Net-Zero America - nebraska state report

2021-03-18

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

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Notes

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

Data by category and subcategory

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		5,541	6,031				
Sales of cooking units - Electric Resistance (%)	44.8	57.1	84	89.3	89.6	89.6	89.6
Sales of cooking units - Gas (%)	55.2	42.9	16	10.7	10.4	10.4	10.4
Sales of space heating units - Electric Heat Pump (%)	3.92	7.61	30.1	78	86.6	87.1	87.1
Sales of space heating units - Electric Resistance (%)	6.31	5.8	8.21	11.8	12.4	12.4	12.4
Sales of space heating units - Fossil (%)	0	1.82	0.351	0.015	0	0	0
Sales of space heating units - Gas Furnace (%)	89.8	84.8	61.3	10.2	1.03	0.454	0.456
Sales of water heating units - Electric Heat Pump (%)	0.944	1.84	14.5	42	47	47.3	47.3
Sales of water heating units - Electric Resistance (%)	8.03	8	20.3	47	51.8	52.1	52.1
Sales of water heating units - Gas Furnace (%)	90.2	89.2	64.5	10.3	0.61	0	0
Sales of water heating units - Other (%)	0.788	0.941	0.732	0.684	0.681	0.683	0.683

Table 2: *E+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		1.62	1.68	2.88	3.08	2.81	2.96

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	70.8	69.4	66.6	62.4	57.8	54.2	52.1
Final energy use - Industry (PJ)	281	293	298	298	301	304	307
Final energy use - Residential (PJ)	86.4	81.9	77.8	69.7	60.5	53.3	48.7
Final energy use - Transportation (PJ)	182	170	150	125	103	89.2	83.4

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)		1.79	2.3				
Sales of cooking units - Electric Resistance (%)	74.2	79.7	96.5	99.8	100	100	100
Sales of cooking units - Gas (%)	25.8	20.3	3.47	0.175	0	0	0
Sales of space heating units - Electric Heat Pump (%)	6.37	12.2	35.2	81.9	90.3	90.9	90.6
Sales of space heating units - Electric Resistance (%)	16.5	22	17.4	7.5	5.7	5.65	5.9
Sales of space heating units - Fossil (%)	5.83	9.86	7.69	3.24	2.34	2.21	2.25
Sales of space heating units - Gas (%)	71.3	55.9	39.7	7.36	1.62	1.25	1.22
Sales of water heating units - Electric Heat Pump (%)	0	0.739	10.1	30.7	34.4	34.6	34.6
Sales of water heating units - Electric Resistance (%)	35.5	51.5	55.3	63.7	65.3	65.4	65.3
Sales of water heating units - Gas Furnace (%)	64.5	47.7	34.5	5.53	0.326	0	0
Sales of water heating units - Other (%)	0.03	0.032	0.032	0.032	0.032	0.032	0.032

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)		377	964	1,565	2,370	2,580	2,460
Public EV charging plugs - DC Fast (1000 units)	0.061		0.695		3.07		4.98
Public EV charging plugs - L2 (1000 units)	0.164		16.7		74		120
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 (%)	1.66	1.92	1.3	0.418	0.076	0.013	0
Vehicle sales - Light-duty - EV (%)	3.53	14	44.6	81.1	96.2	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.5	79.4	50.7	17.3	3.39	0.593	0
Vehicle sales - Light-duty - hybrid (%)	4.05	4.27	3.08	1.16	0.28	0.06	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.111	0.346	0.212	0.066	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.107	0.103	0.068	0.024	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	0.013	0.004	0	0
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	0.005	0	0.597
Capital invested - Solar PV - Base (billion $2018)		2.03	11	9.43	6.82	5.94	15.3
Capital invested - Solar PV - Constrained (billion $2018)		3.44	13.4	6.07	7	7.8	11.1
Capital invested - Wind - Base (billion $2018)		0.55	11.5	23.7	25.9	28.6	37
Capital invested - Wind - Constrained (billion $2018)		17	13.9	23.4	20.3	25.7	27.6
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Rooftop PV (MW)	15.1	27	34.4	46	61	78.7	99.6
Installed renewables - Solar - Base land use assumptions (MW)	1.5	1,779	12,489	22,504	30,188	37,276	56,659
Installed renewables - Solar - Constrained land use assumptions (MW)	0	3,386	11,576	18,646	25,610	35,318	52,473
Installed renewables - Wind - Base land use assumptions (MW)	3,194	3,568	12,188	31,309	53,212	78,726	113,660
Installed renewables - Wind - Constrained land use assumptions (MW)	3,194	8,791	19,997	39,271	57,525	81,044	107,406

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	13.1	17.1	17.1	17.1
Biomass w/ccu power plant (GWh)	0	0	0	0	5.71	5.71	676
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)	3.05	2,889	20,389	36,900	49,574	61,323	93,358
Solar - Constrained land use assumptions (GWh)	0	5,512	18,933	30,594	42,027	58,159	86,542
Wind - Base land use assumptions (GWh)	13,033	14,343	44,430	110,489	184,905	270,650	387,982
Wind - Constrained land use assumptions (GWh)	13,033	32,477	70,737	135,918	196,735	274,397	357,973

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million $2018/year)		0	0	47.4	122	699	3,814
Conversion capital investment - Cumulative 5-yr (million $2018)		0	0	687	1,056	8,178	62,939
Number of facilities - Allam power w ccu (quantity)	0	0	0	1	1	1	1
Number of facilities - Beccs hydrogen (quantity)	0	0	0	1	2	11	29
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	1	1	1	1
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	1	1	2
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	1	1	1	33
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	0.86	2.21	12.7	56.8
Annual - BECCS (MMT)		0	0	0.86	2.21	12.7	56.8
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	0.86	3.07	15.8	72.6
Cumulative - BECCS (MMT)		0	0	0.86	3.07	15.8	72.6
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	276	678	573	1,227	4,968
Cumulative investment - All (million $2018)		0	1,459	2,992	2,939	3,694	6,651
Cumulative investment - Spur (million $2018)		0	0	72.9	19.6	775	3,732
Cumulative investment - Trunk (million $2018)		0	1,459	2,919	2,919	2,919	2,919
Spur (km)		0	0	126	21.5	675	4,416
Trunk (km)		0	276	552	552	552	552

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)							-2,594
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-7,779
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-286
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-10,659
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-2,594
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-4,000
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-143
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-6,737
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							1,456
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							7,064
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							489
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							9,008
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							1,456
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							3,654
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							244
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							5,354

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)							-248
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-17,146
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-947
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-427
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-46.9
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-285
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,717
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-7,855
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-4,189
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-431
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-124
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-5,906
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-158
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-164
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-23.8
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-95
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-951
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,928
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-317
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-145
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-186
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-11,526
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-553
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-296
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-34.9
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-190
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,834
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-5,891
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,253
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-288

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)							40.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							128
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							218
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							17.3
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)							258
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							519
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							119
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							143
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,443
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							20.2
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							120
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							83.4
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							8.63
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)							136
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							260
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							20.6
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							86.4
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							735
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							30.4

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)							124
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							151
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							13
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)							197
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							390
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							149
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							174
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,228

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		144	121	97.3	73.2	46.1	32
Natural gas consumption - Cumulative (tcf)							2,931
Natural gas production - Annual (tcf)		0.529	0.5	0.435	0.368	0.292	0.227
Oil consumption - Annual (million bbls)		46.1	40.8	32.6	24.4	18	12.3
Oil consumption - Cumulative (million bbls)							991
Oil production - Annual (million bbls)		2.66	2.67	2.67	2.12	1.72	1.14

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		125	0.122	0.115	0.092	0.061	0.001
Monetary damages from air pollution - Natural Gas (million 2019$)		73.6	43.8	18.5	11.7	7.14	3.49
Monetary damages from air pollution - Transportation (million 2019$)		195	183	140	81.3	37.2	14.7
Premature deaths from air pollution - Coal (deaths)		14.1	0.014	0.013	0.01	0.007	0
Premature deaths from air pollution - Natural Gas (deaths)		8.31	4.94	2.09	1.32	0.806	0.395
Premature deaths from air pollution - Transportation (deaths)		22	20.6	15.7	9.14	4.19	1.65

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		3,679	3,685	3,623	2,083	1,054	3,462
By economic sector - Construction (jobs)		5,602	16,136	23,789	28,510	34,963	55,610
By economic sector - Manufacturing (jobs)		6,180	7,502	9,750	9,262	8,469	13,621
By economic sector - Mining (jobs)		1,054	702	481	303	184	105

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		586	2,339	3,234	3,948	4,846	8,590
By economic sector - Pipeline (jobs)		199	349	315	105	99.8	425
By economic sector - Professional (jobs)		3,529	8,228	13,833	18,367	24,472	40,728
By economic sector - Trade (jobs)		3,206	5,632	8,311	10,371	13,345	21,991
By economic sector - Utilities (jobs)		5,243	10,308	17,535	21,910	28,841	47,111
By education level - All sectors - Associates degree or some college (jobs)		8,127	16,530	25,051	30,079	37,368	61,009
By education level - All sectors - Bachelors degree (jobs)		5,488	10,348	15,757	19,124	24,036	39,535
By education level - All sectors - Doctoral degree (jobs)		188	397	627	797	1,035	1,715
By education level - All sectors - High school diploma or less (jobs)		14,142	25,005	35,392	39,857	47,457	78,860
By education level - All sectors - Masters or professional degree (jobs)		1,334	2,602	4,044	5,000	6,378	10,524
By resource sector - Biomass (jobs)		8,621	8,390	8,104	4,972	4,014	15,388
By resource sector - CO2 (jobs)		0	1,453	1,457	14.1	247	3,162
By resource sector - Coal (jobs)		1,025	257	0	0	0	0
By resource sector - Grid (jobs)		7,621	16,428	30,894	41,013	53,982	87,725
By resource sector - Natural Gas (jobs)		1,577	1,420	1,280	1,070	1,313	1,251
By resource sector - Nuclear (jobs)		404	398	231	0.007	0.015	0.026
By resource sector - Oil (jobs)		2,295	1,889	1,433	1,005	703	450
By resource sector - Solar (jobs)		3,760	14,627	15,670	15,382	15,001	29,215
By resource sector - Wind (jobs)		3,975	10,020	21,801	31,402	41,013	54,454
Median wages - Annual - All ($2019 per job)		53,898	55,469	57,289	58,995	60,632	61,479
On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs)		4,224	8,567	12,917	15,446	19,150	31,237
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)		1,641	3,637	5,562	6,755	8,490	13,771
On-Site or In-Plant Training - Total jobs - None (jobs)		4,653	8,875	13,119	15,487	19,057	31,441
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)		244	483	726	860	1,060	1,729
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)		18,516	33,320	48,546	56,310	68,515	113,466
On-the-Job Training - All sectors - 1 to 4 years (jobs)		5,243	10,903	16,590	19,991	24,911	40,519
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,556	3,585	5,517	6,735	8,490	13,752
On-the-Job Training - All sectors - None (jobs)		1,652	3,065	4,436	5,168	6,301	10,438
On-the-Job Training - All sectors - Over 10 years (jobs)		269	531	766	885	1,057	1,706
On-the-Job Training - All sectors - Up to 1 year (jobs)		20,559	36,798	53,562	62,080	75,515	125,229
Related work experience - All sectors - 1 to 4 years (jobs)		9,814	18,898	28,302	33,735	41,852	68,915
Related work experience - All sectors - 4 to 10 years (jobs)		6,040	12,063	18,303	22,044	27,492	44,903
Related work experience - All sectors - None (jobs)		4,504	8,224	11,928	13,773	16,748	27,786
Related work experience - All sectors - Over 10 years (jobs)		1,645	3,158	4,764	5,689	7,031	11,460
Related work experience - All sectors - Up to 1 year (jobs)		7,275	12,540	17,573	19,616	23,150	38,579
Wage income - All (million $2019)		1,578	3,045	4,634	5,597	7,051	11,784

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)		5,540	6,039				
Sales of cooking units - Electric Resistance (%)	44.8	49.3	53.1	63	76.9	85.5	88.5
Sales of cooking units - Gas (%)	55.2	50.7	46.9	37	23.1	14.5	11.5
Sales of space heating units - Electric Heat Pump (%)	3.92	6.69	9.32	17.9	38.6	64.5	79.7
Sales of space heating units - Electric Resistance (%)	6.31	5.58	5.85	6.72	8.6	10.7	11.9
Sales of space heating units - Fossil (%)	0	2.1	1.98	1.48	0.719	0.234	0.062
Sales of space heating units - Gas Furnace (%)	89.8	85.6	82.9	73.9	52.1	24.5	8.31
Sales of water heating units - Electric Heat Pump (%)	0.944	1.35	2.81	7.68	19.4	34.3	43
Sales of water heating units - Electric Resistance (%)	8.03	7.53	8.96	13.7	25.1	39.5	48
Sales of water heating units - Gas Furnace (%)	90.2	90.1	87.3	77.8	54.7	25.5	8.33
Sales of water heating units - Other (%)	0.788	0.981	0.957	0.887	0.782	0.716	0.691

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)		1.33	1.36	1.77	1.84	2.53	2.68

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	70.8	69.4	67.5	65.7	63.5	60.8	58.1
Final energy use - Industry (PJ)	281	293	300	302	307	311	314
Final energy use - Residential (PJ)	86.4	82	78.8	75.5	71.4	65.8	59.3
Final energy use - Transportation (PJ)	182	171	156	144	135	124	111

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)		1.78	2.27				
Sales of cooking units - Electric Resistance (%)	74.1	74.8	77.2	83.4	92.1	97.4	99.3
Sales of cooking units - Gas (%)	25.9	25.2	22.8	16.6	7.91	2.55	0.687
Sales of space heating units - Electric Heat Pump (%)	6.37	11	13.7	22.5	43.2	68.9	83.6
Sales of space heating units - Electric Resistance (%)	16.5	22.2	21.5	19.8	15.5	10.2	7.2
Sales of space heating units - Fossil (%)	5.83	9.99	9.81	8.95	6.83	4.3	2.95
Sales of space heating units - Gas (%)	71.3	56.8	54.9	48.8	34.5	16.7	6.23
Sales of water heating units - Electric Heat Pump (%)	0	0.395	1.48	5.1	13.9	24.9	31.5
Sales of water heating units - Electric Resistance (%)	35.5	51.4	51.8	53.2	56.8	61.3	64
Sales of water heating units - Gas Furnace (%)	64.5	48.2	46.7	41.7	29.3	13.7	4.47
Sales of water heating units - Other (%)	0.03	0.032	0.032	0.032	0.032	0.032	0.032

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	60.7	128	432	1,362	1,983
Public EV charging plugs - DC Fast (1000 units)	0.061		0.212		1.14		3.19
Public EV charging plugs - L2 (1000 units)	0.164		5.1		27.4		76.8
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 (%)	1.68	2.07	2.08	1.66	1.07	0.552	0.236
Vehicle sales - Light-duty - EV (%)	1.75	4.38	11.2	24.9	47.3	71.3	87.3
Vehicle sales - Light-duty - gasoline (%)	92.2	88	80.6	67.9	47.4	25.6	11.3
Vehicle sales - Light-duty - hybrid (%)	4.19	5.02	5.67	5.21	3.97	2.38	1.16
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.384	0.333	0.257	0.184	0.103	0.048
Vehicle sales - Light-duty - other (%)	0.108	0.111	0.102	0.089	0.065	0.036	0.016
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)							-2,594
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-7,779
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-286
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-10,659
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-2,594
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-4,000
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-143
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-6,737
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							1,456
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							7,064
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							489

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)							9,008
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							1,456
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							3,654
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							244
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							5,354

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)							-248
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-17,146
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-947
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-427
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-46.9
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-285
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,717
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-7,855
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-4,189
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-431
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-124
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-5,906
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-158
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-164
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-23.8
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-95
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-951
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,928
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-317
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-145
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-186

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)							-11,526
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-553
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-296
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-34.9
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-190
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,834
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-5,891
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,253
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-288
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							40.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							128
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							218
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							17.3
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)							258
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							519
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							119
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							143
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,443
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							20.2
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							120
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							83.4
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							8.63
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)							136
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							260
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							20.6
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							86.4
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							735
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							30.4
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							124
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							151
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							13
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)							197
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							390
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							149
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							174
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,228

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		125	0.122	0.115	0.092	0.061	0.001
Monetary damages from air pollution - Natural Gas (million 2019$)		81.7	39.4	14.4	6.67	2.65	2.09
Monetary damages from air pollution - Transportation (million 2019$)		198	202	197	179	143	98.4
Premature deaths from air pollution - Coal (deaths)		14.1	0.014	0.013	0.01	0.007	0
Premature deaths from air pollution - Natural Gas (deaths)		9.23	4.45	1.63	0.753	0.3	0.236
Premature deaths from air pollution - Transportation (deaths)		22.3	22.7	22.2	20.1	16.1	11.1

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)		5,541	6,031				
Sales of cooking units - Electric Resistance (%)	44.8	57.1	84	89.3	89.6	89.6	89.6
Sales of cooking units - Gas (%)	55.2	42.9	16	10.7	10.4	10.4	10.4
Sales of space heating units - Electric Heat Pump (%)	3.92	7.61	30.1	78	86.6	87.1	87.1
Sales of space heating units - Electric Resistance (%)	6.31	5.8	8.21	11.8	12.4	12.4	12.4
Sales of space heating units - Fossil (%)	0	1.82	0.351	0.015	0	0	0
Sales of space heating units - Gas Furnace (%)	89.8	84.8	61.3	10.2	1.03	0.454	0.456
Sales of water heating units - Electric Heat Pump (%)	0.944	1.84	14.5	42	47	47.3	47.3
Sales of water heating units - Electric Resistance (%)	8.03	8	20.3	47	51.8	52.1	52.1
Sales of water heating units - Gas Furnace (%)	90.2	89.2	64.5	10.3	0.61	0	0
Sales of water heating units - Other (%)	0.788	0.941	0.732	0.684	0.681	0.683	0.683

Table 26: *E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		1.62	1.68	2.88	3.08	2.81	2.96

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	70.8	69.4	66.6	62.4	57.8	54.2	52.1
Final energy use - Industry (PJ)	281	293	298	298	301	304	307
Final energy use - Residential (PJ)	86.4	81.9	77.8	69.7	60.5	53.3	48.7
Final energy use - Transportation (PJ)	182	170	150	125	103	89.2	83.4

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)		1.79	2.3				
Sales of cooking units - Electric Resistance (%)	74.2	79.7	96.5	99.8	100	100	100
Sales of cooking units - Gas (%)	25.8	20.3	3.47	0.175	0	0	0
Sales of space heating units - Electric Heat Pump (%)	6.37	12.2	35.2	81.9	90.3	90.9	90.6
Sales of space heating units - Electric Resistance (%)	16.5	22	17.4	7.5	5.7	5.65	5.9
Sales of space heating units - Fossil (%)	5.83	9.86	7.69	3.24	2.34	2.21	2.25
Sales of space heating units - Gas (%)	71.3	55.9	39.7	7.36	1.62	1.25	1.22
Sales of water heating units - Electric Heat Pump (%)	0	0.739	10.1	30.7	34.4	34.6	34.6
Sales of water heating units - Electric Resistance (%)	35.5	51.5	55.3	63.7	65.3	65.4	65.3
Sales of water heating units - Gas Furnace (%)	64.5	47.7	34.5	5.53	0.326	0	0
Sales of water heating units - Other (%)	0.03	0.032	0.032	0.032	0.032	0.032	0.032

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)		377	964	1,565	2,370	2,580	2,460
Public EV charging plugs - DC Fast (1000 units)	0.061		0.695		3.07		4.98
Public EV charging plugs - L2 (1000 units)	0.164		16.7		74		120
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 (%)	1.66	1.92	1.3	0.418	0.076	0.013	0
Vehicle sales - Light-duty - EV (%)	3.53	14	44.6	81.1	96.2	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.5	79.4	50.7	17.3	3.39	0.593	0
Vehicle sales - Light-duty - hybrid (%)	4.05	4.27	3.08	1.16	0.28	0.06	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.111	0.346	0.212	0.066	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.107	0.103	0.068	0.024	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	15.6	12	14.6	12.2	52.8
Capital invested - Wind - Base (billion $2018)		2.4	13.8	28.7	46.8	55.8	72.8
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Solar - Base land use assumptions (MW)	1.5	1.5	15,250	28,029	44,522	59,085	125,814
Installed renewables - Solar - Constrained land use assumptions (MW)	3	3	35,378	57,933	83,708	117,763	210,296
Installed renewables - Wind - Base land use assumptions (MW)	3,194	4,828	15,204	38,344	77,960	127,723	196,462
Installed renewables - Wind - Constrained land use assumptions (MW)	6,388	21,123	47,262	93,890	162,682	247,616	382,508

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

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	0	0
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Solar - Base land use assumptions (GWh)	3.05	3.05	24,916	46,102	73,931	98,534	214,569
Solar - Constrained land use assumptions (GWh)	6.1	6.1	57,980	96,024	140,054	197,333	355,916
Wind - Base land use assumptions (GWh)	13,033	18,764	54,815	134,543	267,937	435,076	661,392
Wind - Constrained land use assumptions (GWh)	26,065	77,272	165,853	322,911	549,778	816,526	1,260,047

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)							-2,594
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-7,779
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-286
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-10,659
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-2,594
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-4,000
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-143
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-6,737
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							1,456
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							7,064
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							489
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							9,008
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							1,456
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							3,654
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							244
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							5,354

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)							-248
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-17,146
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-947
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-427
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-46.9
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-285

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,717
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-7,855
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-4,189
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-431
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-124
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-5,906
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-158
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-164
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-23.8
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-95
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-951
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,928
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-317
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-145
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-186
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-11,526
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-553
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-296
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-34.9
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-190
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,834
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-5,891
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,253
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-288
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							40.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							128
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							218
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							17.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							258
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							519
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							119
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							143
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,443
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							20.2
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							120
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							83.4
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							8.63
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)							136
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							260
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							20.6
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							86.4
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							735
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							30.4
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							124
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							151
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							13
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)							197

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							390
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							149
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							174
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,228

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		125	0.122	0.115	0.092	0.061	0.001
Monetary damages from air pollution - Natural Gas (million 2019$)		68.4	37.8	10.9	6.51	2.87	1.88
Monetary damages from air pollution - Transportation (million 2019$)		195	183	140	81.3	37.2	14.7
Premature deaths from air pollution - Coal (deaths)		14.1	0.014	0.013	0.01	0.007	0
Premature deaths from air pollution - Natural Gas (deaths)		7.72	4.27	1.24	0.735	0.324	0.212
Premature deaths from air pollution - Transportation (deaths)		22	20.6	15.7	9.14	4.19	1.65

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)		5,541	6,031				
Sales of cooking units - Electric Resistance (%)	44.8	57.1	84	89.3	89.6	89.6	89.6
Sales of cooking units - Gas (%)	55.2	42.9	16	10.7	10.4	10.4	10.4
Sales of space heating units - Electric Heat Pump (%)	3.92	7.61	30.1	78	86.6	87.1	87.1
Sales of space heating units - Electric Resistance (%)	6.31	5.8	8.21	11.8	12.4	12.4	12.4
Sales of space heating units - Fossil (%)	0	1.82	0.351	0.015	0	0	0
Sales of space heating units - Gas Furnace (%)	89.8	84.8	61.3	10.2	1.03	0.454	0.456
Sales of water heating units - Electric Heat Pump (%)	0.944	1.84	14.5	42	47	47.3	47.3
Sales of water heating units - Electric Resistance (%)	8.03	8	20.3	47	51.8	52.1	52.1
Sales of water heating units - Gas Furnace (%)	90.2	89.2	64.5	10.3	0.61	0	0
Sales of water heating units - Other (%)	0.788	0.941	0.732	0.684	0.681	0.683	0.683

Table 36: *E+RE- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		1.62	1.68	2.88	3.08	2.81	2.96

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	70.8	69.4	66.6	62.4	57.8	54.2	52.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	281	293	298	298	301	304	307
Final energy use - Residential (PJ)	86.4	81.9	77.8	69.7	60.5	53.3	48.7
Final energy use - Transportation (PJ)	182	170	150	125	103	89.2	83.4

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)		1.79	2.3				
Sales of cooking units - Electric Resistance (%)	74.2	79.7	96.5	99.8	100	100	100
Sales of cooking units - Gas (%)	25.8	20.3	3.47	0.175	0	0	0
Sales of space heating units - Electric Heat Pump (%)	6.37	12.2	35.2	81.9	90.3	90.9	90.6
Sales of space heating units - Electric Resistance (%)	16.5	22	17.4	7.5	5.7	5.65	5.9
Sales of space heating units - Fossil (%)	5.83	9.86	7.69	3.24	2.34	2.21	2.25
Sales of space heating units - Gas (%)	71.3	55.9	39.7	7.36	1.62	1.25	1.22
Sales of water heating units - Electric Heat Pump (%)	0	0.739	10.1	30.7	34.4	34.6	34.6
Sales of water heating units - Electric Resistance (%)	35.5	51.5	55.3	63.7	65.3	65.4	65.3
Sales of water heating units - Gas Furnace (%)	64.5	47.7	34.5	5.53	0.326	0	0
Sales of water heating units - Other (%)	0.03	0.032	0.032	0.032	0.032	0.032	0.032

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)		377	964	1,565	2,370	2,580	2,460
Public EV charging plugs - DC Fast (1000 units)	0.061		0.695		3.07		4.98
Public EV charging plugs - L2 (1000 units)	0.164		16.7		74		120
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 (%)	1.66	1.92	1.3	0.418	0.076	0.013	0
Vehicle sales - Light-duty - EV (%)	3.53	14	44.6	81.1	96.2	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.5	79.4	50.7	17.3	3.39	0.593	0
Vehicle sales - Light-duty - hybrid (%)	4.05	4.27	3.08	1.16	0.28	0.06	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.111	0.346	0.212	0.066	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.107	0.103	0.068	0.024	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)		5.7	3.92	4.66	3.09	1.34	0
Capital invested - Solar PV - Constrained (billion $2018)		2.15	3.06	7.09	4.01	1.27	0
Capital invested - Wind - Base (billion $2018)		0	3.21	9.2	11.5	16.6	0.769
Capital invested - Wind - Constrained (billion $2018)		2.45	9.77	10.6	13.1	16.1	0.65
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)	384	5,368	9,201	14,151	17,633	19,230	19,230
Installed renewables - Solar - Constrained land use assumptions (MW)	215	2,094	5,086	12,618	17,141	18,653	18,653
Installed renewables - Wind - Base land use assumptions (MW)	3,194	3,194	5,602	13,020	22,791	37,561	38,287
Installed renewables - Wind - Constrained land use assumptions (MW)	3,194	4,861	12,201	20,755	31,810	46,209	46,823

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)	622	8,751	15,039	23,132	28,859	31,458	31,458
Solar - Constrained land use assumptions (GWh)	348	3,428	8,361	20,717	28,122	30,619	30,619
Wind - Base land use assumptions (GWh)	13,033	13,033	21,498	47,321	81,119	131,906	134,361
Wind - Constrained land use assumptions (GWh)	13,033	18,818	44,238	73,249	110,476	158,938	160,933

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)							-2,594
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-7,779
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-286
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-10,659
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-2,594
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-4,000
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-143
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-6,737

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							1,456
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							7,064
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							489
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							9,008
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							1,456
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							3,654
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							244
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							5,354

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)							-248
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-17,146
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-947
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-427
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-46.9
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-285
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,717
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-7,855
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-4,189
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-431
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-124
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-5,906
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-158
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-164
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-23.8
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-95
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-951

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,928
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-317
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-145
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-186
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-11,526
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-553
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-296
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-34.9
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-190
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,834
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-5,891
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,253
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-288
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							40.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							128
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							218
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							17.3
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)							258
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							519
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							119
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							143
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,443
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							20.2
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							120

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							83.4
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							8.63
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)							136
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							260
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							20.6
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							86.4
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							735
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							30.4
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							124
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							151
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							13
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)							197
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							390
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							149
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							174
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,228

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		125	0.122	0.115	0.092	0.061	0.001
Monetary damages from air pollution - Natural Gas (million 2019$)		75.3	34.1	42.7	25.1	10.1	4.54
Monetary damages from air pollution - Transportation (million 2019$)		195	183	140	81.3	37.2	14.7
Premature deaths from air pollution - Coal (deaths)		14.1	0.014	0.013	0.01	0.007	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Natural Gas (deaths)		8.5	3.85	4.82	2.84	1.14	0.512
Premature deaths from air pollution - Transportation (deaths)		22	20.6	15.7	9.14	4.19	1.65

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)		5,540	6,039				
Sales of cooking units - Electric Resistance (%)	44.8	49.3	53.1	63	76.9	85.5	88.5
Sales of cooking units - Gas (%)	55.2	50.7	46.9	37	23.1	14.5	11.5
Sales of space heating units - Electric Heat Pump (%)	3.92	6.69	9.32	17.9	38.6	64.5	79.7
Sales of space heating units - Electric Resistance (%)	6.31	5.58	5.85	6.72	8.6	10.7	11.9
Sales of space heating units - Fossil (%)	0	2.1	1.98	1.48	0.719	0.234	0.062
Sales of space heating units - Gas Furnace (%)	89.8	85.6	82.9	73.9	52.1	24.5	8.31
Sales of water heating units - Electric Heat Pump (%)	0.944	1.35	2.81	7.68	19.4	34.3	43
Sales of water heating units - Electric Resistance (%)	8.03	7.53	8.96	13.7	25.1	39.5	48
Sales of water heating units - Gas Furnace (%)	90.2	90.1	87.3	77.8	54.7	25.5	8.33
Sales of water heating units - Other (%)	0.788	0.981	0.957	0.887	0.782	0.716	0.691

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)		1.33	1.36	1.77	1.84	2.53	2.68

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	70.8	69.4	67.5	65.7	63.5	60.8	58.1
Final energy use - Industry (PJ)	281	293	300	302	307	311	314
Final energy use - Residential (PJ)	86.4	82	78.8	75.5	71.4	65.8	59.3
Final energy use - Transportation (PJ)	182	171	156	144	135	124	111

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)		1.78	2.27				
Sales of cooking units - Electric Resistance (%)	74.1	74.8	77.2	83.4	92.1	97.4	99.3
Sales of cooking units - Gas (%)	25.9	25.2	22.8	16.6	7.91	2.55	0.687
Sales of space heating units - Electric Heat Pump (%)	6.37	11	13.7	22.5	43.2	68.9	83.6
Sales of space heating units - Electric Resistance (%)	16.5	22.2	21.5	19.8	15.5	10.2	7.2
Sales of space heating units - Fossil (%)	5.83	9.99	9.81	8.95	6.83	4.3	2.95
Sales of space heating units - Gas (%)	71.3	56.8	54.9	48.8	34.5	16.7	6.23
Sales of water heating units - Electric Heat Pump (%)	0	0.395	1.48	5.1	13.9	24.9	31.5
Sales of water heating units - Electric Resistance (%)	35.5	51.4	51.8	53.2	56.8	61.3	64

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	64.5	48.2	46.7	41.7	29.3	13.7	4.47
Sales of water heating units - Other (%)	0.03	0.032	0.032	0.032	0.032	0.032	0.032

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	60.7	128	432	1,362	1,983
Public EV charging plugs - DC Fast (1000 units)	0.061		0.212		1.14		3.19
Public EV charging plugs - L2 (1000 units)	0.164		5.1		27.4		76.8
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 (%)	1.68	2.07	2.08	1.66	1.07	0.552	0.236
Vehicle sales - Light-duty - EV (%)	1.75	4.38	11.2	24.9	47.3	71.3	87.3
Vehicle sales - Light-duty - gasoline (%)	92.2	88	80.6	67.9	47.4	25.6	11.3
Vehicle sales - Light-duty - hybrid (%)	4.19	5.02	5.67	5.21	3.97	2.38	1.16
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.384	0.333	0.257	0.184	0.103	0.048
Vehicle sales - Light-duty - other (%)	0.108	0.111	0.102	0.089	0.065	0.036	0.016
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	0.003	0.032	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0.024	0.006	0.01	0
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0.061	0.002	0.208	0.095

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	5.4	67.8	67.8	67.8	67.8	67.8
Biomass w/ccu allam power plant (GWh)	0	0	0	24.1	30.2	40.1	40.1
Biomass w/ccu power plant (GWh)	0	0	0	68	69.9	303	410

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million $2018/year)		0.41	4.64	117	1,093	2,577	6,002
Conversion capital investment - Cumulative 5-yr (million $2018)		3.12	35.5	1,454	12,265	18,692	53,340
Number of facilities - Allam power w ccu (quantity)	0	0	0	1	2	3	3

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

Item	2020	2025	2030	2035	2040	2045	2050
Number of facilities - Beccs hydrogen (quantity)	0	0	0	1	15	35	41
Number of facilities - Diesel (quantity)	0	0	0	1	1	2	3
Number of facilities - Diesel ccu (quantity)	0	0	0	1	2	3	4
Number of facilities - Power (quantity)	0	1	1	1	1	1	1
Number of facilities - Power ccu (quantity)	0	0	0	1	2	3	3
Number of facilities - Pyrolysis (quantity)	0	0	0	1	1	2	32
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	1	2	3	17
Number of facilities - Sng (quantity)	0	1	1	1	1	2	2
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	1	2

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	1.79	17.5	41.5	57.6
Annual - BECCS (MMT)		0	0	1.79	17.5	41.5	57.6
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	1.79	19.3	60.8	118
Cumulative - BECCS (MMT)		0	0	1.79	19.3	60.8	118
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	276	573	1,503	2,642	3,732
Cumulative investment - All (million $2018)		0	1,627	3,273	5,868	6,875	7,932
Cumulative investment - Spur (million $2018)		0	0	17.9	986	1,993	3,050
Cumulative investment - Trunk (million $2018)		0	1,627	3,255	4,882	4,882	4,882
Spur (km)		0	0	21.5	675	1,814	2,905
Trunk (km)		0	276	552	828	828	828

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)							-2,881
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-7,608
Carbon sink potential - Aggressive deployment - Cropland to woody energy crops (1000 tCO2e/y)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Pasture to energy crops (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-273
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-10,762
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-2,881
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-3,910
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)							-136
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-6,927
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							1,679
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							16,939
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							15.7
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							288
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							466
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							19,388
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							1,679
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							3,547
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							15.7
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							288
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							233
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							5,762

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)							-248
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-17,146
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-947
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-427
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-46.9
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-285
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,717
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-7,855
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-4,189
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-431
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-124
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-5,906
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-158
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-164
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-23.8
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-95
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-951
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,928
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-317
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-145
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-186
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-11,526
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-553
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-296
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-34.9
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-190
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,834
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-5,891
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,253
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-288

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							40.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							128
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							218
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							17.3
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)							258
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							519
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							119
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							143
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,443
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							20.2
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							120
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							83.4
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							8.63
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)							136
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							260
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							20.6
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							86.4
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							735
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							30.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							124
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							151
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							13
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)							197
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							390
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							149
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							174
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,228

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		125	0.122	0.115	0.092	0.061	0.001
Monetary damages from air pollution - Natural Gas (million 2019$)		82.7	34.5	17.3	10.8	4.35	2.21
Monetary damages from air pollution - Transportation (million 2019$)		198	202	197	179	143	98.4
Premature deaths from air pollution - Coal (deaths)		14.1	0.014	0.013	0.01	0.007	0
Premature deaths from air pollution - Natural Gas (deaths)		9.33	3.89	1.95	1.22	0.491	0.249
Premature deaths from air pollution - Transportation (deaths)		22.3	22.7	22.2	20.1	16.1	11.1

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)		5,476	5,633				
Sales of cooking units - Electric Resistance (%)	44.8	47.8	47.9	47.8	47.9	47.9	48
Sales of cooking units - Gas (%)	55.2	52.2	52.1	52.2	52.1	52.1	52
Sales of space heating units - Electric Heat Pump (%)	3.92	13	44.6	70.5	74.8	75.2	75.2
Sales of space heating units - Electric Resistance (%)	6.31	6.4	10.8	18.4	23.4	24.2	24.3
Sales of space heating units - Fossil (%)	0	2.06	1.59	0.699	0.102	0.009	0
Sales of space heating units - Gas Furnace (%)	89.8	78.5	43	10.4	1.69	0.518	0.457
Sales of water heating units - Electric Heat Pump (%)	0.944	0.821	0.817	0.818	0.814	0.81	0.81
Sales of water heating units - Electric Resistance (%)	8.03	7.01	7.03	7.01	7.01	7.01	7.01

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Gas Furnace (%)	90.2	91.2	91.2	91.2	91.2	91.2	91.2
Sales of water heating units - Other (%)	0.788	0.989	0.989	0.988	0.987	0.991	0.991

Table 60: *REF scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

Item	2020	2025	2030	2035	2040	2045	2050
Electricity distribution capital invested - Cumulative 5-yr (billion $2018)		1.36	1.39	1.46	1.5	1.63	1.69

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	70.8	71	71	70.2	69.4	70	71.9
Final energy use - Industry (PJ)	281	297	305	312	321	329	340
Final energy use - Residential (PJ)	86.4	82.5	80.6	79.4	79.2	79.6	79.9
Final energy use - Transportation (PJ)	182	171	157	149	149	153	158

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)		1.71	1.81				
Sales of cooking units - Electric Resistance (%)	73.9	73.9	73.9	73.9	73.9	73.9	73.9
Sales of cooking units - Gas (%)	26.1	26.1	26.1	26.1	26.1	26.1	26.1
Sales of space heating units - Electric Heat Pump (%)	5.61	14.1	14.5	15.1	15.7	16.4	17.4
Sales of space heating units - Electric Resistance (%)	16.7	21.4	21.2	20.9	20.5	19.8	18.9
Sales of space heating units - Fossil (%)	5.95	9.38	9.47	9.46	9.32	9.23	9.3
Sales of space heating units - Gas (%)	71.7	55	54.8	54.5	54.5	54.6	54.4
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	35.5	51.2	51.2	51.1	51.1	51	51
Sales of water heating units - Gas Furnace (%)	64.5	48.7	48.8	48.9	48.9	48.9	49
Sales of water heating units - Other (%)	0.03	0.032	0.032	0.032	0.032	0.032	0.032

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 (%)	1.67	2.06	2.2	2.05	1.85	1.72	1.64
Vehicle sales - Light-duty - EV (%)	3.18	5.11	5.84	7.15	8.75	10.2	11.4
Vehicle sales - Light-duty - gasoline (%)	90.9	87.4	85.4	83.7	81.8	79.8	78.2
Vehicle sales - Light-duty - hybrid (%)	4.06	4.93	6.05	6.62	7.22	7.85	8.38
Vehicle sales - Light-duty - hydrogen FC (%)	0.111	0.381	0.353	0.315	0.313	0.314	0.325
Vehicle sales - Light-duty - other (%)	0.107	0.111	0.108	0.108	0.108	0.107	0.11
Vehicle sales - Medium-duty - diesel (%)	65.2	63.5	61.6	59.6	58	56.5	55.2
Vehicle sales - Medium-duty - EV (%)	0.027	0.105	0.329	0.671	0.895	0.973	0.993
Vehicle sales - Medium-duty - gasoline (%)	34	35.5	37	38.5	39.7	40.8	41.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Medium-duty - hybrid (%)	0.365	0.427	0.496	0.577	0.674	0.793	0.929
Vehicle sales - Medium-duty - hydrogen FC (%)	0.175	0.208	0.242	0.285	0.339	0.409	0.487
Vehicle sales - Medium-duty - other (%)	0.255	0.271	0.298	0.345	0.42	0.528	0.671

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-248
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-17,146
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-947
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-427
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-46.9
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-285
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,717
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-7,855
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-4,189
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-431
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-124
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-5,906
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-158
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-164
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-23.8
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-95
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-951
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,928
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-317
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-145
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-186
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-11,526
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-553
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-296
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-34.9
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-190

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,834
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-5,891
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,253
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-288
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							40.5
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							128
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							218
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							17.3
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)							258
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							519
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							119
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							143
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							1,443
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							20.2
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							120
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							83.4
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							8.63
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)							136
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							260
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							20.6
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							86.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							735
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							30.4
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							124
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							151
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							13
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)							197
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							390
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							149
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							174
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,228

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)	-0.18		0.307				0.088
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.078		-0.161				-0.17
Business-as-usual carbon sink - Total (Mt CO2e/y)	-0.258		0.146				-0.081

Table 66: *REF scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		368	190	123	96.5	83.6	81.5
Monetary damages from air pollution - Natural Gas (million 2019$)		95.6	78.3	89.6	56.8	32.9	29.7
Monetary damages from air pollution - Transportation (million 2019$)		198	204	210	217	224	231
Premature deaths from air pollution - Coal (deaths)		41.6	21.4	13.9	10.9	9.45	9.2
Premature deaths from air pollution - Natural Gas (deaths)		10.8	8.84	10.1	6.41	3.72	3.36
Premature deaths from air pollution - Transportation (deaths)		22.3	23	23.6	24.4	25.2	26