Net-Zero America - wyoming state report

2021-03-15

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

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Notes

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

Data by category and subcategory

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)		1,754	1,951				
Sales of cooking units - Electric Resistance (%)	41.9	54.6	83	88.6	88.9	88.9	88.9
Sales of cooking units - Gas (%)	58.1	45.4	17	11.4	11.1	11.1	11.1
Sales of space heating units - Electric Heat Pump (%)	1.45	7.71	29.2	77.9	89.7	90.8	90.8
Sales of space heating units - Electric Resistance (%)	1.46	3.43	4.85	8.06	8.66	8.7	8.7
Sales of space heating units - Fossil (%)	0	0.209	0.04	0.002	0	0	0
Sales of space heating units - Gas Furnace (%)	97.1	88.6	66	14	1.67	0.543	0.493
Sales of water heating units - Electric Heat Pump (%)	0.014	0.99	13.4	41.7	48.6	49.2	49.2
Sales of water heating units - Electric Resistance (%)	0.674	2.42	14.8	42.9	49.7	50.4	50.4
Sales of water heating units - Gas Furnace (%)	99.2	96.2	71.5	15	1.33	0.057	0
Sales of water heating units - Other (%)	0.16	0.382	0.381	0.382	0.381	0.382	0.382

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)		0.475	0.492	0.982	1.06	0.888	0.932

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	23.9	23.9	23.4	22.2	20.6	19.5	18.9
Final energy use - Industry (PJ)	91.2	95.3	94.6	94.5	96.9	97.8	98.7
Final energy use - Residential (PJ)	12.4	11.7	11.2	10	8.47	7.35	6.61
Final energy use - Transportation (PJ)	100	93.7	82.5	69.4	57.8	50.9	48.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		0.195	0.209				
Sales of cooking units - Electric Resistance (%)	38	51.2	91.7	99.6	100	100	100
Sales of cooking units - Gas (%)	62	48.8	8.35	0.42	0	0	0
Sales of space heating units - Electric Heat Pump (%)	5.11	12.5	35.2	82	92.9	94	93.9
Sales of space heating units - Electric Resistance (%)	9.04	15.7	12.6	5.87	4.27	4.11	4.16
Sales of space heating units - Fossil (%)	15.2	17.3	12.6	2.36	0.19	0.008	0
Sales of space heating units - Gas (%)	70.6	54.6	39.6	9.78	2.61	1.91	1.89
Sales of water heating units - Electric Heat Pump (%)	0	0.824	11.4	35.5	41	41.4	41.4
Sales of water heating units - Electric Resistance (%)	12.2	25.1	33.5	52.4	57.1	57.6	57.7
Sales of water heating units - Gas Furnace (%)	87.1	73.3	54.2	11.3	0.997	0.043	0
Sales of water heating units - Other (%)	0.718	0.834	0.853	0.869	0.883	0.888	0.894

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)		161	411	669	1,013	1,103	1,051
Public EV charging plugs - DC Fast (1000 units)	0.067		0.335		1.49		2.42
Public EV charging plugs - L2 (1000 units)	0.087		8.09		36.1		58.5
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 (%)	2.1	2.29	1.49	0.482	0.084	0.013	0
Vehicle sales - Light-duty - EV (%)	2.08	9.65	37.5	78.2	95.9	99.3	100
Vehicle sales - Light-duty - gasoline (%)	92.9	84.3	58.1	20.2	3.78	0.605	0
Vehicle sales - Light-duty - hybrid (%)	2.64	3.27	2.57	1.02	0.236	0.048	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.371	0.249	0.08	0.015	0.003	0
Vehicle sales - Light-duty - other (%)	0.126	0.123	0.087	0.031	0.006	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	0.302
Capital invested - Wind - Base (billion $2018)		1.38	9.97	7.61	10.7	7.23	3.44
Capital invested - Wind - Constrained (billion $2018)		6.49	5.04	2.64	3.93	3.26	2.02
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)	9.15	13.9	18.7	24.6	32	41.1	52.3
Installed renewables - Solar - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Solar - Constrained land use assumptions (MW)	0	0	0	0	0	0	0
Installed renewables - Wind - Base land use assumptions (MW)	5,890	6,828	14,320	20,451	29,540	35,993	39,239
Installed renewables - Wind - Constrained land use assumptions (MW)	5,748	6,713	11,111	14,230	17,473	20,770	22,188

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	339

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

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)	0	0	0	0	0	0	0
Solar - Constrained land use assumptions (GWh)	0	0	0	0	0	0	0
Wind - Base land use assumptions (GWh)	24,571	28,214	53,844	74,557	104,330	125,593	136,765
Wind - Constrained land use assumptions (GWh)	24,034	27,387	42,077	52,246	62,677	72,932	77,334

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	0	16.5
Conversion capital investment - Cumulative 5-yr (million $2018)		0	0	0	0	0	277
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel (quantity)	0	0	0	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	1
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	0	0.32
Annual - BECCS (MMT)		0	0	0	0	0	0.32
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	0	0	0.32
Cumulative - BECCS (MMT)		0	0	0	0	0	0.32
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	25.7	25.7	95.7	25.7	192
Cumulative investment - All (million $2018)		0	13.7	14.8	52.6	14.8	117
Cumulative investment - Spur (million $2018)		0	13.7	14.8	52.6	14.8	117
Cumulative investment - Trunk (million $2018)		0	0	0	0	0	0
Spur (km)		0	25.7	25.7	95.7	25.7	192
Trunk (km)		0	0	0	0	0	0

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)							-742
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-29
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-771
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-378
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.5
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-393
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)							1,003
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							44.6
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,048
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)							513
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							22.3
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							535

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,948
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-13,225
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-691
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-2,406
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-28.8
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-240
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-385
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-2,376
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-1,909
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,241
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-976
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-4,670
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-115
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-924
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-14.7
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-80
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-135
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-1,188
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-145
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,092
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,462
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-8,947
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-403
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-1,665
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-21.5
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-160
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-260
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,782
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,027
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,167

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)							319
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							93.6
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,227
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							10.6
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)							36.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							157
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							54.2
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,074
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							2,972
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							159
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							87.9
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							470
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							5.31
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)							19.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							78.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							9.4
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							650
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,480
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							239

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)							90.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							848
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							7.99
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)							27.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							118
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							68
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,309
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							2,709

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		127	107	86	64.7	40.7	28.3
Natural gas consumption - Cumulative (tcf)							2,590
Natural gas production - Annual (tcf)		1,923	1,818	1,583	1,339	1,062	825
Oil consumption - Annual (million bbls)		28.7	25.8	21.1	16.3	12.6	8.98
Oil consumption - Cumulative (million bbls)							638
Oil production - Annual (million bbls)		114	114	114	90.5	73.5	48.9

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		28.4	0.02	0.02	0.015	0.009	0
Monetary damages from air pollution - Natural Gas (million 2019$)		6.16	3.96	2.86	2.71	1.79	0.854
Monetary damages from air pollution - Transportation (million 2019$)		23.8	21.5	15.8	8.75	3.79	1.38
Premature deaths from air pollution - Coal (deaths)		3.21	0.002	0.002	0.002	0.001	0
Premature deaths from air pollution - Natural Gas (deaths)		0.695	0.447	0.323	0.305	0.202	0.096
Premature deaths from air pollution - Transportation (deaths)		2.67	2.42	1.78	0.984	0.427	0.156

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		0	0	0	0	0	15.2
By economic sector - Construction (jobs)		6,007	8,230	9,850	11,769	12,143	11,338
By economic sector - Manufacturing (jobs)		6,304	7,764	8,870	8,022	6,909	6,810
By economic sector - Mining (jobs)		9,381	6,651	5,046	3,291	2,068	1,102

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		301	533	739	1,018	1,171	1,210
By economic sector - Pipeline (jobs)		730	663	582	452	328	218
By economic sector - Professional (jobs)		4,587	5,950	7,183	8,786	9,437	9,204
By economic sector - Trade (jobs)		5,530	4,608	5,011	5,494	5,659	5,396
By economic sector - Utilities (jobs)		4,537	5,685	7,196	9,489	10,097	9,660
By education level - All sectors - Associates degree or some college (jobs)		10,995	12,151	13,693	15,164	15,141	14,338
By education level - All sectors - Bachelors degree (jobs)		8,829	9,225	9,985	10,614	10,428	9,743
By education level - All sectors - Doctoral degree (jobs)		303	340	375	418	426	402
By education level - All sectors - High school diploma or less (jobs)		15,167	16,128	17,979	19,456	19,147	17,959
By education level - All sectors - Masters or professional degree (jobs)		2,082	2,242	2,447	2,668	2,669	2,510
By resource sector - Biomass (jobs)		0	0	0	0	0	65
By resource sector - CO2 (jobs)		0	0	14.6	17.8	18.1	99.9
By resource sector - Coal (jobs)		3,817	364	193	142	110	92.3
By resource sector - Grid (jobs)		4,061	7,284	10,871	15,254	16,972	16,762
By resource sector - Natural Gas (jobs)		10,721	8,701	6,672	5,462	3,800	2,339
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		11,814	10,701	9,641	7,043	5,296	3,313
By resource sector - Solar (jobs)		1,038	1,396	2,498	2,528	2,589	3,245
By resource sector - Wind (jobs)		5,926	11,639	14,590	17,873	19,026	19,036
Median wages - Annual - All ($2019 per job)		63,266	63,772	64,191	64,926	65,780	66,476
On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs)		5,836	6,397	7,147	7,851	7,799	7,334
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)		2,288	2,580	2,904	3,292	3,324	3,113
On-Site or In-Plant Training - Total jobs - None (jobs)		6,003	6,532	7,253	7,886	7,818	7,382
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)		273	318	366	416	420	398
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)		22,976	24,258	26,809	28,876	28,450	26,725
On-the-Job Training - All sectors - 1 to 4 years (jobs)		7,427	8,216	9,195	10,152	10,113	9,519
On-the-Job Training - All sectors - 4 to 10 years (jobs)		2,103	2,423	2,764	3,187	3,245	3,055
On-the-Job Training - All sectors - None (jobs)		2,105	2,212	2,423	2,606	2,572	2,414
On-the-Job Training - All sectors - Over 10 years (jobs)		353	396	438	464	450	423
On-the-Job Training - All sectors - Up to 1 year (jobs)		25,389	26,837	29,660	31,912	31,431	29,542
Related work experience - All sectors - 1 to 4 years (jobs)		13,915	14,737	16,269	17,609	17,400	16,315
Related work experience - All sectors - 4 to 10 years (jobs)		8,770	9,502	10,538	11,499	11,408	10,721
Related work experience - All sectors - None (jobs)		5,155	5,582	6,223	6,809	6,756	6,357
Related work experience - All sectors - Over 10 years (jobs)		2,421	2,618	2,878	3,077	3,016	2,831
Related work experience - All sectors - Up to 1 year (jobs)		7,116	7,645	8,571	9,325	9,231	8,729
Wage income - All (million $2019)		2,365	2,556	2,855	3,137	3,145	2,989

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)		1,753	1,948				
Sales of cooking units - Electric Resistance (%)	41.9	46.2	50.2	60.8	75.4	84.6	87.8
Sales of cooking units - Gas (%)	58.1	53.8	49.8	39.2	24.6	15.4	12.2
Sales of space heating units - Electric Heat Pump (%)	1.45	6.48	7.77	12	22.4	35.8	44.2
Sales of space heating units - Electric Resistance (%)	1.46	3.35	3.43	3.71	4.42	5.32	5.86
Sales of space heating units - Fossil (%)	0	0.246	0.238	0.208	0.166	0.139	0.129
Sales of space heating units - Gas Furnace (%)	97.1	89.9	88.6	84.1	73	58.7	49.8
Sales of water heating units - Electric Heat Pump (%)	0.014	0.298	1.07	3.62	9.83	17.9	23
Sales of water heating units - Electric Resistance (%)	0.674	1.73	2.5	5.04	11.2	19.3	24.3
Sales of water heating units - Gas Furnace (%)	99.2	97.6	96	91	78.6	62.4	52.4
Sales of water heating units - Other (%)	0.16	0.382	0.381	0.382	0.381	0.382	0.382

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)		0.375	0.38	0.515	0.536	0.847	0.903

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	23.9	23.9	23.7	23.6	23.4	23.1	22.9
Final energy use - Industry (PJ)	91.2	95.4	95	95.9	99	99.6	100
Final energy use - Residential (PJ)	12.4	11.7	11.3	11.1	10.7	10.3	9.8
Final energy use - Transportation (PJ)	100	94.2	85.5	79.2	74.7	69.4	62.9

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		0.194	0.206				
Sales of cooking units - Electric Resistance (%)	37.8	39.4	45.1	60.1	81	93.9	98.3
Sales of cooking units - Gas (%)	62.2	60.6	54.9	39.9	19	6.14	1.65
Sales of space heating units - Electric Heat Pump (%)	5.11	10.8	12.2	17	27.9	41.4	49.7
Sales of space heating units - Electric Resistance (%)	9.04	15.9	15.6	15.1	13.8	11.8	10.6
Sales of space heating units - Fossil (%)	15.2	17.6	17.7	15.3	12	9.78	8.25
Sales of space heating units - Gas (%)	70.6	55.7	54.6	52.6	46.3	37	31.4
Sales of water heating units - Electric Heat Pump (%)	0	0.23	0.889	3.05	8.31	15.1	19.3
Sales of water heating units - Electric Resistance (%)	12.2	24.6	25.4	27.4	31.8	37.2	40.6
Sales of water heating units - Gas Furnace (%)	87.1	74.3	72.8	68.7	59	46.8	39.1
Sales of water heating units - Other (%)	0.718	0.834	0.853	0.868	0.881	0.89	0.897

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	25.8	54.8	184	582	848
Public EV charging plugs - DC Fast (1000 units)	0.067		0.1		0.552		1.55
Public EV charging plugs - L2 (1000 units)	0.087		2.42		13.3		37.5
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 (%)	2.11	2.42	2.16	1.75	1.17	0.614	0.26
Vehicle sales - Light-duty - EV (%)	1.25	3.29	8.83	21	42.9	68.3	86.1
Vehicle sales - Light-duty - gasoline (%)	93.7	90.1	84.4	72.9	52.4	28.8	12.5
Vehicle sales - Light-duty - hybrid (%)	2.7	3.64	4.15	4.05	3.3	2.1	1.08
Vehicle sales - Light-duty - hydrogen FC (%)	0.114	0.396	0.359	0.287	0.213	0.122	0.056
Vehicle sales - Light-duty - other (%)	0.127	0.13	0.123	0.109	0.081	0.046	0.021
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)							-742
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-29
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-771
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-378
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.5
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-393
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)							1,003
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							44.6

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)							1,048
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)							513
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							22.3
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							535

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,948
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-13,225
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-691
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-2,406
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-28.8
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-240
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-385
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-2,376
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-1,909
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,241
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-976
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-4,670
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-115
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-924
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-14.7
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-80
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-135
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-1,188
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-145
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,092
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,462

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)							-8,947
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-403
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-1,665
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-21.5
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-160
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-260
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,782
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,027
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,167
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							319
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							93.6
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,227
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							10.6
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)							36.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							157
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							54.2
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,074
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							2,972
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							159
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							87.9
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							470
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							5.31
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)							19.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							78.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							9.4
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							650
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,480
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							239
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							90.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							848
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							7.99
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)							27.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							118
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							68
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,309
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							2,709

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		28.4	0.02	0.02	0.015	0.009	0
Monetary damages from air pollution - Natural Gas (million 2019$)		6.25	3.48	2.29	1.39	0.762	0.566
Monetary damages from air pollution - Transportation (million 2019$)		24.1	23.5	22.2	19.3	14.8	9.75
Premature deaths from air pollution - Coal (deaths)		3.21	0.002	0.002	0.002	0.001	0
Premature deaths from air pollution - Natural Gas (deaths)		0.706	0.393	0.258	0.157	0.086	0.064
Premature deaths from air pollution - Transportation (deaths)		2.71	2.64	2.49	2.17	1.67	1.1

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)		1,754	1,951				
Sales of cooking units - Electric Resistance (%)	41.9	54.6	83	88.6	88.9	88.9	88.9
Sales of cooking units - Gas (%)	58.1	45.4	17	11.4	11.1	11.1	11.1
Sales of space heating units - Electric Heat Pump (%)	1.45	7.71	29.2	77.9	89.7	90.8	90.8
Sales of space heating units - Electric Resistance (%)	1.46	3.43	4.85	8.06	8.66	8.7	8.7
Sales of space heating units - Fossil (%)	0	0.209	0.04	0.002	0	0	0
Sales of space heating units - Gas Furnace (%)	97.1	88.6	66	14	1.67	0.543	0.493
Sales of water heating units - Electric Heat Pump (%)	0.014	0.99	13.4	41.7	48.6	49.2	49.2
Sales of water heating units - Electric Resistance (%)	0.674	2.42	14.8	42.9	49.7	50.4	50.4
Sales of water heating units - Gas Furnace (%)	99.2	96.2	71.5	15	1.33	0.057	0
Sales of water heating units - Other (%)	0.16	0.382	0.381	0.382	0.381	0.382	0.382

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)		0.475	0.492	0.982	1.06	0.888	0.932

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	23.9	23.9	23.4	22.2	20.6	19.5	18.9
Final energy use - Industry (PJ)	91.2	95.3	94.6	94.5	96.9	97.8	98.7
Final energy use - Residential (PJ)	12.4	11.7	11.2	10	8.47	7.35	6.61
Final energy use - Transportation (PJ)	100	93.7	82.5	69.4	57.8	50.9	48.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		0.195	0.209				
Sales of cooking units - Electric Resistance (%)	38	51.2	91.7	99.6	100	100	100
Sales of cooking units - Gas (%)	62	48.8	8.35	0.42	0	0	0
Sales of space heating units - Electric Heat Pump (%)	5.11	12.5	35.2	82	92.9	94	93.9
Sales of space heating units - Electric Resistance (%)	9.04	15.7	12.6	5.87	4.27	4.11	4.16
Sales of space heating units - Fossil (%)	15.2	17.3	12.6	2.36	0.19	0.008	0
Sales of space heating units - Gas (%)	70.6	54.6	39.6	9.78	2.61	1.91	1.89
Sales of water heating units - Electric Heat Pump (%)	0	0.824	11.4	35.5	41	41.4	41.4
Sales of water heating units - Electric Resistance (%)	12.2	25.1	33.5	52.4	57.1	57.6	57.7
Sales of water heating units - Gas Furnace (%)	87.1	73.3	54.2	11.3	0.997	0.043	0
Sales of water heating units - Other (%)	0.718	0.834	0.853	0.869	0.883	0.888	0.894

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)		161	411	669	1,013	1,103	1,051
Public EV charging plugs - DC Fast (1000 units)	0.067		0.335		1.49		2.42
Public EV charging plugs - L2 (1000 units)	0.087		8.09		36.1		58.5
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 (%)	2.1	2.29	1.49	0.482	0.084	0.013	0
Vehicle sales - Light-duty - EV (%)	2.08	9.65	37.5	78.2	95.9	99.3	100
Vehicle sales - Light-duty - gasoline (%)	92.9	84.3	58.1	20.2	3.78	0.605	0
Vehicle sales - Light-duty - hybrid (%)	2.64	3.27	2.57	1.02	0.236	0.048	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.371	0.249	0.08	0.015	0.003	0
Vehicle sales - Light-duty - other (%)	0.126	0.123	0.087	0.031	0.006	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Base (billion $2018)		0	0	0	0	0	10.5
Capital invested - Wind - Base (billion $2018)		2.04	10.9	14.4	17.3	14	33.4
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)	0	0	0	0	0	0	13,219
Installed renewables - Solar - Constrained land use assumptions (MW)	0	0	0	0	0	0	12,600
Installed renewables - Wind - Base land use assumptions (MW)	6,123	7,512	15,720	27,314	41,989	54,506	86,025
Installed renewables - Wind - Constrained land use assumptions (MW)	11,495	14,846	23,999	33,135	46,201	56,431	119,201

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)	0	0	0	0	0	0	24,112
Solar - Constrained land use assumptions (GWh)	0	0	0	0	0	0	22,821
Wind - Base land use assumptions (GWh)	25,403	30,769	58,728	97,027	145,256	185,499	287,770
Wind - Constrained land use assumptions (GWh)	48,069	59,739	89,897	119,591	160,431	191,129	383,395

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)							-742
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-29
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-771
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-378
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.5
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-393
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)							1,003
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							44.6
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,048
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)							513
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							22.3
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							535

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,948
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-13,225
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-691
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-2,406
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-28.8
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-240

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)							-385
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-2,376
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-1,909
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,241
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-976
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-4,670
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-115
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-924
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-14.7
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-80
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-135
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-1,188
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-145
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,092
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,462
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-8,947
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-403
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-1,665
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-21.5
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-160
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-260
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,782
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,027
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,167
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							319
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							93.6
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,227
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							10.6

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)							36.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							157
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							54.2
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,074
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							2,972
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							159
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							87.9
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							470
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							5.31
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)							19.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							78.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							9.4
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							650
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,480
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							239
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							90.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							848
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							7.99
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)							27.9

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)							118
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							68
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,309
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							2,709

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		28.4	0.02	0.02	0.015	0.009	0
Monetary damages from air pollution - Natural Gas (million 2019$)		5.58	3.29	1.66	1.36	0.746	0.458
Monetary damages from air pollution - Transportation (million 2019$)		23.8	21.5	15.8	8.75	3.79	1.38
Premature deaths from air pollution - Coal (deaths)		3.21	0.002	0.002	0.002	0.001	0
Premature deaths from air pollution - Natural Gas (deaths)		0.63	0.371	0.187	0.153	0.084	0.052
Premature deaths from air pollution - Transportation (deaths)		2.67	2.42	1.78	0.984	0.427	0.156

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)		1,754	1,951				
Sales of cooking units - Electric Resistance (%)	41.9	54.6	83	88.6	88.9	88.9	88.9
Sales of cooking units - Gas (%)	58.1	45.4	17	11.4	11.1	11.1	11.1
Sales of space heating units - Electric Heat Pump (%)	1.45	7.71	29.2	77.9	89.7	90.8	90.8
Sales of space heating units - Electric Resistance (%)	1.46	3.43	4.85	8.06	8.66	8.7	8.7
Sales of space heating units - Fossil (%)	0	0.209	0.04	0.002	0	0	0
Sales of space heating units - Gas Furnace (%)	97.1	88.6	66	14	1.67	0.543	0.493
Sales of water heating units - Electric Heat Pump (%)	0.014	0.99	13.4	41.7	48.6	49.2	49.2
Sales of water heating units - Electric Resistance (%)	0.674	2.42	14.8	42.9	49.7	50.4	50.4
Sales of water heating units - Gas Furnace (%)	99.2	96.2	71.5	15	1.33	0.057	0
Sales of water heating units - Other (%)	0.16	0.382	0.381	0.382	0.381	0.382	0.382

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)		0.475	0.492	0.982	1.06	0.888	0.932

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	23.9	23.9	23.4	22.2	20.6	19.5	18.9

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	91.2	95.3	94.6	94.5	96.9	97.8	98.7
Final energy use - Residential (PJ)	12.4	11.7	11.2	10	8.47	7.35	6.61
Final energy use - Transportation (PJ)	100	93.7	82.5	69.4	57.8	50.9	48.2

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		0.195	0.209				
Sales of cooking units - Electric Resistance (%)	38	51.2	91.7	99.6	100	100	100
Sales of cooking units - Gas (%)	62	48.8	8.35	0.42	0	0	0
Sales of space heating units - Electric Heat Pump (%)	5.11	12.5	35.2	82	92.9	94	93.9
Sales of space heating units - Electric Resistance (%)	9.04	15.7	12.6	5.87	4.27	4.11	4.16
Sales of space heating units - Fossil (%)	15.2	17.3	12.6	2.36	0.19	0.008	0
Sales of space heating units - Gas (%)	70.6	54.6	39.6	9.78	2.61	1.91	1.89
Sales of water heating units - Electric Heat Pump (%)	0	0.824	11.4	35.5	41	41.4	41.4
Sales of water heating units - Electric Resistance (%)	12.2	25.1	33.5	52.4	57.1	57.6	57.7
Sales of water heating units - Gas Furnace (%)	87.1	73.3	54.2	11.3	0.997	0.043	0
Sales of water heating units - Other (%)	0.718	0.834	0.853	0.869	0.883	0.888	0.894

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)		161	411	669	1,013	1,103	1,051
Public EV charging plugs - DC Fast (1000 units)	0.067		0.335		1.49		2.42
Public EV charging plugs - L2 (1000 units)	0.087		8.09		36.1		58.5
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 (%)	2.1	2.29	1.49	0.482	0.084	0.013	0
Vehicle sales - Light-duty - EV (%)	2.08	9.65	37.5	78.2	95.9	99.3	100
Vehicle sales - Light-duty - gasoline (%)	92.9	84.3	58.1	20.2	3.78	0.605	0
Vehicle sales - Light-duty - hybrid (%)	2.64	3.27	2.57	1.02	0.236	0.048	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.371	0.249	0.08	0.015	0.003	0
Vehicle sales - Light-duty - other (%)	0.126	0.123	0.087	0.031	0.006	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Base (billion $2018)		0.836	0	0	0	0.603	0.481
Capital invested - Solar PV - Constrained (billion $2018)		0	0	0	0.499	0	0.303
Capital invested - Wind - Base (billion $2018)		1.53	4.64	5.2	8.26	6	0.933
Capital invested - Wind - Constrained (billion $2018)		1.25	3.92	2.37	4.03	2.15	0.51
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)	0	731	731	731	731	1,451	2,059
Installed renewables - Solar - Constrained land use assumptions (MW)	0	0	0	0	563	563	945
Installed renewables - Wind - Base land use assumptions (MW)	6,123	7,162	10,647	14,835	21,823	27,173	28,055
Installed renewables - Wind - Constrained land use assumptions (MW)	5,748	6,597	9,541	11,449	14,857	16,777	17,258

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)	0	1,350	1,350	1,350	1,350	2,677	3,799
Solar - Constrained land use assumptions (GWh)	0	0	0	0	1,031	1,031	1,732
Wind - Base land use assumptions (GWh)	25,403	29,333	41,691	55,645	79,358	97,055	100,139
Wind - Constrained land use assumptions (GWh)	24,034	26,992	36,886	43,210	54,319	60,449	61,985

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)							-742
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-29
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-771
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-378
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.5
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-393

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)							0
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							1,003
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							44.6
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							1,048
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)							513
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							22.3
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							535

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,948
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-13,225
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-691
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-2,406
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-28.8
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-240
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-385
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-2,376
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-1,909
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,241
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-976
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-4,670
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-115
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-924
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-14.7
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-80
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-135

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)							-1,188
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-145
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,092
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,462
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-8,947
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-403
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-1,665
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-21.5
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-160
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-260
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,782
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,027
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,167
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							319
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							93.6
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,227
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							10.6
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)							36.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							157
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							54.2
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,074
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							2,972
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							159
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							87.9

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)							470
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							5.31
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)							19.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							78.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							9.4
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							650
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,480
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							239
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							90.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							848
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							7.99
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)							27.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							118
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							68
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,309
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							2,709

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		28.4	0.02	0.02	0.015	0.009	0
Monetary damages from air pollution - Natural Gas (million 2019$)		6.12	3.87	3.62	4.6	2.16	0.626
Monetary damages from air pollution - Transportation (million 2019$)		23.8	21.5	15.8	8.75	3.79	1.38
Premature deaths from air pollution - Coal (deaths)		3.21	0.002	0.002	0.002	0.001	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)		0.691	0.437	0.408	0.519	0.244	0.071
Premature deaths from air pollution - Transportation (deaths)		2.67	2.42	1.78	0.984	0.427	0.156

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)		1,753	1,948				
Sales of cooking units - Electric Resistance (%)	41.9	46.2	50.2	60.8	75.4	84.6	87.8
Sales of cooking units - Gas (%)	58.1	53.8	49.8	39.2	24.6	15.4	12.2
Sales of space heating units - Electric Heat Pump (%)	1.45	6.48	7.77	12	22.4	35.8	44.2
Sales of space heating units - Electric Resistance (%)	1.46	3.35	3.43	3.71	4.42	5.32	5.86
Sales of space heating units - Fossil (%)	0	0.246	0.238	0.208	0.166	0.139	0.129
Sales of space heating units - Gas Furnace (%)	97.1	89.9	88.6	84.1	73	58.7	49.8
Sales of water heating units - Electric Heat Pump (%)	0.014	0.298	1.07	3.62	9.83	17.9	23
Sales of water heating units - Electric Resistance (%)	0.674	1.73	2.5	5.04	11.2	19.3	24.3
Sales of water heating units - Gas Furnace (%)	99.2	97.6	96	91	78.6	62.4	52.4
Sales of water heating units - Other (%)	0.16	0.382	0.381	0.382	0.381	0.382	0.382

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)		0.375	0.38	0.515	0.536	0.847	0.903

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	23.9	23.9	23.7	23.6	23.4	23.1	22.9
Final energy use - Industry (PJ)	91.2	95.4	95	95.9	99	99.6	100
Final energy use - Residential (PJ)	12.4	11.7	11.3	11.1	10.7	10.3	9.8
Final energy use - Transportation (PJ)	100	94.2	85.5	79.2	74.7	69.4	62.9

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		0.194	0.206				
Sales of cooking units - Electric Resistance (%)	37.8	39.4	45.1	60.1	81	93.9	98.3
Sales of cooking units - Gas (%)	62.2	60.6	54.9	39.9	19	6.14	1.65
Sales of space heating units - Electric Heat Pump (%)	5.11	10.8	12.2	17	27.9	41.4	49.7
Sales of space heating units - Electric Resistance (%)	9.04	15.9	15.6	15.1	13.8	11.8	10.6
Sales of space heating units - Fossil (%)	15.2	17.6	17.7	15.3	12	9.78	8.25
Sales of space heating units - Gas (%)	70.6	55.7	54.6	52.6	46.3	37	31.4
Sales of water heating units - Electric Heat Pump (%)	0	0.23	0.889	3.05	8.31	15.1	19.3
Sales of water heating units - Electric Resistance (%)	12.2	24.6	25.4	27.4	31.8	37.2	40.6

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 (%)	87.1	74.3	72.8	68.7	59	46.8	39.1
Sales of water heating units - Other (%)	0.718	0.834	0.853	0.868	0.881	0.89	0.897

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	25.8	54.8	184	582	848
Public EV charging plugs - DC Fast (1000 units)	0.067		0.1		0.552		1.55
Public EV charging plugs - L2 (1000 units)	0.087		2.42		13.3		37.5
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 (%)	2.11	2.42	2.16	1.75	1.17	0.614	0.26
Vehicle sales - Light-duty - EV (%)	1.25	3.29	8.83	21	42.9	68.3	86.1
Vehicle sales - Light-duty - gasoline (%)	93.7	90.1	84.4	72.9	52.4	28.8	12.5
Vehicle sales - Light-duty - hybrid (%)	2.7	3.64	4.15	4.05	3.3	2.1	1.08
Vehicle sales - Light-duty - hydrogen FC (%)	0.114	0.396	0.359	0.287	0.213	0.122	0.056
Vehicle sales - Light-duty - other (%)	0.127	0.13	0.123	0.109	0.081	0.046	0.021
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	0.68

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	763

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	0	0	47
Conversion capital investment - Cumulative 5-yr (million $2018)		0	0	0	0	0	624
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	0	0	0

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	0	0	0	0
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	1
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	0	0	0.75
Annual - BECCS (MMT)		0	0	0	0	0	0.75
Annual - Cement and lime (MMT)		0	0	0	0	0	0
Annual - NGCC (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	0	0	0	0.75
Cumulative - BECCS (MMT)		0	0	0	0	0	0.75
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	60.7	25.7	25.7	311	279
Cumulative investment - All (million $2018)		0	32.2	16.6	16.6	179	179
Cumulative investment - Spur (million $2018)		0	32.2	16.6	16.6	179	179
Cumulative investment - Trunk (million $2018)		0	0	0	0	0	0
Spur (km)		0	60.7	25.7	25.7	311	279
Trunk (km)		0	0	0	0	0	0

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)							-5.6
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-735
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)							-28.3
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-769
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-5.6
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-375
Carbon sink potential - Moderate deployment - Cropland to woody energy crops (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Pasture to energy crops (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-14.1
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-394
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							8.46
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							2,452
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							2.77
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							43.5
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							2,507
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							8.46
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							507
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							2.77
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							21.7
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							540

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y)							-1,948
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-13,225
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-691
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-2,406
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-28.8
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-240
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-385
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-2,376
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-1,909
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,241
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-976
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-4,670
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-115
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-924
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-14.7
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-80
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-135
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-1,188
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-145
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,092
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,462
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-8,947
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-403
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-1,665
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-21.5
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-160
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-260
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,782
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,027
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,167

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)							319
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							93.6
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,227
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							10.6
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)							36.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							157
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							54.2
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,074
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							2,972
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							159
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							87.9
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							470
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							5.31
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)							19.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							78.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							9.4
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							650
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,480
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							239

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)							90.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							848
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							7.99
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)							27.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							118
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							68
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,309
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							2,709

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		28.4	0.02	0.02	0.015	0.009	0
Monetary damages from air pollution - Natural Gas (million 2019$)		5.93	3.34	2.42	1.82	1.17	0.533
Monetary damages from air pollution - Transportation (million 2019$)		24.1	23.5	22.2	19.3	14.8	9.75
Premature deaths from air pollution - Coal (deaths)		3.21	0.002	0.002	0.002	0.001	0
Premature deaths from air pollution - Natural Gas (deaths)		0.669	0.377	0.273	0.206	0.132	0.06
Premature deaths from air pollution - Transportation (deaths)		2.71	2.64	2.49	2.17	1.67	1.1

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)		1,732	1,819				
Sales of cooking units - Electric Resistance (%)	41.9	44.7	44.7	44.6	44.4	44.5	44.6
Sales of cooking units - Gas (%)	58.1	55.3	55.3	55.4	55.6	55.5	55.4
Sales of space heating units - Electric Heat Pump (%)	1.45	13.4	45.3	72.5	77.4	78.1	78.1
Sales of space heating units - Electric Resistance (%)	1.46	4.34	9.12	16.3	20.7	21.4	21.4
Sales of space heating units - Fossil (%)	0	0.228	0.136	0.039	0.005	0	0
Sales of space heating units - Gas Furnace (%)	97.1	82	45.5	11.2	1.88	0.584	0.494
Sales of water heating units - Electric Heat Pump (%)	0.014	0.03	0.03	0.03	0.03	0.03	0.03
Sales of water heating units - Electric Resistance (%)	0.674	1.46	1.46	1.47	1.46	1.47	1.46

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 (%)	99.2	98.1	98.1	98.1	98.1	98.1	98.1
Sales of water heating units - Other (%)	0.16	0.382	0.381	0.382	0.381	0.382	0.382

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)		0.451	0.465	0.504	0.521	0.589	0.612

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	23.8	24.3	24.8	24.8	24.8	25.4	26.5
Final energy use - Industry (PJ)	91.2	98	100	103	106	111	116
Final energy use - Residential (PJ)	12.4	11.8	11.6	11.6	11.6	11.8	12
Final energy use - Transportation (PJ)	100	94.3	86.2	81.7	81.7	84.2	87.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Residential HVAC investment in 2020s vs. REF - Cumulative 5-yr (billion $2018)		0.191	0.192				
Sales of cooking units - Electric Resistance (%)	37.2	37.2	37.2	37.2	37.2	37.2	37.2
Sales of cooking units - Gas (%)	62.8	62.8	62.8	62.8	62.8	62.8	62.8
Sales of space heating units - Electric Heat Pump (%)	4.61	14.6	14.9	15.5	16.1	16.6	17.2
Sales of space heating units - Electric Resistance (%)	9.12	15.3	15.1	15.1	15.1	14.6	14
Sales of space heating units - Fossil (%)	15.3	16.2	16.5	15.3	14	14.2	14.2
Sales of space heating units - Gas (%)	70.9	53.8	53.4	54	54.8	54.6	54.5
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	12.2	24.4	24.7	25	25.4	25.6	25.8
Sales of water heating units - Gas Furnace (%)	87.1	74.7	74.4	74.1	73.7	73.6	73.3
Sales of water heating units - Other (%)	0.718	0.834	0.853	0.868	0.881	0.89	0.897

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 (%)	2.11	2.42	2.28	2.12	1.93	1.81	1.72
Vehicle sales - Light-duty - EV (%)	1.75	3.29	3.74	4.44	5.48	6.62	7.7
Vehicle sales - Light-duty - gasoline (%)	93.3	90.1	89.1	88	86.4	84.6	82.8
Vehicle sales - Light-duty - hybrid (%)	2.65	3.61	4.4	5	5.66	6.46	7.32
Vehicle sales - Light-duty - hydrogen FC (%)	0.114	0.396	0.379	0.345	0.349	0.355	0.367
Vehicle sales - Light-duty - other (%)	0.127	0.13	0.129	0.131	0.132	0.132	0.136
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)							-1,948
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-13,225
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-691
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-2,406
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-28.8
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-240
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-385
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-2,376
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-1,909
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-3,241
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-976
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-4,670
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-115
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-924
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-14.7
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-80
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-135
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-1,188
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-145
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-1,092
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-1,462
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-8,947
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-403
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-1,665
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-21.5
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-160

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)							-260
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-1,782
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-1,027
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-2,167
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							319
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							93.6
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,227
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							10.6
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)							36.5
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							157
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							54.2
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							1,074
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							2,972
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							159
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							87.9
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							470
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							5.31
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)							19.2
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							78.6
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							9.4
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							650

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)							1,480
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							239
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							90.8
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							848
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							7.99
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)							27.9
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							118
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							68
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							1,309
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							2,709

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)	29		1.96				0.561
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.065		-0.136				-0.143
Business-as-usual carbon sink - Total (Mt CO2e/y)	28.9		1.82				0.418

Table 66: *REF scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		56.8	32.8	17.8	14	12	11.5
Monetary damages from air pollution - Natural Gas (million 2019$)		6.77	6.48	6.36	4.47	4.22	3.11
Monetary damages from air pollution - Transportation (million 2019$)		24.1	23.9	23.6	23.5	23.2	23
Premature deaths from air pollution - Coal (deaths)		6.41	3.7	2.01	1.58	1.35	1.3
Premature deaths from air pollution - Natural Gas (deaths)		0.764	0.731	0.718	0.504	0.476	0.351
Premature deaths from air pollution - Transportation (deaths)		2.71	2.68	2.66	2.64	2.61	2.59