Net-Zero America - oregon state report

2021-03-15

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

E. Larson, C. Greig, J. Jenkins, E. Mayfield, A. Pascale, C. Zhang, J. Drossman, R. Williams, S. Pacala, R. Socolow, EJ Baik, R. Birdsey, R. Duke, R. Jones, B. Haley, E. Leslie, K. Paustian, and A. Swan, Net-Zero America: Potential Pathways, Infrastructure, and Impacts, interim report, Princeton University, Princeton, NJ, December 15, 2020. Report available at https://netzeroamerica.princeton.edu.

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)		13,358	14,518				
Sales of cooking units - Electric Resistance (%)	27.5	41.7	78.2	85.4	85.8	85.8	85.8
Sales of cooking units - Gas (%)	72.5	58.3	21.8	14.6	14.2	14.2	14.2
Sales of space heating units - Electric Heat Pump (%)	2.5	16.7	41.2	54.8	56.6	56.7	56.7
Sales of space heating units - Electric Resistance (%)	16.7	17.5	36.3	42	42.6	42.6	42.6
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace (%)	80.8	65.8	22.5	3.25	0.79	0.695	0.695
Sales of water heating units - Electric Heat Pump (%)	1	10.3	52.2	64.9	66	66	66
Sales of water heating units - Electric Resistance (%)	3.08	6.46	25	32.5	33.3	33.3	33.3
Sales of water heating units - Gas Furnace (%)	95.1	82.6	22.2	1.99	0.085	0	0
Sales of water heating units - Other (%)	0.791	0.625	0.628	0.63	0.63	0.629	0.629

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)		2.38	2.48	3.93	4.2	3.62	3.78

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	93.8	95	93.3	89	85.5	84.8	85.9
Final energy use - Industry (PJ)	209	215	214	219	226	230	236
Final energy use - Residential (PJ)	151	140	123	104	88.4	78.3	72.2
Final energy use - Transportation (PJ)	334	313	278	236	197	173	163

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)		2.54	2.66				
Sales of cooking units - Electric Resistance (%)	65.6	73	95.4	99.8	100	100	100
Sales of cooking units - Gas (%)	34.4	27	4.63	0.233	0	0	0
Sales of space heating units - Electric Heat Pump (%)	12.4	24.5	48.3	57.6	58.8	58.8	58.7
Sales of space heating units - Electric Resistance (%)	31	37.4	34.1	31.4	31	31.2	31.3
Sales of space heating units - Fossil (%)	8.35	13.5	10.5	9.63	9.42	9.21	9.21
Sales of space heating units - Gas (%)	48.3	24.7	7.17	1.4	0.846	0.812	0.816
Sales of water heating units - Electric Heat Pump (%)	0	7.68	41.4	51	51.8	51.8	51.8
Sales of water heating units - Electric Resistance (%)	40.2	54.8	44.8	43.1	43.1	43.1	43.1
Sales of water heating units - Gas Furnace (%)	53.4	32.3	8.69	0.78	0.033	0	0
Sales of water heating units - Other (%)	6.41	5.3	5.09	5.09	5.1	5.11	5.12

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)		737	1,953	3,062	4,679	5,048	4,837
Public EV charging plugs - DC Fast (1000 units)	0.347		1.51		5.84		9.31
Public EV charging plugs - L2 (1000 units)	1.3		36.3		141		224
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 (%)	1.62	1.88	1.29	0.412	0.076	0.013	0
Vehicle sales - Light-duty - EV (%)	3.67	14.4	45.3	81.3	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.3	78.9	50	17	3.35	0.592	0
Vehicle sales - Light-duty - hybrid (%)	4.18	4.37	3.13	1.17	0.284	0.062	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.111	0.344	0.209	0.065	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.105	0.101	0.067	0.023	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	0	0	0
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Offshore Wind - Base (billion $2018)		0.417	0	0	0.179	0	12.3
Capital invested - Offshore Wind - Constrained (billion $2018)		0.46	0	0	0	0.231	14.1
Capital invested - Solar PV - Base (billion $2018)		0	0	0	0	0	0
Capital invested - Solar PV - Constrained (billion $2018)		1.68	0	0	0	0	0
Capital invested - Wind - Base (billion $2018)		0	2.51	1.27	1.2	0.855	0.175
Capital invested - Wind - Constrained (billion $2018)		0	2.32	2.86	7.4	6.28	0.499
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	109	109	109	197	197	9,476
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	109	109	109	197	197	9,476
Installed renewables - Rooftop PV (MW)	2,443	3,766	5,029	6,555	8,366	10,477	12,977
Installed renewables - Solar - Base land use assumptions (MW)	978	978	978	978	978	978	978
Installed renewables - Solar - Constrained land use assumptions (MW)	837	837	837	837	837	837	837
Installed renewables - Wind - Base land use assumptions (MW)	4,154	4,154	5,605	6,394	7,175	7,762	7,889
Installed renewables - Wind - Constrained land use assumptions (MW)	4,154	4,154	5,500	7,117	11,811	16,223	16,552

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0
OffshoreWind - Base land use assumptions (GWh)	0	522	522	522	945	945	39,327
OffshoreWind - Constrained land use assumptions (GWh)	0	522	522	522	945	945	39,327
Solar - Base land use assumptions (GWh)	2,011	2,011	2,011	2,011	2,011	2,011	2,011
Solar - Constrained land use assumptions (GWh)	1,737	1,737	1,737	1,737	1,737	1,737	1,737
Wind - Base land use assumptions (GWh)	14,129	14,129	19,419	22,163	24,777	26,676	27,057
Wind - Constrained land use assumptions (GWh)	14,129	14,129	18,888	23,821	37,206	49,139	50,021

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million $2018/year)		0	0	0	0	124	398
Conversion capital investment - Cumulative 5-yr (million $2018)		0	0	0	0	2,271	5,019
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	4	11
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	0	2.92	9.37
Annual - BECCS (MMT)		0	0	0	0	2.92	9.37
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	0	2.92	12.3
Cumulative - BECCS (MMT)		0	0	0	0	2.92	12.3
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	0	497	497	871	1,423
Cumulative investment - All (million $2018)		0	0	1,561	1,561	1,794	2,143
Cumulative investment - Spur (million $2018)		0	0	0	0	234	583
Cumulative investment - Trunk (million $2018)		0	0	1,561	1,561	1,561	1,561
Spur (km)		0	0	0	0	373	926
Trunk (km)		0	0	497	497	497	497

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)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,084
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-74.1
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-1,158
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-558
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-37
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-595
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,788
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							126
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,914
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							926
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							62.8
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							988

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)							-3,070
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-60,233
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,267
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-11,025
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-5,746
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-20,097
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-660
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-6,564
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-3,779
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-8,025
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-1,538
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-22,111
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-211
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,235
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,923
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-6,699
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-231
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,282
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-286
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-2,705
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-2,304
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-41,121
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-739
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-7,630
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-4,284
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-13,398
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-446
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4,923
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,033
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-5,365

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)							502
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							172
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							5,622
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2,117
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)							62.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							434
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							107
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							2,660
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							11,677
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							251
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							161
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,154
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1,058
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)							33
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							217
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							18.6
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,609
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							5,503
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							377

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)							166
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,888
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,593
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)							47.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							325
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							135
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							3,241
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							9,773

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		198	167	134	101	63.4	44
Natural gas consumption - Cumulative (tcf)							4,030
Natural gas production - Annual (tcf)		0.609	0.576	0.502	0.424	0.336	0.261
Oil consumption - Annual (million bbls)		58.9	50.4	38	26.4	17.2	9.78
Oil consumption - Cumulative (million bbls)							1,173
Oil production - Annual (million bbls)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		36.5	0.043	0.043	0.027	0.016	0
Monetary damages from air pollution - Natural Gas (million 2019$)		38.6	22.4	18.6	17.2	14	10.5
Monetary damages from air pollution - Transportation (million 2019$)		414	387	294	170	77.9	31.3
Premature deaths from air pollution - Coal (deaths)		4.12	0.005	0.005	0.003	0.002	0
Premature deaths from air pollution - Natural Gas (deaths)		4.36	2.52	2.1	1.94	1.57	1.18
Premature deaths from air pollution - Transportation (deaths)		46.6	43.5	33.1	19.1	8.76	3.52

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		183	298	156	105	229	501
By economic sector - Construction (jobs)		9,860	9,552	11,033	10,875	11,128	23,154
By economic sector - Manufacturing (jobs)		2,689	4,018	4,949	4,552	4,061	5,967
By economic sector - Mining (jobs)		1,109	788	503	297	160	80.2

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		1,508	1,565	1,882	2,198	2,513	5,237
By economic sector - Pipeline (jobs)		259	218	358	124	109	129
By economic sector - Professional (jobs)		4,290	4,527	4,973	5,413	5,976	13,282
By economic sector - Trade (jobs)		2,854	2,896	3,218	3,532	3,890	8,534
By economic sector - Utilities (jobs)		4,145	4,455	6,315	6,083	6,269	15,629
By education level - All sectors - Associates degree or some college (jobs)		8,494	8,962	10,765	10,703	11,062	23,425
By education level - All sectors - Bachelors degree (jobs)		5,307	5,592	6,496	6,510	6,766	14,373
By education level - All sectors - Doctoral degree (jobs)		212	219	242	253	272	589
By education level - All sectors - High school diploma or less (jobs)		11,566	12,160	14,290	14,083	14,514	30,392
By education level - All sectors - Masters or professional degree (jobs)		1,319	1,383	1,596	1,630	1,721	3,734
By resource sector - Biomass (jobs)		647	788	400	290	840	2,149
By resource sector - CO2 (jobs)		0	0	1,544	0	250	659
By resource sector - Coal (jobs)		86.9	0	0	0	0	0
By resource sector - Grid (jobs)		6,144	7,093	9,281	10,434	10,900	29,558
By resource sector - Natural Gas (jobs)		2,131	1,792	1,840	1,654	1,259	1,035
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		2,619	2,054	1,431	922	562	300
By resource sector - Solar (jobs)		11,450	11,083	13,181	14,424	15,631	27,983
By resource sector - Wind (jobs)		3,820	5,507	5,711	5,457	4,893	10,829
Median wages - Annual - All ($2019 per job)		62,291	62,798	63,770	64,648	65,678	67,496
On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs)		4,427	4,632	5,533	5,475	5,642	11,956
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)		1,945	1,979	2,369	2,341	2,426	5,225
On-Site or In-Plant Training - Total jobs - None (jobs)		4,437	4,681	5,482	5,470	5,677	11,904
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)		233	245	297	294	304	652
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)		15,855	16,780	19,707	19,600	20,288	42,777
On-the-Job Training - All sectors - 1 to 4 years (jobs)		5,712	5,968	7,149	7,070	7,285	15,467
On-the-Job Training - All sectors - 4 to 10 years (jobs)		1,939	1,970	2,369	2,346	2,436	5,258
On-the-Job Training - All sectors - None (jobs)		1,517	1,579	1,833	1,841	1,918	4,026
On-the-Job Training - All sectors - Over 10 years (jobs)		279	292	343	335	339	681
On-the-Job Training - All sectors - Up to 1 year (jobs)		17,451	18,508	21,696	21,588	22,358	47,081
Related work experience - All sectors - 1 to 4 years (jobs)		9,580	10,079	11,879	11,825	12,253	25,966
Related work experience - All sectors - 4 to 10 years (jobs)		6,236	6,539	7,757	7,696	7,947	16,851
Related work experience - All sectors - None (jobs)		3,889	4,093	4,854	4,818	5,004	10,602
Related work experience - All sectors - Over 10 years (jobs)		1,604	1,705	2,022	2,000	2,049	4,301
Related work experience - All sectors - Up to 1 year (jobs)		5,587	5,901	6,877	6,840	7,084	14,793
Wage income - All (million $2019)		1,676	1,778	2,130	2,145	2,256	4,895

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)		13,324	14,288				
Sales of cooking units - Electric Resistance (%)	27.5	31	36.1	49.7	68.6	80.2	84.3
Sales of cooking units - Gas (%)	72.5	69	63.9	50.3	31.4	19.8	15.7
Sales of space heating units - Electric Heat Pump (%)	2.5	12.5	15.3	23.6	37.7	49.3	54.5
Sales of space heating units - Electric Resistance (%)	16.7	13.9	16.1	22.4	32.2	39	41.6
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace (%)	80.8	73.6	68.6	54	30.1	11.7	3.87
Sales of water heating units - Electric Heat Pump (%)	1	2.5	7.27	21.1	42.9	58.1	63.8
Sales of water heating units - Electric Resistance (%)	3.08	3.16	5.27	11.4	21.5	29	32.1
Sales of water heating units - Gas Furnace (%)	95.1	93.7	86.8	66.8	35	12.3	3.44
Sales of water heating units - Other (%)	0.791	0.625	0.628	0.63	0.63	0.629	0.629

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)		1.88	1.92	2.22	2.29	3.56	3.78

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	93.8	95.2	96.6	96.8	95.9	94.4	93.4
Final energy use - Industry (PJ)	209	215	215	222	230	234	240
Final energy use - Residential (PJ)	151	140	128	117	105	92.8	81.8
Final energy use - Transportation (PJ)	334	315	290	270	254	235	213

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)		2.53	2.65				
Sales of cooking units - Electric Resistance (%)	65.5	66.4	69.6	77.9	89.5	96.6	99.1
Sales of cooking units - Gas (%)	34.5	33.6	30.4	22.1	10.5	3.4	0.915
Sales of space heating units - Electric Heat Pump (%)	12.4	20.2	22.9	30.9	43.8	53.4	57.2
Sales of space heating units - Electric Resistance (%)	31	37.9	37.5	36.3	34.2	32.4	31.5
Sales of space heating units - Fossil (%)	8.35	14	13.7	12.7	11	9.88	9.53
Sales of space heating units - Gas (%)	48.3	27.9	25.9	20.1	10.9	4.35	1.81
Sales of water heating units - Electric Heat Pump (%)	0	1.35	5.19	16.3	33.7	45.7	50.1
Sales of water heating units - Electric Resistance (%)	40.2	56.7	55.5	52.2	47.4	44.4	43.4
Sales of water heating units - Gas Furnace (%)	53.4	36.6	34	26.2	13.7	4.82	1.35
Sales of water heating units - Other (%)	6.41	5.35	5.33	5.3	5.21	5.14	5.13

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	130	249	865	2,649	3,885
Public EV charging plugs - DC Fast (1000 units)	0.347		0.57		2.25		5.96
Public EV charging plugs - L2 (1000 units)	1.3		13.7		54.1		144
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 (%)	1.63	2.03	2.07	1.65	1.06	0.547	0.234
Vehicle sales - Light-duty - EV (%)	1.8	4.49	11.5	25.2	47.7	71.6	87.4
Vehicle sales - Light-duty - gasoline (%)	92	87.8	80.2	67.5	47	25.3	11.2
Vehicle sales - Light-duty - hybrid (%)	4.33	5.15	5.81	5.32	4.03	2.4	1.17
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.382	0.33	0.254	0.181	0.101	0.047
Vehicle sales - Light-duty - other (%)	0.106	0.11	0.1	0.087	0.063	0.035	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)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,084
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-74.1
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-1,158
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-558
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-37
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-595
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,788
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							126

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,914
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							926
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							62.8
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							988

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)							-3,070
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-60,233
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,267
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-11,025
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-5,746
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-20,097
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-660
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-6,564
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-3,779
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-8,025
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-1,538
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-22,111
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-211
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,235
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,923
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-6,699
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-231
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,282
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-286
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-2,705
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-2,304

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)							-41,121
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-739
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-7,630
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-4,284
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-13,398
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-446
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4,923
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,033
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-5,365
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							502
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							172
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							5,622
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2,117
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)							62.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							434
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							107
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							2,660
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							11,677
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							251
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							161
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,154
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1,058
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)							33
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							217
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							18.6
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,609
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							5,503
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							377
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							166
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,888
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,593
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)							47.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							325
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							135
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							3,241
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							9,773

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		36.5	0.043	0.043	0.027	0.016	0
Monetary damages from air pollution - Natural Gas (million 2019$)		40.6	21	13.7	9.96	7.56	7.55
Monetary damages from air pollution - Transportation (million 2019$)		421	425	414	372	296	204
Premature deaths from air pollution - Coal (deaths)		4.12	0.005	0.005	0.003	0.002	0
Premature deaths from air pollution - Natural Gas (deaths)		4.58	2.37	1.55	1.12	0.854	0.853
Premature deaths from air pollution - Transportation (deaths)		47.3	47.8	46.5	41.9	33.3	22.9

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)		13,358	14,518				
Sales of cooking units - Electric Resistance (%)	27.5	41.7	78.2	85.4	85.8	85.8	85.8
Sales of cooking units - Gas (%)	72.5	58.3	21.8	14.6	14.2	14.2	14.2
Sales of space heating units - Electric Heat Pump (%)	2.5	16.7	41.2	54.8	56.6	56.7	56.7
Sales of space heating units - Electric Resistance (%)	16.7	17.5	36.3	42	42.6	42.6	42.6
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace (%)	80.8	65.8	22.5	3.25	0.79	0.695	0.695
Sales of water heating units - Electric Heat Pump (%)	1	10.3	52.2	64.9	66	66	66
Sales of water heating units - Electric Resistance (%)	3.08	6.46	25	32.5	33.3	33.3	33.3
Sales of water heating units - Gas Furnace (%)	95.1	82.6	22.2	1.99	0.085	0	0
Sales of water heating units - Other (%)	0.791	0.625	0.628	0.63	0.63	0.629	0.629

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)		2.38	2.48	3.93	4.2	3.62	3.78

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	93.8	95	93.3	89	85.5	84.8	85.9
Final energy use - Industry (PJ)	209	215	214	219	226	230	236
Final energy use - Residential (PJ)	151	140	123	104	88.4	78.3	72.2
Final energy use - Transportation (PJ)	334	313	278	236	197	173	163

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)		2.54	2.66				
Sales of cooking units - Electric Resistance (%)	65.6	73	95.4	99.8	100	100	100
Sales of cooking units - Gas (%)	34.4	27	4.63	0.233	0	0	0
Sales of space heating units - Electric Heat Pump (%)	12.4	24.5	48.3	57.6	58.8	58.8	58.7
Sales of space heating units - Electric Resistance (%)	31	37.4	34.1	31.4	31	31.2	31.3
Sales of space heating units - Fossil (%)	8.35	13.5	10.5	9.63	9.42	9.21	9.21
Sales of space heating units - Gas (%)	48.3	24.7	7.17	1.4	0.846	0.812	0.816
Sales of water heating units - Electric Heat Pump (%)	0	7.68	41.4	51	51.8	51.8	51.8
Sales of water heating units - Electric Resistance (%)	40.2	54.8	44.8	43.1	43.1	43.1	43.1
Sales of water heating units - Gas Furnace (%)	53.4	32.3	8.69	0.78	0.033	0	0
Sales of water heating units - Other (%)	6.41	5.3	5.09	5.09	5.1	5.11	5.12

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)		737	1,953	3,062	4,679	5,048	4,837
Public EV charging plugs - DC Fast (1000 units)	0.347		1.51		5.84		9.31
Public EV charging plugs - L2 (1000 units)	1.3		36.3		141		224
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 (%)	1.62	1.88	1.29	0.412	0.076	0.013	0
Vehicle sales - Light-duty - EV (%)	3.67	14.4	45.3	81.3	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.3	78.9	50	17	3.35	0.592	0
Vehicle sales - Light-duty - hybrid (%)	4.18	4.37	3.13	1.17	0.284	0.062	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.111	0.344	0.209	0.065	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.105	0.101	0.067	0.023	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 - Offshore Wind - Base (billion $2018)		0.417	0	0	0.179	0.218	26.6
Capital invested - Solar PV - Base (billion $2018)		0	0	0	0	0	16.9
Capital invested - Wind - Base (billion $2018)		0	2.58	2.21	4.06	5.44	5.95
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	109	109	109	197	330	20,397
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	240	240	240	314	3,185	40,695
Installed renewables - Solar - Base land use assumptions (MW)	978	978	978	978	978	978	22,319
Installed renewables - Solar - Constrained land use assumptions (MW)	1,955	1,955	1,955	1,955	1,955	1,955	48,148
Installed renewables - Wind - Base land use assumptions (MW)	4,188	4,188	5,678	7,051	9,692	13,427	17,751
Installed renewables - Wind - Constrained land use assumptions (MW)	8,309	8,309	11,222	21,431	45,018	64,697	113,864

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	522	522	522	945	1,574	90,985
OffshoreWind - Constrained land use assumptions (GWh)	0	1,136	1,136	1,136	1,446	14,844	179,881
Solar - Base land use assumptions (GWh)	2,011	2,011	2,011	2,011	2,011	2,011	38,275
Solar - Constrained land use assumptions (GWh)	4,022	4,022	4,022	4,022	4,022	4,022	83,079
Wind - Base land use assumptions (GWh)	14,258	14,258	19,673	24,363	32,645	43,716	56,058

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

Item	2020	2025	2030	2035	2040	2045	2050
Wind - Constrained land use assumptions (GWh)	28,258	28,258	38,434	68,294	130,933	179,695	279,622

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,084
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-74.1
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-1,158
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-558
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-37
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-595
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,788
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							126
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,914
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							926
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							62.8
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							988

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)							-3,070
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-60,233
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,267

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-11,025
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-5,746
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-20,097
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-660
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-6,564
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-3,779
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-8,025
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-1,538
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-22,111
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-211
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,235
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,923
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-6,699
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-231
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,282
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-286
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-2,705
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-2,304
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-41,121
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-739
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-7,630
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-4,284
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-13,398
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-446
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4,923
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,033
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-5,365
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							502
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							172

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							5,622
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2,117
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)							62.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							434
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							107
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							2,660
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							11,677
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							251
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							161
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,154
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1,058
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)							33
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							217
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							18.6
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,609
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							5,503
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							377
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							166
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,888
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,593

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							47.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							325
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							135
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							3,241
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							9,773

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		36.5	0.043	0.043	0.027	0.016	0
Monetary damages from air pollution - Natural Gas (million 2019$)		35.6	16.4	9.85	8.49	6.96	1.27
Monetary damages from air pollution - Transportation (million 2019$)		414	387	294	170	77.9	31.3
Premature deaths from air pollution - Coal (deaths)		4.12	0.005	0.005	0.003	0.002	0
Premature deaths from air pollution - Natural Gas (deaths)		4.02	1.85	1.11	0.958	0.786	0.143
Premature deaths from air pollution - Transportation (deaths)		46.6	43.5	33.1	19.1	8.76	3.52

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)		13,358	14,518				
Sales of cooking units - Electric Resistance (%)	27.5	41.7	78.2	85.4	85.8	85.8	85.8
Sales of cooking units - Gas (%)	72.5	58.3	21.8	14.6	14.2	14.2	14.2
Sales of space heating units - Electric Heat Pump (%)	2.5	16.7	41.2	54.8	56.6	56.7	56.7
Sales of space heating units - Electric Resistance (%)	16.7	17.5	36.3	42	42.6	42.6	42.6
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace (%)	80.8	65.8	22.5	3.25	0.79	0.695	0.695
Sales of water heating units - Electric Heat Pump (%)	1	10.3	52.2	64.9	66	66	66
Sales of water heating units - Electric Resistance (%)	3.08	6.46	25	32.5	33.3	33.3	33.3
Sales of water heating units - Gas Furnace (%)	95.1	82.6	22.2	1.99	0.085	0	0
Sales of water heating units - Other (%)	0.791	0.625	0.628	0.63	0.63	0.629	0.629

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)		2.38	2.48	3.93	4.2	3.62	3.78

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	93.8	95	93.3	89	85.5	84.8	85.9
Final energy use - Industry (PJ)	209	215	214	219	226	230	236
Final energy use - Residential (PJ)	151	140	123	104	88.4	78.3	72.2
Final energy use - Transportation (PJ)	334	313	278	236	197	173	163

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)		2.54	2.66				
Sales of cooking units - Electric Resistance (%)	65.6	73	95.4	99.8	100	100	100
Sales of cooking units - Gas (%)	34.4	27	4.63	0.233	0	0	0
Sales of space heating units - Electric Heat Pump (%)	12.4	24.5	48.3	57.6	58.8	58.8	58.7
Sales of space heating units - Electric Resistance (%)	31	37.4	34.1	31.4	31	31.2	31.3
Sales of space heating units - Fossil (%)	8.35	13.5	10.5	9.63	9.42	9.21	9.21
Sales of space heating units - Gas (%)	48.3	24.7	7.17	1.4	0.846	0.812	0.816
Sales of water heating units - Electric Heat Pump (%)	0	7.68	41.4	51	51.8	51.8	51.8
Sales of water heating units - Electric Resistance (%)	40.2	54.8	44.8	43.1	43.1	43.1	43.1
Sales of water heating units - Gas Furnace (%)	53.4	32.3	8.69	0.78	0.033	0	0
Sales of water heating units - Other (%)	6.41	5.3	5.09	5.09	5.1	5.11	5.12

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)		737	1,953	3,062	4,679	5,048	4,837
Public EV charging plugs - DC Fast (1000 units)	0.347		1.51		5.84		9.31
Public EV charging plugs - L2 (1000 units)	1.3		36.3		141		224
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 (%)	1.62	1.88	1.29	0.412	0.076	0.013	0
Vehicle sales - Light-duty - EV (%)	3.67	14.4	45.3	81.3	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.3	78.9	50	17	3.35	0.592	0
Vehicle sales - Light-duty - hybrid (%)	4.18	4.37	3.13	1.17	0.284	0.062	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.111	0.344	0.209	0.065	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.105	0.101	0.067	0.023	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

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Offshore Wind - Base (billion $2018)		0.417	0	0	0	0	1.04
Capital invested - Offshore Wind - Constrained (billion $2018)		0.46	0	0	0	0	1.11
Capital invested - Solar PV - Base (billion $2018)		2.37	0.587	0.212	0.709	2.04	1.48
Capital invested - Solar PV - Constrained (billion $2018)		1.33	1.51	1.35	1.07	2.88	1.77
Capital invested - Wind - Base (billion $2018)		0.067	1.42	0.908	1.46	0.52	0
Capital invested - Wind - Constrained (billion $2018)		0.084	2.07	0.174	2.85	3.08	0
Installed renewables - OffshoreWind - Base land use assumptions (MW)	0	109	109	109	109	109	895
Installed renewables - OffshoreWind - Constrained land use assumptions (MW)	0	120	120	120	120	120	959
Installed renewables - Solar - Base land use assumptions (MW)	2,395	4,465	5,039	5,264	6,063	8,493	10,360
Installed renewables - Solar - Constrained land use assumptions (MW)	1,889	3,048	4,521	5,950	7,154	10,596	12,835
Installed renewables - Wind - Base land use assumptions (MW)	4,188	4,223	5,042	5,605	6,554	6,911	6,911
Installed renewables - Wind - Constrained land use assumptions (MW)	4,154	4,198	5,392	5,500	7,353	9,465	9,465

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	522	522	522	522	522	4,290
OffshoreWind - Constrained land use assumptions (GWh)	0	568	568	568	568	568	3,822
Solar - Base land use assumptions (GWh)	4,444	7,991	8,949	9,331	10,695	14,809	17,995
Solar - Constrained land use assumptions (GWh)	3,569	5,552	8,076	10,473	12,506	18,343	22,220
Wind - Base land use assumptions (GWh)	14,258	14,389	17,413	19,419	22,707	23,920	23,920
Wind - Constrained land use assumptions (GWh)	14,129	14,288	18,527	18,888	24,515	30,552	30,552

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-1,084
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-74.1
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-1,158

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-558
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-37
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-595
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,788
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							126
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,914
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							926
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							62.8
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							988

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)							-3,070
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-60,233
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,267
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-11,025
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-5,746
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-20,097
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-660
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-6,564
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-3,779
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-8,025
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-1,538

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-22,111
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-211
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,235
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,923
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-6,699
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-231
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,282
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-286
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-2,705
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-2,304
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-41,121
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-739
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-7,630
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-4,284
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-13,398
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-446
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4,923
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,033
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-5,365
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							502
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							172
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							5,622
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2,117
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)							62.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							434
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							107

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 - Restore productivity (1000 hectares)							2,660
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							11,677
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							251
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							161
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,154
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1,058
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)							33
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							217
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							18.6
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,609
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							5,503
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							377
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							166
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,888
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,593
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)							47.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							325
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							135
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							3,241
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							9,773

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		36.5	0.043	0.043	0.027	0.016	0
Monetary damages from air pollution - Natural Gas (million 2019$)		38	17.4	20	22.8	14.5	6.62
Monetary damages from air pollution - Transportation (million 2019$)		414	387	294	170	77.9	31.3
Premature deaths from air pollution - Coal (deaths)		4.12	0.005	0.005	0.003	0.002	0
Premature deaths from air pollution - Natural Gas (deaths)		4.29	1.96	2.25	2.57	1.64	0.748
Premature deaths from air pollution - Transportation (deaths)		46.6	43.5	33.1	19.1	8.76	3.52

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)		13,324	14,288				
Sales of cooking units - Electric Resistance (%)	27.5	31	36.1	49.7	68.6	80.2	84.3
Sales of cooking units - Gas (%)	72.5	69	63.9	50.3	31.4	19.8	15.7
Sales of space heating units - Electric Heat Pump (%)	2.5	12.5	15.3	23.6	37.7	49.3	54.5
Sales of space heating units - Electric Resistance (%)	16.7	13.9	16.1	22.4	32.2	39	41.6
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0
Sales of space heating units - Gas Furnace (%)	80.8	73.6	68.6	54	30.1	11.7	3.87
Sales of water heating units - Electric Heat Pump (%)	1	2.5	7.27	21.1	42.9	58.1	63.8
Sales of water heating units - Electric Resistance (%)	3.08	3.16	5.27	11.4	21.5	29	32.1
Sales of water heating units - Gas Furnace (%)	95.1	93.7	86.8	66.8	35	12.3	3.44
Sales of water heating units - Other (%)	0.791	0.625	0.628	0.63	0.63	0.629	0.629

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)		1.88	1.92	2.22	2.29	3.56	3.78

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	93.8	95.2	96.6	96.8	95.9	94.4	93.4
Final energy use - Industry (PJ)	209	215	215	222	230	234	240
Final energy use - Residential (PJ)	151	140	128	117	105	92.8	81.8
Final energy use - Transportation (PJ)	334	315	290	270	254	235	213

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)		2.53	2.65				
Sales of cooking units - Electric Resistance (%)	65.5	66.4	69.6	77.9	89.5	96.6	99.1
Sales of cooking units - Gas (%)	34.5	33.6	30.4	22.1	10.5	3.4	0.915
Sales of space heating units - Electric Heat Pump (%)	12.4	20.2	22.9	30.9	43.8	53.4	57.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Electric Resistance (%)	31	37.9	37.5	36.3	34.2	32.4	31.5
Sales of space heating units - Fossil (%)	8.35	14	13.7	12.7	11	9.88	9.53
Sales of space heating units - Gas (%)	48.3	27.9	25.9	20.1	10.9	4.35	1.81
Sales of water heating units - Electric Heat Pump (%)	0	1.35	5.19	16.3	33.7	45.7	50.1
Sales of water heating units - Electric Resistance (%)	40.2	56.7	55.5	52.2	47.4	44.4	43.4
Sales of water heating units - Gas Furnace (%)	53.4	36.6	34	26.2	13.7	4.82	1.35
Sales of water heating units - Other (%)	6.41	5.35	5.33	5.3	5.21	5.14	5.13

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	130	249	865	2,649	3,885
Public EV charging plugs - DC Fast (1000 units)	0.347		0.57		2.25		5.96
Public EV charging plugs - L2 (1000 units)	1.3		13.7		54.1		144
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 (%)	1.63	2.03	2.07	1.65	1.06	0.547	0.234
Vehicle sales - Light-duty - EV (%)	1.8	4.49	11.5	25.2	47.7	71.6	87.4
Vehicle sales - Light-duty - gasoline (%)	92	87.8	80.2	67.5	47	25.3	11.2
Vehicle sales - Light-duty - hybrid (%)	4.33	5.15	5.81	5.32	4.03	2.4	1.17
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.382	0.33	0.254	0.181	0.101	0.047
Vehicle sales - Light-duty - other (%)	0.106	0.11	0.1	0.087	0.063	0.035	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	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million $2018/year)		0	0	0	234	604	650
Conversion capital investment - Cumulative 5-yr (million $2018)		0	0	0	3,120	4,937	607
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	4	9	10
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	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	0	4.01	10.4	11.1
Annual - BECCS (MMT)		0	0	0	4.01	10.4	11.1
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	4.01	14.4	25.5
Cumulative - BECCS (MMT)		0	0	0	4.01	14.4	25.5
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	0	497	871	1,159	1,234
Cumulative investment - All (million $2018)		0	0	1,561	1,809	2,020	2,068
Cumulative investment - Spur (million $2018)		0	0	0	248	460	507
Cumulative investment - Trunk (million $2018)		0	0	1,561	1,561	1,561	1,561
Spur (km)		0	0	0	373	662	737
Trunk (km)		0	0	497	497	497	497

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)							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 - Cropland measures (1000 tCO2e/y)							-1,084
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)							-74.1
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-1,158
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-558
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)							-37
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-595
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							4,416
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							0.006
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							4.06
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							126
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							4,546
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							926
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							0.006
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							4.06

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							62.8
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							993

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)							-3,070
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-60,233
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,267
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-11,025
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-5,746
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-20,097
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-660
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-6,564
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-3,779
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-8,025
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-1,538
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-22,111
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-211
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,235
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,923
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-6,699
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-231
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,282
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-286
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-2,705
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-2,304
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-41,121
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-739
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-7,630
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-4,284
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-13,398

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-446
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4,923
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,033
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-5,365
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							502
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							172
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							5,622
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2,117
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)							62.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							434
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							107
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							2,660
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							11,677
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							251
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							161
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,154
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1,058
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)							33
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							217
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							18.6
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,609

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							5,503
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							377
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							166
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,888
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,593
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)							47.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							325
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							135
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							3,241
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							9,773

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		36.5	0.043	0.043	0.027	0.016	0
Monetary damages from air pollution - Natural Gas (million 2019$)		39.2	20.1	14.5	13.3	11	8.87
Monetary damages from air pollution - Transportation (million 2019$)		421	425	414	372	296	204
Premature deaths from air pollution - Coal (deaths)		4.12	0.005	0.005	0.003	0.002	0
Premature deaths from air pollution - Natural Gas (deaths)		4.43	2.27	1.63	1.5	1.24	1
Premature deaths from air pollution - Transportation (deaths)		47.3	47.8	46.5	41.9	33.3	22.9

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)		13,236	13,602				
Sales of cooking units - Electric Resistance (%)	27.5	29	29	29	29	28.9	28.9
Sales of cooking units - Gas (%)	72.5	71	71	71	71	71.1	71.1
Sales of space heating units - Electric Heat Pump (%)	2.5	22.4	55	63.9	64.6	64.7	64.7
Sales of space heating units - Electric Resistance (%)	16.7	16.3	26	31	34.1	34.6	34.6
Sales of space heating units - Fossil (%)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Gas Furnace (%)	80.8	61.3	19	5.16	1.26	0.741	0.694
Sales of water heating units - Electric Heat Pump (%)	1	0.818	0.818	0.822	0.828	0.831	0.832
Sales of water heating units - Electric Resistance (%)	3.08	2.41	2.42	2.43	2.43	2.43	2.43
Sales of water heating units - Gas Furnace (%)	95.1	96.1	96.1	96.1	96.1	96.1	96.1
Sales of water heating units - Other (%)	0.791	0.625	0.628	0.63	0.63	0.629	0.629

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)		2.31	2.4	2.04	2.08	2.23	2.28

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	93.8	96.3	99.1	101	104	110	118
Final energy use - Industry (PJ)	209	222	230	240	253	268	285
Final energy use - Residential (PJ)	151	140	129	121	115	111	107
Final energy use - Transportation (PJ)	334	316	295	284	286	295	308

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)		2.54	2.44				
Sales of cooking units - Electric Resistance (%)	65.2	65.2	65.2	65.2	65.2	65.2	65.2
Sales of cooking units - Gas (%)	34.8	34.8	34.8	34.8	34.8	34.8	34.8
Sales of space heating units - Electric Heat Pump (%)	10.6	29.2	30	31.3	32.8	34.9	37.8
Sales of space heating units - Electric Resistance (%)	31.7	33	32.6	31.9	30.8	28.9	25.7
Sales of space heating units - Fossil (%)	8.51	13	11.8	11	10.8	10.7	10.8
Sales of space heating units - Gas (%)	49.2	24.7	25.6	25.8	25.6	25.6	25.6
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	40.2	57.1	57	57	56.9	56.9	56.9
Sales of water heating units - Gas Furnace (%)	53.4	37.5	37.6	37.6	37.6	37.7	37.7
Sales of water heating units - Other (%)	6.41	5.36	5.36	5.41	5.42	5.43	5.44

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 (%)	1.63	2.03	2.2	2.04	1.84	1.72	1.63
Vehicle sales - Light-duty - EV (%)	3.32	5.28	6.04	7.41	9.04	10.5	11.7
Vehicle sales - Light-duty - gasoline (%)	90.6	87.1	85.1	83.4	81.3	79.4	77.8
Vehicle sales - Light-duty - hybrid (%)	4.2	5.06	6.2	6.77	7.36	7.98	8.47

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Light-duty - hydrogen FC (%)	0.111	0.379	0.35	0.312	0.31	0.311	0.322
Vehicle sales - Light-duty - other (%)	0.105	0.109	0.106	0.106	0.106	0.105	0.108
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)							-3,070
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-60,233
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,267
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-11,025
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-5,746
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-20,097
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-660
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-6,564
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-3,779
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-8,025
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-1,538
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-22,111
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-211
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-4,235
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-2,923
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-6,699
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-231
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-3,282
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-286
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-2,705
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-2,304
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-41,121
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-739

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-7,630
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-4,284
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-13,398
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-446
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4,923
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,033
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-5,365
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							502
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							172
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							5,622
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							2,117
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)							62.7
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							434
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							107
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							2,660
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							11,677
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							251
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							161
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							2,154
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							1,058
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)							33

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							217
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							18.6
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							1,609
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							5,503
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							377
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							166
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							3,888
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							1,593
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)							47.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							325
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							135
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							3,241
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							9,773

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)	-34.3		-7.18				-5.98
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-5.47		-9.18				-9.66
Business-as-usual carbon sink - Total (Mt CO2e/y)	-39.7		-16.4				-15.6

Table 66: *REF scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		100	63.7	18.3	13.8	12.6	11.8
Monetary damages from air pollution - Natural Gas (million 2019$)		47.2	44.8	42	35.4	32.9	31.9
Monetary damages from air pollution - Transportation (million 2019$)		421	431	441	453	464	476
Premature deaths from air pollution - Coal (deaths)		11.3	7.2	2.07	1.56	1.42	1.34
Premature deaths from air pollution - Natural Gas (deaths)		5.32	5.06	4.75	4	3.72	3.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Premature deaths from air pollution - Transportation (deaths)		47.3	48.5	49.6	50.9	52.2	53.6