	0.59	24.8
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed (cumulative) - Rooftop PV (MW)	14.5	25.5	37.9	57.4	85.2	121	168
Installed (cumulative) - Solar - Base land use assumptions (MW)	179	1,034	1,217	4,205	8,279	8,432	8,432
Installed (cumulative) - Wind - Base land use assumptions (MW)	84.5	2,450	8,676	17,144	27,980	37,359	57,370

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	21.7	21.7	21.7	53.4
Biomass w/ccu power plant (GWh)	0	0	0	0	4,907	4,907	4,940
Solar - Base land use assumptions (GWh)	409	1,634	348	5,704	7,789	293	0
Solar - Constrained land use assumptions (GWh)	390	0	2,376	8,004	5,204	551	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Wind - Base land use assumptions (GWh)	315	7,953	20,431	28,313	34,898	28,467	60,107
Wind - Constrained land use assumptions (GWh)	1,989	17,265	30,171	46,574	73,989	1,830	74,128

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million $2018/year)	0	0	0	79.9	391	858	1,068
Conversion capital investment - Cumulative 5-yr (million $2018)	0	0	0	1,551	6,476	8,924	4,059
Number of facilities - Allam power w ccu (quantity)	0	0	0	1	1	1	2
Number of facilities - Beccs hydrogen (quantity)	0	0	0	1	4	14	17
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	1	1	1	2
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	4	4	5
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	1	1	1	2
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	1.95	9.81	21.3	26.4
Annual - BECCS (MMT)		0	0	1.95	9.81	21.3	26.4
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	1.95	11.8	33	59.5
Cumulative - BECCS (MMT)		0	0	1.95	11.8	33	59.5
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	39.8	140	420	894	1,699
Cumulative investment - All (million $2018)		0	244	540	812	1,335	2,026
Cumulative investment - Spur (million $2018)		0	0	50.8	323	846	1,537
Cumulative investment - Trunk (million $2018)		0	244	489	489	489	489
Spur (km)		0	0	60.8	341	815	1,619
Trunk (km)		0	39.8	79.6	79.6	79.6	79.6

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

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	2.19	8.81	16.3	25.8	35.4
Injection wells (wells)		0	2	10	18	30	38
Resource characterization, appraisal, permitting costs (million $2020)		14.2	255	404	404	404	404
Wells and facilities construction costs (million $2020)		0	78.2	305	543	909	1,128

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)							-243
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-10,076
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-64.8
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-10,383
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-243
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-5,130
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-32.4
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-5,405
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							96.4
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							2,955
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							118
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							3,170
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							96.4
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							1,507
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							58.9
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,662

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)							-356
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-46,154
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,334
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-9,227
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,044
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-13,825

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,120
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,077
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-11,526
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,644
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-178
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-13,471
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-222
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,544
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,549
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-4,608
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-392
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-538
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-873
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,565
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-267
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-29,786
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-778
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,386
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,270
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-9,217
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-756
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-807
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-6,200
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,105
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							58.3
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							181
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,705
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,121

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							106
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							71.2
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							327
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,539
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,110
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							29.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							170
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,803
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							561
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
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							35.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							56.8
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							931
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,642
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							43.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							175
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,254
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							844
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							81.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							53.4
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							410
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,876
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,737

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		279	235	189	142	89.4	62
Natural gas consumption - Cumulative (tcf)		0	0	0	0	0	5,687
Natural gas production - Annual (tcf)		720	681	593	501	397	309
Oil consumption - Annual (million bbls)		54.3	46.3	34.6	23.5	14.8	7.61
Oil consumption - Cumulative (million bbls)		0	0	0	0	0	1,065
Oil production - Annual (million bbls)		6.5	6.52	6.52	5.16	4.2	2.79

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		319	0.217	0.206	0.16	0.104	0.004
Monetary damages from air pollution - Natural Gas (million 2019$)		113	64.1	34	28.5	12.5	6.16
Monetary damages from air pollution - Transportation (million 2019$)		404	374	283	163	74.8	30.8
Premature deaths from air pollution - Coal (deaths)		36	0.024	0.023	0.018	0.012	0
Premature deaths from air pollution - Natural Gas (deaths)		12.8	7.24	3.84	3.21	1.41	0.695
Premature deaths from air pollution - Transportation (deaths)		45.5	42.1	31.8	18.3	8.42	3.46

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		122	247	259	772	1,312	1,336
By economic sector - Construction (jobs)		4,896	6,363	11,223	15,191	14,823	20,176
By economic sector - Manufacturing (jobs)		5,351	6,235	8,016	8,218	7,279	9,324
By economic sector - Mining (jobs)		4,370	3,274	2,308	1,469	913	501
By economic sector - Other (jobs)		378	481	1,264	1,956	1,707	2,330
By economic sector - Pipeline (jobs)		462	422	348	245	210	294
By economic sector - Professional (jobs)		3,306	4,324	7,167	10,566	12,169	16,526
By economic sector - Trade (jobs)		2,329	2,667	4,131	5,742	6,200	8,554
By economic sector - Utilities (jobs)		5,433	5,851	9,006	12,339	13,051	18,471
By education level - All sectors - Associates degree or some college (jobs)		8,235	9,338	13,898	17,964	18,160	24,604
By education level - All sectors - Bachelors degree (jobs)		5,967	6,481	9,160	11,755	12,197	16,367
By education level - All sectors - Doctoral degree (jobs)		206	233	346	474	521	698
By education level - All sectors - High school diploma or less (jobs)		10,795	12,232	18,040	23,297	23,593	31,540

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

Item	2020	2025	2030	2035	2040	2045	2050
By education level - All sectors - Masters or professional degree (jobs)		1,442	1,582	2,278	3,008	3,194	4,302
By resource sector - Biomass (jobs)		523	682	737	2,323	4,786	5,704
By resource sector - CO2 (jobs)		5.51	379	463	249	721	1,891
By resource sector - Coal (jobs)		901	80.8	0	0	0	0
By resource sector - Grid (jobs)		5,282	7,780	14,354	20,576	22,284	32,952
By resource sector - Natural Gas (jobs)		9,323	7,514	5,850	5,167	3,424	1,726
By resource sector - Nuclear (jobs)		549	0.005	0.01	0.011	0.023	0.035
By resource sector - Oil (jobs)		3,609	2,977	2,297	1,546	1,027	571
By resource sector - Solar (jobs)		2,982	2,521	6,677	8,730	4,946	5,816
By resource sector - Wind (jobs)		3,471	7,932	13,343	17,906	20,476	28,852
Median wages - Annual - All ($2019 per job)		53,507	53,547	53,429	54,135	55,332	56,196
On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs)		4,292	4,836	7,148	9,211	9,294	12,561
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)		1,721	1,962	2,972	3,911	3,977	5,402
On-Site or In-Plant Training - Total jobs - None (jobs)		4,337	4,872	7,160	9,290	9,515	12,757
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)		216	251	381	498	508	693
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)		16,078	17,944	26,061	33,587	34,369	46,099
On-the-Job Training - All sectors - 1 to 4 years (jobs)		5,538	6,243	9,246	11,929	12,040	16,297
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,631	1,885	2,911	3,863	3,924	5,347
On-the-Job Training - All sectors - None (jobs)		1,449	1,598	2,345	3,041	3,108	4,169
On-the-Job Training - All sectors - Over 10 years (jobs)		262	294	430	537	527	703
On-the-Job Training - All sectors - Up to 1 year (jobs)		17,766	19,845	28,789	37,127	38,066	50,995
Related work experience - All sectors - 1 to 4 years (jobs)		9,737	10,843	15,763	20,344	20,782	27,917
Related work experience - All sectors - 4 to 10 years (jobs)		6,307	7,048	10,298	13,269	13,528	18,258
Related work experience - All sectors - None (jobs)		3,765	4,235	6,234	8,105	8,276	11,117
Related work experience - All sectors - Over 10 years (jobs)		1,750	1,931	2,762	3,489	3,529	4,753
Related work experience - All sectors - Up to 1 year (jobs)		5,087	5,808	8,665	11,289	11,550	15,465
Wage income - All (million $2019)		1,426	1,599	2,336	3,059	3,191	4,356

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)	0	10,527	12,223	0	0	0	0
Sales of cooking units - Electric Resistance (%)	30.1	34.2	39	52	70.1	81.2	85
Sales of cooking units - Gas (%)	69.9	65.8	61	48	29.9	18.8	15
Sales of space heating units - Electric Heat Pump (%)	2.92	17.8	23.5	40	65.6	83.3	89.8
Sales of space heating units - Electric Resistance (%)	2.74	4.44	4.48	4.65	5.07	5.74	6.19
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace (%)	94.3	77.8	72	55.4	29.3	11	3.97

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Electric Heat Pump (%)	0.08	1.96	7.15	22.1	45	59.9	65.1
Sales of water heating units - Electric Resistance (%)	2.31	4.44	6.56	12.7	22.2	28.4	30.5
Sales of water heating units - Gas Furnace (%)	96.5	91.8	84.5	63.4	31	9.91	2.58
Sales of water heating units - Other (%)	1.07	1.78	1.78	1.78	1.79	1.79	1.8

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)		2.1	2.13	2.57	2.64	3.75	3.95

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	90	90.7	90.4	89.6	87.6	85.4	84.4
Final energy use - Industry (PJ)	236	243	246	249	254	253	258
Final energy use - Residential (PJ)	123	118	114	110	103	94.4	86.6
Final energy use - Transportation (PJ)	324	305	276	255	238	219	197

Table 20: *E- scenario - PILLAR 1: Efficiency/Electrification - Residential*

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)	0	2.28	2.67	0	0	0	0
Sales of cooking units - Electric Resistance (%)	52.5	53.8	58.1	69.6	85.5	95.3	98.7
Sales of cooking units - Gas (%)	47.5	46.2	41.9	30.4	14.5	4.68	1.26
Sales of space heating units - Electric Heat Pump (%)	11.9	18.1	23.5	39	62.6	78	83.3
Sales of space heating units - Electric Resistance (%)	34.9	37.6	35.2	28.7	19	12.7	10.5
Sales of space heating units - Fossil (%)	8.14	13.1	12.5	10.3	7.08	5.03	4.32
Sales of space heating units - Gas (%)	45.1	31.2	28.8	22	11.3	4.24	1.82
Sales of water heating units - Electric Heat Pump (%)	0	1.94	7.45	23.3	47.7	63.6	69.1
Sales of water heating units - Electric Resistance (%)	44.5	55.7	53.5	47.1	37	30.5	28.2
Sales of water heating units - Gas Furnace (%)	53.7	40.9	37.5	28.1	13.8	4.37	1.13
Sales of water heating units - Other (%)	1.86	1.52	1.52	1.51	1.52	1.5	1.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million $2018)	0	0	86.7	184	621	1,961	2,854
Public EV charging plugs - DC Fast (1000 units)	0.043	0	0.334	0	1.85	0	5.2
Public EV charging plugs - L2 (1000 units)	0.243	0	8.03	0	44.4	0	125
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 (%)	1.82	2.19	2.11	1.69	1.1	0.572	0.244

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Light-duty - EV (%)	1.58	4.01	10.5	23.6	45.9	70.4	86.9
Vehicle sales - Light-duty - gasoline (%)	92.7	88.7	81.8	69.5	49	26.6	11.7
Vehicle sales - Light-duty - hybrid (%)	3.69	4.55	5.17	4.83	3.75	2.29	1.14
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.388	0.341	0.266	0.193	0.109	0.05
Vehicle sales - Light-duty - other (%)	0.114	0.118	0.109	0.096	0.07	0.039	0.018
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)							-243
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-10,076
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-64.8
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-10,383
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-243
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-5,130
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-32.4
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-5,405
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							96.4
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							2,955
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							118
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							3,170
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							96.4
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							1,507
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							58.9

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,662

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)							-356
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-46,154
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,334
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-9,227
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,044
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-13,825
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,120
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,077
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-11,526
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,644
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-178
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-13,471
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-222
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,544
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,549
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-4,608
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-392
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-538
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-873
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,565
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-267
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-29,786
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-778
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,386
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,270
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-9,217
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-756

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-807
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-6,200
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,105
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							58.3
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							181
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,705
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,121
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)							106
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							71.2
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							327
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,539
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,110
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							29.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							170
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,803
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							561
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
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							35.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							56.8
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							931

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,642
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							43.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							175
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,254
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							844
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							81.2
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							53.4
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							410
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,876
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,737

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		319	0.217	0.206	0.16	0.104	0.004
Monetary damages from air pollution - Natural Gas (million 2019$)		110	54	25	11.9	4.22	3.25
Monetary damages from air pollution - Transportation (million 2019$)		410	410	397	357	283	194
Premature deaths from air pollution - Coal (deaths)		36	0.024	0.023	0.018	0.012	0
Premature deaths from air pollution - Natural Gas (deaths)		12.4	6.1	2.82	1.34	0.476	0.367
Premature deaths from air pollution - Transportation (deaths)		46.1	46.1	44.7	40.1	31.8	21.8

Table 25: *E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Commercial*

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)	0	10,539	12,307	0	0	0	0
Sales of cooking units - Electric Resistance (%)	30.1	44.4	79.2	86.1	86.5	86.5	86.5
Sales of cooking units - Gas (%)	69.9	55.6	20.8	13.9	13.5	13.5	13.5
Sales of space heating units - Electric Heat Pump (%)	2.92	27.3	77.1	91.1	92.3	92.3	92.3
Sales of space heating units - Electric Resistance (%)	2.74	4.44	4.73	6.05	6.35	6.37	6.39
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0

Table 25: *E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Commercial (continued)*

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Gas Furnace (%)	94.3	68.3	18.2	2.83	1.38	1.34	1.33
Sales of water heating units - Electric Heat Pump (%)	0.08	10.7	56.3	66.5	66.9	66.9	66.9
Sales of water heating units - Electric Resistance (%)	2.31	8.07	26.9	31.1	31.3	31.3	31.3
Sales of water heating units - Gas Furnace (%)	96.5	79.4	15	0.632	0	0	0
Sales of water heating units - Other (%)	1.07	1.78	1.78	1.78	1.79	1.79	1.8

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)		2.42	2.48	3.87	4.09	4.01	4.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	90	90.4	87	81.6	77.4	76.4	78.1
Final energy use - Industry (PJ)	236	242	246	246	250	250	255
Final energy use - Residential (PJ)	123	117	108	95.6	85.1	78.9	76.1
Final energy use - Transportation (PJ)	324	303	265	220	179	155	146

Table 28: *E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Residential*

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)	0	2.31	2.82	0	0	0	0
Sales of cooking units - Electric Resistance (%)	52.7	62.8	93.6	99.7	100	100	100
Sales of cooking units - Gas (%)	47.3	37.2	6.37	0.321	0	0	0
Sales of space heating units - Electric Heat Pump (%)	11.9	27.2	74.3	84.8	85.3	85.2	85.2
Sales of space heating units - Electric Resistance (%)	34.9	33.8	14.2	9.82	9.65	9.82	9.86
Sales of space heating units - Fossil (%)	8.14	11.9	5.59	4.18	4.11	4.04	4.03
Sales of space heating units - Gas (%)	45.1	27.1	5.9	1.18	0.978	0.957	0.954
Sales of water heating units - Electric Heat Pump (%)	0	11.3	59.7	70.6	71.1	71.1	71.1
Sales of water heating units - Electric Resistance (%)	44.5	51.9	32.1	27.6	27.4	27.4	27.4
Sales of water heating units - Gas Furnace (%)	53.7	35.3	6.65	0.277	0	0	0
Sales of water heating units - Other (%)	1.86	1.52	1.52	1.49	1.49	1.5	1.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million $2018)	0	542	1,384	2,253	3,409	3,714	3,539
Public EV charging plugs - DC Fast (1000 units)	0.043	0	1.12	0	5.01	0	8.11
Public EV charging plugs - L2 (1000 units)	0.243	0	26.9	0	120	0	195
Vehicle sales - Heavy-duty - diesel (%)	97.2	92.1	67	23.3	4.22	0.628	0
Vehicle sales - Heavy-duty - EV (%)	0.588	3.81	19	45.6	57.4	59.6	60
Vehicle sales - Heavy-duty - gasoline (%)	0.227	0.227	0.176	0.066	0.013	0.002	0
Vehicle sales - Heavy-duty - hybrid (%)	0.082	0.09	0.077	0.031	0.007	0.001	0
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.392	2.54	12.7	30.4	38.2	39.7	40

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Heavy-duty - other (%)	1.5	1.23	1.07	0.568	0.163	0.038	0
Vehicle sales - Light-duty - diesel (%)	1.81	2.04	1.36	0.439	0.079	0.013	0
Vehicle sales - Light-duty - EV (%)	3.04	12.5	42.3	80.1	96.1	99.3	100
Vehicle sales - Light-duty - gasoline (%)	91.3	81	53.1	18.2	3.51	0.597	0
Vehicle sales - Light-duty - hybrid (%)	3.57	3.93	2.92	1.11	0.266	0.056	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.354	0.224	0.071	0.014	0.002	0
Vehicle sales - Light-duty - other (%)	0.113	0.11	0.074	0.026	0.005	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Base (billion $2018)	0	0.463	3.64	3.66	3.27	10.3	9.23
Capital invested - Wind - Base (billion $2018)	0	3.54	8.66	17.5	15.8	25.6	45.4
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed (cumulative) - Solar - Base land use assumptions (MW)	179	525	3,561	6,876	10,017	20,475	30,434
Installed (cumulative) - Wind - Base land use assumptions (MW)	84.5	2,493	8,997	23,141	36,480	59,292	102,194

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	409	658	5,790	6,349	5,998	19,976	18,926
Solar - Constrained land use assumptions (GWh)	409	1,781	2,296	5,518	7,435	24,374	24,110
Wind - Base land use assumptions (GWh)	315	8,107	21,440	46,708	41,293	68,635	118,691
Wind - Constrained land use assumptions (GWh)	1,989	18,247	29,786	71,941	51,853	8,742	138,685

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)							-243
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-10,076
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-64.8
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-10,383
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-243
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-5,130

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-32.4
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-5,405
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							96.4
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							2,955
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							118
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							3,170
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							96.4
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							1,507
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							58.9
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,662

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)							-356
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-46,154
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,334
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-9,227
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,044
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-13,825
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,120
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,077
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-11,526
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,644
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-178
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-13,471
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-222
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,544

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,549
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-4,608
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-392
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-538
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-873
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,565
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-267
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-29,786
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-778
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,386
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,270
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-9,217
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-756
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-807
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-6,200
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,105
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							58.3
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							181
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,705
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,121
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)							106
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							71.2
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							327
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,539
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,110

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							29.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							170
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,803
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							561
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
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							35.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							56.8
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							931
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,642
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							43.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							175
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,254
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							844
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							81.2
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							53.4
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							410
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,876
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,737

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		319	0.217	0.206	0.16	0.104	0.004

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Natural Gas (million 2019$)		104	59.7	24.6	17.2	5.17	2.89
Monetary damages from air pollution - Transportation (million 2019$)		404	374	283	163	74.8	30.8
Premature deaths from air pollution - Coal (deaths)		36	0.024	0.023	0.018	0.012	0
Premature deaths from air pollution - Natural Gas (deaths)		11.7	6.74	2.78	1.95	0.583	0.326
Premature deaths from air pollution - Transportation (deaths)		45.5	42.1	31.8	18.3	8.42	3.46

Table 35: *E+RE- scenario - PILLAR 1: Efficiency/Electrification - Commercial*

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)	0	10,539	12,307	0	0	0	0
Sales of cooking units - Electric Resistance (%)	30.1	44.4	79.2	86.1	86.5	86.5	86.5
Sales of cooking units - Gas (%)	69.9	55.6	20.8	13.9	13.5	13.5	13.5
Sales of space heating units - Electric Heat Pump (%)	2.92	27.3	77.1	91.1	92.3	92.3	92.3
Sales of space heating units - Electric Resistance (%)	2.74	4.44	4.73	6.05	6.35	6.37	6.39
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace (%)	94.3	68.3	18.2	2.83	1.38	1.34	1.33
Sales of water heating units - Electric Heat Pump (%)	0.08	10.7	56.3	66.5	66.9	66.9	66.9
Sales of water heating units - Electric Resistance (%)	2.31	8.07	26.9	31.1	31.3	31.3	31.3
Sales of water heating units - Gas Furnace (%)	96.5	79.4	15	0.632	0	0	0
Sales of water heating units - Other (%)	1.07	1.78	1.78	1.78	1.79	1.79	1.8

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)		2.42	2.48	3.87	4.09	4.01	4.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	90	90.4	87	81.6	77.4	76.4	78.1
Final energy use - Industry (PJ)	236	242	246	246	250	250	255
Final energy use - Residential (PJ)	123	117	108	95.6	85.1	78.9	76.1
Final energy use - Transportation (PJ)	324	303	265	220	179	155	146

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)	0	2.31	2.82	0	0	0	0
Sales of cooking units - Electric Resistance (%)	52.7	62.8	93.6	99.7	100	100	100
Sales of cooking units - Gas (%)	47.3	37.2	6.37	0.321	0	0	0
Sales of space heating units - Electric Heat Pump (%)	11.9	27.2	74.3	84.8	85.3	85.2	85.2
Sales of space heating units - Electric Resistance (%)	34.9	33.8	14.2	9.82	9.65	9.82	9.86

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Fossil (%)	8.14	11.9	5.59	4.18	4.11	4.04	4.03
Sales of space heating units - Gas (%)	45.1	27.1	5.9	1.18	0.978	0.957	0.954
Sales of water heating units - Electric Heat Pump (%)	0	11.3	59.7	70.6	71.1	71.1	71.1
Sales of water heating units - Electric Resistance (%)	44.5	51.9	32.1	27.6	27.4	27.4	27.4
Sales of water heating units - Gas Furnace (%)	53.7	35.3	6.65	0.277	0	0	0
Sales of water heating units - Other (%)	1.86	1.52	1.52	1.49	1.49	1.5	1.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million $2018)	0	542	1,384	2,253	3,409	3,714	3,539
Public EV charging plugs - DC Fast (1000 units)	0.043	0	1.12	0	5.01	0	8.11
Public EV charging plugs - L2 (1000 units)	0.243	0	26.9	0	120	0	195
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 (%)	1.81	2.04	1.36	0.439	0.079	0.013	0
Vehicle sales - Light-duty - EV (%)	3.04	12.5	42.3	80.1	96.1	99.3	100
Vehicle sales - Light-duty - gasoline (%)	91.3	81	53.1	18.2	3.51	0.597	0
Vehicle sales - Light-duty - hybrid (%)	3.57	3.93	2.92	1.11	0.266	0.056	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.354	0.224	0.071	0.014	0.002	0
Vehicle sales - Light-duty - other (%)	0.113	0.11	0.074	0.026	0.005	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Base (billion $2018)		0.463	1.85	2	1.93	0	0
Capital invested - Solar PV - Constrained (billion $2018)		1.81	2.13	1.76	3.38	2.64	0
Capital invested - Wind - Base (billion $2018)		2.7	1.94	0.055	4.45	5.63	10.7
Capital invested - Wind - Constrained (billion $2018)		4.74	4.41	0.402	6.29	6.57	19.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	409	658	2,950	3,475	3,539	0	0
Solar - Constrained land use assumptions (GWh)	409	2,576	3,399	3,044	6,216	5,152	0
Wind - Base land use assumptions (GWh)	0.381	6,347	4,671	165	12,376	16,859	33,130
Wind - Constrained land use assumptions (GWh)	1,673	11,345	11,299	1,186	17,721	18,659	55,022

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)							-243
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-10,076
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-64.8
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-10,383
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-243
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-5,130
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-32.4
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-5,405
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							96.4
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							2,955
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							118
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							3,170
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							96.4
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							1,507
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							58.9
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							1,662

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)							-356
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-46,154
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,334
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-9,227
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,044
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-13,825

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,120
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,077
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-11,526
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,644
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-178
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-13,471
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-222
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,544
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,549
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-4,608
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-392
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-538
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-873
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,565
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-267
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-29,786
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-778
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,386
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,270
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-9,217
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-756
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-807
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-6,200
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,105
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							58.3
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							181
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,705
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,121

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							106
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							71.2
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							327
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,539
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,110
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							29.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							170
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,803
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							561
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
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							35.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							56.8
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							931
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,642
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							43.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							175
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,254
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							844
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							81.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							53.4
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							410
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,876
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,737

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		319	0.217	0.206	0.16	0.104	0.004
Monetary damages from air pollution - Natural Gas (million 2019$)		117	64.9	68	54.8	18.6	5.95
Monetary damages from air pollution - Transportation (million 2019$)		404	374	283	163	74.8	30.8
Premature deaths from air pollution - Coal (deaths)		36	0.024	0.023	0.018	0.012	0
Premature deaths from air pollution - Natural Gas (deaths)		13.2	7.33	7.68	6.19	2.1	0.672
Premature deaths from air pollution - Transportation (deaths)		45.5	42.1	31.8	18.3	8.42	3.46

Table 45: *E-B+ scenario - PILLAR 1: Efficiency/Electrification - Commercial*

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)	0	10,527	12,223	0	0	0	0
Sales of cooking units - Electric Resistance (%)	30.1	34.2	39	52	70.1	81.2	85
Sales of cooking units - Gas (%)	69.9	65.8	61	48	29.9	18.8	15
Sales of space heating units - Electric Heat Pump (%)	2.92	17.8	23.5	40	65.6	83.3	89.8
Sales of space heating units - Electric Resistance (%)	2.74	4.44	4.48	4.65	5.07	5.74	6.19
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace (%)	94.3	77.8	72	55.4	29.3	11	3.97
Sales of water heating units - Electric Heat Pump (%)	0.08	1.96	7.15	22.1	45	59.9	65.1
Sales of water heating units - Electric Resistance (%)	2.31	4.44	6.56	12.7	22.2	28.4	30.5
Sales of water heating units - Gas Furnace (%)	96.5	91.8	84.5	63.4	31	9.91	2.58
Sales of water heating units - Other (%)	1.07	1.78	1.78	1.78	1.79	1.79	1.8

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)		2.1	2.13	2.57	2.64	3.75	3.95

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	90	90.7	90.4	89.6	87.6	85.4	84.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	236	243	246	249	254	253	258
Final energy use - Residential (PJ)	123	118	114	110	103	94.4	86.6
Final energy use - Transportation (PJ)	324	305	276	255	238	219	197

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)	0	2.28	2.67	0	0	0	0
Sales of cooking units - Electric Resistance (%)	52.5	53.8	58.1	69.6	85.5	95.3	98.7
Sales of cooking units - Gas (%)	47.5	46.2	41.9	30.4	14.5	4.68	1.26
Sales of space heating units - Electric Heat Pump (%)	11.9	18.1	23.5	39	62.6	78	83.3
Sales of space heating units - Electric Resistance (%)	34.9	37.6	35.2	28.7	19	12.7	10.5
Sales of space heating units - Fossil (%)	8.14	13.1	12.5	10.3	7.08	5.03	4.32
Sales of space heating units - Gas (%)	45.1	31.2	28.8	22	11.3	4.24	1.82
Sales of water heating units - Electric Heat Pump (%)	0	1.94	7.45	23.3	47.7	63.6	69.1
Sales of water heating units - Electric Resistance (%)	44.5	55.7	53.5	47.1	37	30.5	28.2
Sales of water heating units - Gas Furnace (%)	53.7	40.9	37.5	28.1	13.8	4.37	1.13
Sales of water heating units - Other (%)	1.86	1.52	1.52	1.51	1.52	1.5	1.5

Table 49: *E-B+ scenario - PILLAR 1: Efficiency/Electrification - Transportation*

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million $2018)	0	0	86.7	184	621	1,961	2,854
Public EV charging plugs - DC Fast (1000 units)	0.043	0	0.334	0	1.85	0	5.2
Public EV charging plugs - L2 (1000 units)	0.243	0	8.03	0	44.4	0	125
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 (%)	1.82	2.19	2.11	1.69	1.1	0.572	0.244
Vehicle sales - Light-duty - EV (%)	1.58	4.01	10.5	23.6	45.9	70.4	86.9
Vehicle sales - Light-duty - gasoline (%)	92.7	88.7	81.8	69.5	49	26.6	11.7
Vehicle sales - Light-duty - hybrid (%)	3.69	4.55	5.17	4.83	3.75	2.29	1.14
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.388	0.341	0.266	0.193	0.109	0.05
Vehicle sales - Light-duty - other (%)	0.114	0.118	0.109	0.096	0.07	0.039	0.018
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen FC (%)	0.166	0.485	1.37	3.58	7.86	13.2	17
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0	0	0	0.063
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	13.1	6.33	8.69	5.05

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	62.9
Biomass w/ccu power plant (GWh)	0	0	0	14,741	21,844	31,603	37,270

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million $2018/year)	0	0	0	886	1,910	2,497	2,840
Conversion capital investment - Cumulative 5-yr (million $2018)	0	0	0	12,047	12,821	7,975	4,709
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	8	8	8
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	12	18	26	30
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	14.6	30.6	40.3	45.8
Annual - BECCS (MMT)		0	0	14.6	30.6	40.3	45.8
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	14.6	45.2	85.5	131
Cumulative - BECCS (MMT)		0	0	14.6	45.2	85.5	131
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	39.8	150	721	1,074	1,074
Cumulative investment - All (million $2018)		0	284	887	1,728	2,267	2,443
Cumulative investment - Spur (million $2018)		0	0	318	874	1,414	1,589
Cumulative investment - Trunk (million $2018)		0	284	569	853	853	853
Spur (km)		0	0	69.9	602	955	955
Trunk (km)		0	39.8	79.6	119	119	119

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	30.9	41.4	45.1
Injection wells (wells)		0	4	14	26	42	54
Resource characterization, appraisal, permitting costs (million $2020)		14.2	350	562	562	562	562
Wells and facilities construction costs (million $2020)		0	111	432	770	1,288	1,600

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)							-923
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-9,220
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)							-49.6
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-10,192
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-923
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-4,678
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)							-24.8
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-5,626
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							367
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							6,684
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							143
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							440
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							90.3
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							7,724

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							367
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							1,376
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							143
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							440
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							45.1
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							2,371

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)							-356
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-46,154
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,334
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-9,227
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,044
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-13,825
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,120
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,077
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-11,526
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,644
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-178
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-13,471
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-222
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,544
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,549
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-4,608
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-392
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-538
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-873
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,565

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-267
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-29,786
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-778
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,386
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,270
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-9,217
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-756
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-807
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-6,200
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,105
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							58.3
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							181
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,705
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,121
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)							106
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							71.2
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							327
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,539
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,110
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							29.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							170
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,803
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							561

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							56
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							35.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							56.8
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							931
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,642
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							43.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							175
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,254
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							844
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							81.2
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							53.4
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							410
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,876
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,737

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		319	0.217	0.206	0.16	0.104	0.004
Monetary damages from air pollution - Natural Gas (million 2019$)		110	52.6	30.1	21.1	8.66	4.65
Monetary damages from air pollution - Transportation (million 2019$)		410	410	397	357	283	194
Premature deaths from air pollution - Coal (deaths)		36	0.024	0.023	0.018	0.012	0
Premature deaths from air pollution - Natural Gas (deaths)		12.4	5.93	3.4	2.39	0.977	0.525
Premature deaths from air pollution - Transportation (deaths)		46.1	46.1	44.7	40.1	31.8	21.8

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)	0	10,305	10,816	0	0	0	0
Sales of cooking units - Electric Resistance (%)	30.1	32.3	32.3	32.3	32.3	32.3	32.3
Sales of cooking units - Gas (%)	69.9	67.7	67.7	67.7	67.7	67.7	67.7
Sales of space heating units - Electric Heat Pump (%)	2.92	28.4	67	78.3	79.4	79.5	79.5
Sales of space heating units - Electric Resistance (%)	2.74	6.12	11.6	15.8	18.7	19.1	19.2
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace (%)	94.3	65.5	21.4	5.92	1.92	1.38	1.33
Sales of water heating units - Electric Heat Pump (%)	0.08	0.13	0.128	0.13	0.13	0.128	0.128
Sales of water heating units - Electric Resistance (%)	2.31	3.68	3.66	3.67	3.69	3.68	3.7
Sales of water heating units - Gas Furnace (%)	96.5	94.4	94.4	94.4	94.4	94.4	94.4
Sales of water heating units - Other (%)	1.07	1.78	1.78	1.78	1.79	1.79	1.8

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)		2.28	2.33	3.46	3.64	3.57	3.72

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	90	91.9	92.9	93.6	95.4	100	108
Final energy use - Industry (PJ)	236	248	257	261	270	278	287
Final energy use - Residential (PJ)	123	117	115	115	116	119	121
Final energy use - Transportation (PJ)	324	305	279	263	263	271	282

Table 62: *REF scenario - PILLAR 1: Efficiency/Electrification - Residential*

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)	0	2.25	2.32	0	0	0	0
Sales of cooking units - Electric Resistance (%)	52.1	52.1	52.1	52.1	52.1	52.1	52.1
Sales of cooking units - Gas (%)	47.9	47.9	47.9	47.9	47.9	47.9	47.9
Sales of space heating units - Electric Heat Pump (%)	8.95	36.6	37.8	39.7	41.3	43.3	46.3
Sales of space heating units - Electric Resistance (%)	36.2	30.2	29.6	28.9	27.9	26.1	23
Sales of space heating units - Fossil (%)	8.35	8.61	8.72	8.67	8.53	8.52	8.55
Sales of space heating units - Gas (%)	46.5	24.5	23.8	22.8	22.3	22.1	22.2
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	44.5	56.5	56.6	56.6	56.5	56.5	56.5
Sales of water heating units - Gas Furnace (%)	53.7	42	41.9	41.8	42	42	42
Sales of water heating units - Other (%)	1.86	1.52	1.52	1.52	1.53	1.53	1.53

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 (%)	1.82	2.19	2.23	2.07	1.88	1.75	1.67
Vehicle sales - Light-duty - EV (%)	2.7	4.49	5.15	6.27	7.7	9.08	10.2
Vehicle sales - Light-duty - gasoline (%)	91.7	88.3	86.6	85.1	83.3	81.3	79.6
Vehicle sales - Light-duty - hybrid (%)	3.59	4.48	5.51	6.09	6.72	7.41	8.05
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.386	0.361	0.325	0.325	0.327	0.339
Vehicle sales - Light-duty - other (%)	0.114	0.118	0.115	0.116	0.116	0.115	0.118
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)							-356
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-46,154
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,334
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-9,227
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-3,044
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-13,825
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-1,120
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,077
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-11,526
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-4,644
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-178
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-13,471
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-222
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-3,544
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-1,549
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-4,608
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-392
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-538

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-873
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,565
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-267
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-29,786
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-778
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-6,386
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-2,270
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-9,217
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-756
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-807
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-6,200
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-3,105
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							58.3
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							181
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							4,705
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							1,121
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)							106
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							71.2
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							327
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,539
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							8,110
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							29.1
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							170
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							1,803

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							561
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
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							35.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							56.8
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							931
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							3,642
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							43.7
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							175
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,254
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							844
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							81.2
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							53.4
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							410
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,876
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							6,737

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)	-22.2		-14.6				-11.9
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-3.76		-6.27				-6.6
Business-as-usual carbon sink - Total (Mt CO2e/y)	-26		-20.9				-18.5

Table 66: *REF scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		1,291	810	532	419	377	374
Monetary damages from air pollution - Natural Gas (million 2019$)		122	119	126	95.4	75.3	67.7
Monetary damages from air pollution - Transportation (million 2019$)		410	416	424	433	443	453
Premature deaths from air pollution - Coal (deaths)		146	91.5	60.1	47.3	42.6	42.2
Premature deaths from air pollution - Natural Gas (deaths)		13.8	13.5	14.2	10.8	8.5	7.64
Premature deaths from air pollution - Transportation (deaths)		46.2	46.8	47.7	48.7	49.8	51