Net-Zero America - indiana state report

2021-03-05

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)	0	19,994	21,829	0	0	0	0
Sales of cooking units - Electric Resistance (%)	41	54.2	82.9	88.6	88.9	88.9	88.9
Sales of cooking units - Gas (%)	59	45.8	17.1	11.4	11.1	11.1	11.1
Sales of space heating units - Electric Heat Pump (%)	2.05	9.66	38.6	81.8	89.2	89.7	89.7
Sales of space heating units - Electric Resistance (%)	6.04	3.52	5.22	9.16	9.92	9.96	9.94
Sales of space heating units - Fossil (%)	3.02	2.32	0.438	0.019	0	0	0
Sales of space heating units - Gas Furnace (%)	88.9	84.5	55.7	9.03	0.86	0.359	0.36
Sales of water heating units - Electric Heat Pump (%)	0.622	3.21	22.6	47.9	52.2	52.5	52.5
Sales of water heating units - Electric Resistance (%)	5.71	4.94	19	42.9	47.1	47.4	47.4
Sales of water heating units - Gas Furnace (%)	93.3	91.7	58.2	8.97	0.524	0	0
Sales of water heating units - Other (%)	0.34	0.189	0.189	0.191	0.19	0.19	0.19

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)		4.81	4.97	8.01	8.51	7.33	7.63

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	190	187	179	166	151	140	135
Final energy use - Industry (PJ)	680	692	706	721	751	767	776
Final energy use - Residential (PJ)	311	288	267	232	196	169	152
Final energy use - Transportation (PJ)	652	610	534	441	358	306	285

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	5.74	7.82	0	0	0	0
Sales of cooking units - Electric Resistance (%)	67.6	74.5	95.6	99.8	100	100	100
Sales of cooking units - Gas (%)	32.4	25.5	4.36	0.22	0	0	0
Sales of space heating units - Electric Heat Pump (%)	7.14	16.5	45.4	84.9	91.7	92.1	91.9
Sales of space heating units - Electric Resistance (%)	18.1	24.2	17.6	8.04	6.29	6.24	6.46
Sales of space heating units - Fossil (%)	6.08	9.3	6.1	2.21	1.58	1.53	1.49
Sales of space heating units - Gas (%)	68.7	49.9	30.9	4.83	0.406	0.132	0.133
Sales of water heating units - Electric Heat Pump (%)	0	2.32	17.1	34.9	37.8	38	38.1
Sales of water heating units - Electric Resistance (%)	39.3	55.4	55.8	60.8	61.7	61.8	61.7
Sales of water heating units - Gas Furnace (%)	60.6	42.1	26.8	4.14	0.241	0	0
Sales of water heating units - Other (%)	0.101	0.202	0.203	0.203	0.201	0.202	0.203

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million $2018)	0	1,189	3,044	4,939	7,479	8,143	7,762
Public EV charging plugs - DC Fast (1000 units)	0.168	0	2.17	0	9.57	0	15.5
Public EV charging plugs - L2 (1000 units)	0.43	0	52.1	0	230	0	372
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 (%)	1.59	1.85	1.27	0.407	0.075	0.013	0
Vehicle sales - Light-duty - EV (%)	3.79	14.8	45.9	81.6	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.1	78.4	49.4	16.8	3.32	0.591	0
Vehicle sales - Light-duty - hybrid (%)	4.3	4.45	3.17	1.18	0.287	0.063	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.111	0.342	0.206	0.064	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.103	0.099	0.065	0.023	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

Table 6: *E+ scenario - PILLAR 2: Clean Electricity - Generating capacity*

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Biomass power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Biomass w/ccu allam power plant (billion $2018)	0	0	0	0	0.006	0.021	0
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	0	0.909	0
Capital invested - Solar PV - Base (billion $2018)	0	0.952	13.2	19.6	8.1	2.03	2.42
Capital invested - Solar PV - Constrained (billion $2018)	0	1.79	15.2	20	8.27	4.43	1.1
Capital invested - Wind - Base (billion $2018)	0	0	28.7	19.6	12.6	0.095	0
Capital invested - Wind - Constrained (billion $2018)	0	0	9.95	0	0	0	7.78
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed (cumulative) - Rooftop PV (MW)	98.1	147	195	258	334	421	520
Installed (cumulative) - Solar - Base land use assumptions (MW)	128	839	11,858	29,639	37,430	39,496	42,109
Installed (cumulative) - Wind - Base land use assumptions (MW)	3,368	3,368	24,947	40,707	51,343	51,428	51,428

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	6.38	27.4	27.4
Biomass w/ccu power plant (GWh)	0	0	0	0	0	1,020	1,020
Solar - Base land use assumptions (GWh)	245	1,279	19,828	31,904	13,870	3,677	4,552
Solar - Constrained land use assumptions (GWh)	36.1	3,257	31,198	30,308	12,835	3,367	1,578

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

Item	2020	2025	2030	2035	2040	2045	2050
Wind - Base land use assumptions (GWh)	12,511	0	69,770	47,656	30,422	219	0
Wind - Constrained land use assumptions (GWh)	12,511	0	21,947	0	0	0	9,557

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	531	2,880	2,928
Conversion capital investment - Cumulative 5-yr (million $2018)	0	0	0	0	7,842	34,786	704
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	1	2	2
Number of facilities - Beccs hydrogen (quantity)	0	0	0	0	9	46	47
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	1	2	2
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	0	1	1
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	1	2	2
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	1.08	11.5	59.5	60.5
Annual - BECCS (MMT)		0	0	0	10.1	54.7	55.6
Annual - Cement and lime (MMT)		0	0	0	0	3.42	3.53
Annual - NGCC (MMT)		0	0	1.08	1.43	1.45	1.36
Cumulative - All (MMT)		0	0	1.08	12.6	72.1	133
Cumulative - BECCS (MMT)		0	0	0	10.1	64.7	120
Cumulative - Cement and lime (MMT)		0	0	0	0	3.42	6.95
Cumulative - NGCC (MMT)		0	0	1.08	2.51	3.96	5.32

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	499	758	788	2,397	2,712
Cumulative investment - All (million $2018)		0	2,413	2,617	2,670	4,365	4,596
Cumulative investment - Spur (million $2018)		0	57.6	249	302	1,997	2,228
Cumulative investment - Trunk (million $2018)		0	2,355	2,368	2,368	2,368	2,368
Spur (km)		0	34.3	292	321	1,930	2,245
Trunk (km)		0	465	467	467	467	467

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

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	1.1	1.76	3.61	6.02	7.46
Injection wells (wells)		0	1	4	8	13	16
Resource characterization, appraisal, permitting costs (million $2020)		50.6	142	182	182	182	182
Wells and facilities construction costs (million $2020)		0	33.7	131	234	391	485

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)							-1,845
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-7,474
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-234
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-9,552
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-1,845
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-3,936
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-117
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-5,898
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							808
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							3,995
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							425
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							5,228
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							808
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							2,104
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							213
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							3,124

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)							-77.5
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-14,566
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,952
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-2,158
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-168
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-1,834

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,006
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,264
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-3,822
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-1,284
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-38.8
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-3,947
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-325
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-829
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-85.6
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-611
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-702
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-632
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-290
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-433
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-58.2
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-9,255
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,138
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-1,493
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-125
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-1,223
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,354
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-948
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,056
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-858
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							12.7
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							264
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,100
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							62

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							191
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							83.6
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							109
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							426
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							2,248
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							6.34
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							248
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							422
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							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)							100
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							41.8
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							18.8
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							258
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,125
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							9.51
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							256
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							761
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							46.6
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)							145

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							62.7
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							136
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							519
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,936

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		661	557	447	336	212	147
Natural gas consumption - Cumulative (tcf)		0	0	0	0	0	13,461
Natural gas production - Annual (tcf)		6.17	5.83	5.08	4.3	3.41	2.65
Oil consumption - Annual (million bbls)		125	109	84.3	61.1	42.8	28
Oil consumption - Cumulative (million bbls)		0	0	0	0	0	2,596
Oil production - Annual (million bbls)		2.18	2.19	2.19	1.73	1.41	0.937

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		822	1	0.991	0.866	0.63	0.056
Monetary damages from air pollution - Natural Gas (million 2019$)		203	153	103	88.6	48	19.9
Monetary damages from air pollution - Transportation (million 2019$)		1,813	1,690	1,283	740	339	136
Premature deaths from air pollution - Coal (deaths)		92.9	0.113	0.112	0.098	0.071	0.006
Premature deaths from air pollution - Natural Gas (deaths)		22.9	17.2	11.6	10	5.42	2.25
Premature deaths from air pollution - Transportation (deaths)		204	190	144	83.2	38.1	15.3

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		2,024	2,048	1,949	1,792	3,432	2,767
By economic sector - Construction (jobs)		8,136	25,157	36,051	33,704	29,553	28,716
By economic sector - Manufacturing (jobs)		10,527	13,063	17,489	16,961	14,999	17,931
By economic sector - Mining (jobs)		3,873	2,301	1,595	1,045	704	486
By economic sector - Other (jobs)		572	3,173	5,274	4,739	4,029	4,326
By economic sector - Pipeline (jobs)		751	905	535	409	381	291
By economic sector - Professional (jobs)		4,717	13,008	19,560	20,564	21,999	21,593
By economic sector - Trade (jobs)		4,346	8,197	11,831	11,692	11,188	11,331
By economic sector - Utilities (jobs)		9,913	17,094	25,225	27,186	25,731	25,200
By education level - All sectors - Associates degree or some college (jobs)		13,562	26,706	38,008	37,704	35,117	35,463
By education level - All sectors - Bachelors degree (jobs)		9,014	16,787	23,650	23,751	22,963	23,140
By education level - All sectors - Doctoral degree (jobs)		273	629	907	924	948	935
By education level - All sectors - High school diploma or less (jobs)		19,913	36,668	51,006	49,683	47,037	47,162

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

Item	2020	2025	2030	2035	2040	2045	2050
By education level - All sectors - Masters or professional degree (jobs)		2,096	4,156	5,938	6,031	5,950	5,942
By resource sector - Biomass (jobs)		4,782	4,683	4,346	4,688	12,609	12,142
By resource sector - CO2 (jobs)		26.8	2,275	376	439	1,369	1,311
By resource sector - Coal (jobs)		4,776	1,153	227	191	168	148
By resource sector - Grid (jobs)		10,883	24,844	43,681	48,041	46,064	46,682
By resource sector - Natural Gas (jobs)		7,694	6,136	5,869	5,252	3,344	2,042
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		6,069	4,885	3,582	2,434	1,622	998
By resource sector - Solar (jobs)		4,858	19,592	30,562	23,628	17,533	20,963
By resource sector - Wind (jobs)		5,769	21,376	30,866	33,420	29,305	28,356
Median wages - Annual - All ($2019 per job)		56,477	57,177	58,000	59,270	60,370	61,031
On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs)		7,007	13,782	19,527	19,321	17,988	18,078
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)		2,728	5,859	8,316	8,215	7,608	7,519
On-Site or In-Plant Training - Total jobs - None (jobs)		7,125	13,838	19,505	19,290	18,426	18,533
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)		375	752	1,067	1,057	981	984
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)		27,623	50,713	71,093	70,209	67,012	67,527
On-the-Job Training - All sectors - 1 to 4 years (jobs)		8,896	17,748	25,196	24,979	23,201	23,295
On-the-Job Training - All sectors - 4 to 10 years (jobs)		2,609	5,792	8,270	8,169	7,537	7,438
On-the-Job Training - All sectors - None (jobs)		2,402	4,634	6,510	6,363	6,047	6,097
On-the-Job Training - All sectors - Over 10 years (jobs)		426	845	1,175	1,130	1,024	1,044
On-the-Job Training - All sectors - Up to 1 year (jobs)		30,525	55,925	78,358	77,451	74,205	74,768
Related work experience - All sectors - 1 to 4 years (jobs)		15,860	30,032	42,402	42,159	40,127	40,307
Related work experience - All sectors - 4 to 10 years (jobs)		10,041	19,539	27,638	27,490	25,888	26,035
Related work experience - All sectors - None (jobs)		6,587	12,383	17,356	17,095	16,244	16,290
Related work experience - All sectors - Over 10 years (jobs)		2,744	5,136	7,247	7,202	6,749	6,859
Related work experience - All sectors - Up to 1 year (jobs)		9,626	17,855	24,867	24,146	23,007	23,152
Wage income - All (million $2019)		2,534	4,857	6,932	7,000	6,763	6,875

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)	0	19,992	21,841	0	0	0	0
Sales of cooking units - Electric Resistance (%)	41	45.8	49.8	60.5	75.4	84.5	87.7
Sales of cooking units - Gas (%)	59	54.2	50.2	39.5	24.6	15.5	12.3
Sales of space heating units - Electric Heat Pump (%)	2.05	6.96	10.3	20.9	43.5	68.9	83
Sales of space heating units - Electric Resistance (%)	6.04	3.45	3.62	4.3	5.98	8.09	9.31
Sales of space heating units - Fossil (%)	3.02	2.68	2.47	1.87	0.951	0.308	0.081
Sales of space heating units - Gas Furnace (%)	88.9	86.9	83.6	72.9	49.6	22.7	7.57

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of water heating units - Electric Heat Pump (%)	0.622	1.14	3.37	10.3	24.6	40.1	48.5
Sales of water heating units - Electric Resistance (%)	5.71	3.86	5.44	10.7	22.3	35.9	43.7
Sales of water heating units - Gas Furnace (%)	93.3	94.8	91	78.8	52.9	23.8	7.64
Sales of water heating units - Other (%)	0.34	0.189	0.189	0.191	0.19	0.19	0.19

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)		4.04	4.11	5.15	5.33	7.04	7.41

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	190	187	183	179	172	164	155
Final energy use - Industry (PJ)	680	693	708	728	762	777	784
Final energy use - Residential (PJ)	311	289	273	257	238	214	188
Final energy use - Transportation (PJ)	653	615	559	514	480	439	392

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	5.71	7.71	0	0	0	0
Sales of cooking units - Electric Resistance (%)	67.5	68.3	71.3	79.1	90.1	96.8	99.1
Sales of cooking units - Gas (%)	32.5	31.7	28.7	20.9	9.94	3.21	0.863
Sales of space heating units - Electric Heat Pump (%)	7.14	13.6	16.9	27.4	49.2	73	86
Sales of space heating units - Electric Resistance (%)	18.1	24.8	24	21.6	16.2	10.6	7.72
Sales of space heating units - Fossil (%)	6.08	9.67	9.33	8.18	5.9	3.46	2.13
Sales of space heating units - Gas (%)	68.7	51.9	49.7	42.9	28.7	12.9	4.2
Sales of water heating units - Electric Heat Pump (%)	0	0.608	2.31	7.59	18.2	29.3	35.3
Sales of water heating units - Electric Resistance (%)	39.3	55.7	55.6	55.8	57.2	59.4	61
Sales of water heating units - Gas Furnace (%)	60.6	43.5	41.9	36.4	24.4	11	3.54
Sales of water heating units - Other (%)	0.101	0.202	0.203	0.204	0.204	0.204	0.204

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million $2018)	0	0	192	404	1,364	4,297	6,258
Public EV charging plugs - DC Fast (1000 units)	0.168	0	0.662	0	3.54	0	9.92
Public EV charging plugs - L2 (1000 units)	0.43	0	15.9	0	85.2	0	238
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 (%)	1.6	2	2.06	1.64	1.05	0.542	0.232

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Light-duty - EV (%)	1.85	4.59	11.7	25.5	48	71.8	87.5
Vehicle sales - Light-duty - gasoline (%)	91.9	87.6	79.9	67.1	46.6	25.1	11.1
Vehicle sales - Light-duty - hybrid (%)	4.46	5.27	5.93	5.42	4.08	2.42	1.18
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.381	0.328	0.251	0.179	0.099	0.046
Vehicle sales - Light-duty - other (%)	0.105	0.108	0.098	0.086	0.062	0.034	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)							-1,845
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-7,474
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-234
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-9,552
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-1,845
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-3,936
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-117
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-5,898
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							808
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							3,995
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							425
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							5,228
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							808
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							2,104
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							213

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							3,124

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)							-77.5
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-14,566
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,952
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-2,158
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-168
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-1,834
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,006
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,264
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-3,822
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-1,284
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-38.8
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-3,947
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-325
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-829
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-85.6
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-611
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-702
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-632
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-290
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-433
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-58.2
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-9,255
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,138
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-1,493
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-125
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-1,223
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,354

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-948
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,056
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-858
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							12.7
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							264
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,100
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							62
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)							191
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							83.6
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							109
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							426
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							2,248
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							6.34
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							248
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							422
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							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)							100
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							41.8
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							18.8
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							258

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,125
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							9.51
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							256
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							761
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							46.6
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)							145
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							62.7
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							136
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							519
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,936

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		822	1	0.991	0.866	0.63	0.056
Monetary damages from air pollution - Natural Gas (million 2019$)		213	138	58.6	27	9.17	6.15
Monetary damages from air pollution - Transportation (million 2019$)		1,843	1,859	1,807	1,625	1,292	887
Premature deaths from air pollution - Coal (deaths)		92.9	0.113	0.112	0.098	0.071	0.006
Premature deaths from air pollution - Natural Gas (deaths)		24.1	15.6	6.61	3.05	1.03	0.695
Premature deaths from air pollution - Transportation (deaths)		207	209	203	183	145	99.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)	0	19,994	21,829	0	0	0	0
Sales of cooking units - Electric Resistance (%)	41	54.2	82.9	88.6	88.9	88.9	88.9
Sales of cooking units - Gas (%)	59	45.8	17.1	11.4	11.1	11.1	11.1
Sales of space heating units - Electric Heat Pump (%)	2.05	9.66	38.6	81.8	89.2	89.7	89.7
Sales of space heating units - Electric Resistance (%)	6.04	3.52	5.22	9.16	9.92	9.96	9.94
Sales of space heating units - Fossil (%)	3.02	2.32	0.438	0.019	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Gas Furnace (%)	88.9	84.5	55.7	9.03	0.86	0.359	0.36
Sales of water heating units - Electric Heat Pump (%)	0.622	3.21	22.6	47.9	52.2	52.5	52.5
Sales of water heating units - Electric Resistance (%)	5.71	4.94	19	42.9	47.1	47.4	47.4
Sales of water heating units - Gas Furnace (%)	93.3	91.7	58.2	8.97	0.524	0	0
Sales of water heating units - Other (%)	0.34	0.189	0.189	0.191	0.19	0.19	0.19

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)		4.81	4.97	8.01	8.51	7.33	7.63

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	190	187	179	166	151	140	135
Final energy use - Industry (PJ)	680	692	706	721	751	767	776
Final energy use - Residential (PJ)	311	288	267	232	196	169	152
Final energy use - Transportation (PJ)	652	610	534	441	358	306	285

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	5.74	7.82	0	0	0	0
Sales of cooking units - Electric Resistance (%)	67.6	74.5	95.6	99.8	100	100	100
Sales of cooking units - Gas (%)	32.4	25.5	4.36	0.22	0	0	0
Sales of space heating units - Electric Heat Pump (%)	7.14	16.5	45.4	84.9	91.7	92.1	91.9
Sales of space heating units - Electric Resistance (%)	18.1	24.2	17.6	8.04	6.29	6.24	6.46
Sales of space heating units - Fossil (%)	6.08	9.3	6.1	2.21	1.58	1.53	1.49
Sales of space heating units - Gas (%)	68.7	49.9	30.9	4.83	0.406	0.132	0.133
Sales of water heating units - Electric Heat Pump (%)	0	2.32	17.1	34.9	37.8	38	38.1
Sales of water heating units - Electric Resistance (%)	39.3	55.4	55.8	60.8	61.7	61.8	61.7
Sales of water heating units - Gas Furnace (%)	60.6	42.1	26.8	4.14	0.241	0	0
Sales of water heating units - Other (%)	0.101	0.202	0.203	0.203	0.201	0.202	0.203

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million $2018)	0	1,189	3,044	4,939	7,479	8,143	7,762
Public EV charging plugs - DC Fast (1000 units)	0.168	0	2.17	0	9.57	0	15.5
Public EV charging plugs - L2 (1000 units)	0.43	0	52.1	0	230	0	372
Vehicle sales - Heavy-duty - diesel (%)	97.2	92.1	67	23.3	4.22	0.628	0
Vehicle sales - Heavy-duty - EV (%)	0.588	3.81	19	45.6	57.4	59.6	60
Vehicle sales - Heavy-duty - gasoline (%)	0.227	0.227	0.176	0.066	0.013	0.002	0
Vehicle sales - Heavy-duty - hybrid (%)	0.082	0.09	0.077	0.031	0.007	0.001	0
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.392	2.54	12.7	30.4	38.2	39.7	40

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

Item	2020	2025	2030	2035	2040	2045	2050
Vehicle sales - Heavy-duty - other (%)	1.5	1.23	1.07	0.568	0.163	0.038	0
Vehicle sales - Light-duty - diesel (%)	1.59	1.85	1.27	0.407	0.075	0.013	0
Vehicle sales - Light-duty - EV (%)	3.79	14.8	45.9	81.6	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.1	78.4	49.4	16.8	3.32	0.591	0
Vehicle sales - Light-duty - hybrid (%)	4.3	4.45	3.17	1.18	0.287	0.063	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.111	0.342	0.206	0.064	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.103	0.099	0.065	0.023	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Capital invested - Solar PV - Base (billion $2018)	0	6.9	19.5	15.4	2.85	5.57	54.9
Capital invested - Wind - Base (billion $2018)	0	0	36.8	24.1	1.13	0	0
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	0	0
Installed (cumulative) - Solar - Base land use assumptions (MW)	128	5,277	21,597	35,586	38,324	43,997	103,295
Installed (cumulative) - Wind - Base land use assumptions (MW)	3,368	3,368	31,037	50,472	51,428	51,428	51,428

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	245	9,278	29,360	25,060	4,791	9,692	106,429
Solar - Constrained land use assumptions (GWh)	245	11,719	16,065	11,874	4,989	3,681	140,455
Wind - Base land use assumptions (GWh)	12,511	0	88,473	57,025	2,570	0	0
Wind - Constrained land use assumptions (GWh)	12,511	0	21,947	0	0	0	143,283

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)							-1,845
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-7,474
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-234
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-9,552
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-1,845
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-3,936

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-117
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-5,898
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							808
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							3,995
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							425
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							5,228
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							808
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							2,104
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							213
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							3,124

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)							-77.5
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-14,566
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,952
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-2,158
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-168
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-1,834
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,006
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,264
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-3,822
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-1,284
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-38.8
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-3,947
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-325
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-829

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-85.6
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-611
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-702
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-632
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-290
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-433
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-58.2
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-9,255
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,138
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-1,493
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-125
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-1,223
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,354
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-948
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,056
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-858
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							12.7
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							264
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,100
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							62
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)							191
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							83.6
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							109
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							426
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							2,248

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							6.34
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							248
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							422
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							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)							100
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							41.8
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							18.8
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							258
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,125
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							9.51
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							256
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							761
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							46.6
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)							145
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							62.7
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							136
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							519
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,936

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		822	1	0.991	0.866	0.63	0.056

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Natural Gas (million 2019$)		210	143	83.1	57.1	19.8	5.12
Monetary damages from air pollution - Transportation (million 2019$)		1,813	1,690	1,283	740	339	136
Premature deaths from air pollution - Coal (deaths)		92.9	0.113	0.112	0.098	0.071	0.006
Premature deaths from air pollution - Natural Gas (deaths)		23.7	16.1	9.39	6.45	2.23	0.578
Premature deaths from air pollution - Transportation (deaths)		204	190	144	83.2	38.1	15.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)	0	19,994	21,829	0	0	0	0
Sales of cooking units - Electric Resistance (%)	41	54.2	82.9	88.6	88.9	88.9	88.9
Sales of cooking units - Gas (%)	59	45.8	17.1	11.4	11.1	11.1	11.1
Sales of space heating units - Electric Heat Pump (%)	2.05	9.66	38.6	81.8	89.2	89.7	89.7
Sales of space heating units - Electric Resistance (%)	6.04	3.52	5.22	9.16	9.92	9.96	9.94
Sales of space heating units - Fossil (%)	3.02	2.32	0.438	0.019	0	0	0
Sales of space heating units - Gas Furnace (%)	88.9	84.5	55.7	9.03	0.86	0.359	0.36
Sales of water heating units - Electric Heat Pump (%)	0.622	3.21	22.6	47.9	52.2	52.5	52.5
Sales of water heating units - Electric Resistance (%)	5.71	4.94	19	42.9	47.1	47.4	47.4
Sales of water heating units - Gas Furnace (%)	93.3	91.7	58.2	8.97	0.524	0	0
Sales of water heating units - Other (%)	0.34	0.189	0.189	0.191	0.19	0.19	0.19

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)		4.81	4.97	8.01	8.51	7.33	7.63

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	190	187	179	166	151	140	135
Final energy use - Industry (PJ)	680	692	706	721	751	767	776
Final energy use - Residential (PJ)	311	288	267	232	196	169	152
Final energy use - Transportation (PJ)	652	610	534	441	358	306	285

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	5.74	7.82	0	0	0	0
Sales of cooking units - Electric Resistance (%)	67.6	74.5	95.6	99.8	100	100	100
Sales of cooking units - Gas (%)	32.4	25.5	4.36	0.22	0	0	0
Sales of space heating units - Electric Heat Pump (%)	7.14	16.5	45.4	84.9	91.7	92.1	91.9
Sales of space heating units - Electric Resistance (%)	18.1	24.2	17.6	8.04	6.29	6.24	6.46

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of space heating units - Fossil (%)	6.08	9.3	6.1	2.21	1.58	1.53	1.49
Sales of space heating units - Gas (%)	68.7	49.9	30.9	4.83	0.406	0.132	0.133
Sales of water heating units - Electric Heat Pump (%)	0	2.32	17.1	34.9	37.8	38	38.1
Sales of water heating units - Electric Resistance (%)	39.3	55.4	55.8	60.8	61.7	61.8	61.7
Sales of water heating units - Gas Furnace (%)	60.6	42.1	26.8	4.14	0.241	0	0
Sales of water heating units - Other (%)	0.101	0.202	0.203	0.203	0.201	0.202	0.203

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million $2018)	0	1,189	3,044	4,939	7,479	8,143	7,762
Public EV charging plugs - DC Fast (1000 units)	0.168	0	2.17	0	9.57	0	15.5
Public EV charging plugs - L2 (1000 units)	0.43	0	52.1	0	230	0	372
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 (%)	1.59	1.85	1.27	0.407	0.075	0.013	0
Vehicle sales - Light-duty - EV (%)	3.79	14.8	45.9	81.6	96.3	99.3	100
Vehicle sales - Light-duty - gasoline (%)	90.1	78.4	49.4	16.8	3.32	0.591	0
Vehicle sales - Light-duty - hybrid (%)	4.3	4.45	3.17	1.18	0.287	0.063	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.111	0.342	0.206	0.064	0.013	0.002	0
Vehicle sales - Light-duty - other (%)	0.103	0.099	0.065	0.023	0.004	0.001	0
Vehicle sales - Medium-duty - diesel (%)	64.7	59.7	42.3	14.4	2.59	0.384	0
Vehicle sales - Medium-duty - EV (%)	0.784	5.07	25.3	60.8	76.5	79.5	80
Vehicle sales - Medium-duty - gasoline (%)	33.7	33.3	25.5	9.32	1.77	0.277	0
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.402	0.341	0.14	0.03	0.005	0
Vehicle sales - Medium-duty - hydrogen FC (%)	0.196	1.27	6.33	15.2	19.1	19.9	20
Vehicle sales - Medium-duty - other (%)	0.253	0.255	0.205	0.083	0.019	0.004	0

Table 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	2.53	5.35	4.05	2.84	0.454
Capital invested - Solar PV - Constrained (billion $2018)		0	3.23	5.34	3.48	4.56	0.08
Capital invested - Wind - Base (billion $2018)		0.955	10.4	0	2.02	0.645	0.849
Capital invested - Wind - Constrained (billion $2018)		0	2.48	0	1.74	0.35	0.394

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

Item	2020	2025	2030	2035	2040	2045	2050
Solar - Base land use assumptions (GWh)	245	0	3,769	8,731	7,022	5,183	870
Solar - Constrained land use assumptions (GWh)	245	0	4,836	8,692	6,008	8,353	155
Wind - Base land use assumptions (GWh)	12,511	2,180	25,818	0	5,506	1,848	2,559
Wind - Constrained land use assumptions (GWh)	12,511	0	5,689	0	4,401	937	1,089

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)							-1,845
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-7,474
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-234
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-9,552
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-1,845
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-3,936
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-117
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-5,898
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							808
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							3,995
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							425
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							5,228
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							808
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							2,104
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							213
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							3,124

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)							-77.5
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-14,566
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,952
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-2,158
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-168
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-1,834

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,006
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,264
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-3,822
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-1,284
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-38.8
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-3,947
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-325
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-829
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-85.6
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-611
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-702
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-632
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-290
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-433
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-58.2
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-9,255
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,138
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-1,493
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-125
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-1,223
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,354
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-948
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,056
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-858
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							12.7
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							264
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,100
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							62

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							191
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							83.6
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							109
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							426
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							2,248
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							6.34
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							248
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							422
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							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)							100
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							41.8
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							18.8
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							258
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,125
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							9.51
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							256
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							761
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							46.6
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)							145

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							62.7
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							136
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							519
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,936

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		822	1	0.991	0.866	0.63	0.056
Monetary damages from air pollution - Natural Gas (million 2019$)		188	118	140	103	35.4	11.2
Monetary damages from air pollution - Transportation (million 2019$)		1,813	1,690	1,283	740	339	136
Premature deaths from air pollution - Coal (deaths)		92.9	0.113	0.112	0.098	0.071	0.006
Premature deaths from air pollution - Natural Gas (deaths)		21.2	13.3	15.8	11.6	3.99	1.26
Premature deaths from air pollution - Transportation (deaths)		204	190	144	83.2	38.1	15.3

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)	0	19,992	21,841	0	0	0	0
Sales of cooking units - Electric Resistance (%)	41	45.8	49.8	60.5	75.4	84.5	87.7
Sales of cooking units - Gas (%)	59	54.2	50.2	39.5	24.6	15.5	12.3
Sales of space heating units - Electric Heat Pump (%)	2.05	6.96	10.3	20.9	43.5	68.9	83
Sales of space heating units - Electric Resistance (%)	6.04	3.45	3.62	4.3	5.98	8.09	9.31
Sales of space heating units - Fossil (%)	3.02	2.68	2.47	1.87	0.951	0.308	0.081
Sales of space heating units - Gas Furnace (%)	88.9	86.9	83.6	72.9	49.6	22.7	7.57
Sales of water heating units - Electric Heat Pump (%)	0.622	1.14	3.37	10.3	24.6	40.1	48.5
Sales of water heating units - Electric Resistance (%)	5.71	3.86	5.44	10.7	22.3	35.9	43.7
Sales of water heating units - Gas Furnace (%)	93.3	94.8	91	78.8	52.9	23.8	7.64
Sales of water heating units - Other (%)	0.34	0.189	0.189	0.191	0.19	0.19	0.19

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)		4.04	4.11	5.15	5.33	7.04	7.41

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	190	187	183	179	172	164	155

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	680	693	708	728	762	777	784
Final energy use - Residential (PJ)	311	289	273	257	238	214	188
Final energy use - Transportation (PJ)	653	615	559	514	480	439	392

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	5.71	7.71	0	0	0	0
Sales of cooking units - Electric Resistance (%)	67.5	68.3	71.3	79.1	90.1	96.8	99.1
Sales of cooking units - Gas (%)	32.5	31.7	28.7	20.9	9.94	3.21	0.863
Sales of space heating units - Electric Heat Pump (%)	7.14	13.6	16.9	27.4	49.2	73	86
Sales of space heating units - Electric Resistance (%)	18.1	24.8	24	21.6	16.2	10.6	7.72
Sales of space heating units - Fossil (%)	6.08	9.67	9.33	8.18	5.9	3.46	2.13
Sales of space heating units - Gas (%)	68.7	51.9	49.7	42.9	28.7	12.9	4.2
Sales of water heating units - Electric Heat Pump (%)	0	0.608	2.31	7.59	18.2	29.3	35.3
Sales of water heating units - Electric Resistance (%)	39.3	55.7	55.6	55.8	57.2	59.4	61
Sales of water heating units - Gas Furnace (%)	60.6	43.5	41.9	36.4	24.4	11	3.54
Sales of water heating units - Other (%)	0.101	0.202	0.203	0.204	0.204	0.204	0.204

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

Item	2020	2025	2030	2035	2040	2045	2050
Light-duty vehicle capital costs - Cumulative 5-yr (million $2018)	0	0	192	404	1,364	4,297	6,258
Public EV charging plugs - DC Fast (1000 units)	0.168	0	0.662	0	3.54	0	9.92
Public EV charging plugs - L2 (1000 units)	0.43	0	15.9	0	85.2	0	238
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 (%)	1.6	2	2.06	1.64	1.05	0.542	0.232
Vehicle sales - Light-duty - EV (%)	1.85	4.59	11.7	25.5	48	71.8	87.5
Vehicle sales - Light-duty - gasoline (%)	91.9	87.6	79.9	67.1	46.6	25.1	11.1
Vehicle sales - Light-duty - hybrid (%)	4.46	5.27	5.93	5.42	4.08	2.42	1.18
Vehicle sales - Light-duty - hydrogen FC (%)	0.113	0.381	0.328	0.251	0.179	0.099	0.046
Vehicle sales - Light-duty - other (%)	0.105	0.108	0.098	0.086	0.062	0.034	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	0.009	0	0
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	0.001	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	9.16	9.16	9.16
Biomass w/ccu power plant (GWh)	0	0	0	0	0.958	0.958	0.958

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	1,634	4,541	9,183	9,183
Conversion capital investment - Cumulative 5-yr (million $2018)	0	0	0	16,160	28,771	45,905	0
Number of facilities - Allam power w ccu (quantity)	0	0	0	0	1	1	1
Number of facilities - Beccs hydrogen (quantity)	0	0	0	19	52	105	105
Number of facilities - Diesel (quantity)	0	0	0	0	0	0	0
Number of facilities - Diesel ccu (quantity)	0	0	0	0	1	1	1
Number of facilities - Power (quantity)	0	0	0	0	0	0	0
Number of facilities - Power ccu (quantity)	0	0	0	0	1	1	1
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	1	1	1
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	20.8	57.7	120	120
Annual - BECCS (MMT)		0	0	20.8	57.7	117	117
Annual - Cement and lime (MMT)		0	0	0	0	3.42	3.53
Annual - NGCC (MMT)		0	0	0	0	0	0
Cumulative - All (MMT)		0	0	20.8	78.5	199	319
Cumulative - BECCS (MMT)		0	0	20.8	78.5	195	312
Cumulative - Cement and lime (MMT)		0	0	0	0	3.42	6.95
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	499	518	1,642	3,995	4,659
Cumulative investment - All (million $2018)		0	2,487	2,637	3,825	7,043	7,503
Cumulative investment - Spur (million $2018)		0	130	265	1,323	4,317	4,777
Cumulative investment - Trunk (million $2018)		0	2,358	2,372	2,502	2,726	2,726
Spur (km)		0	34.3	51.8	1,171	3,524	4,188
Trunk (km)		0	465	467	471	471	471

Table 55: *E-B+ scenario - PILLAR 4: CCUS - CO2 storage*

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	1.85	7.49	14.3	19.7	20.1
Injection wells (wells)		0	3	13	23	39	49
Resource characterization, appraisal, permitting costs (million $2020)		50.6	222	344	344	344	344
Wells and facilities construction costs (million $2020)		0	101	394	701	1,173	1,456

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-2,302
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-6,796
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)							-211
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-9,309
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-2,302
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-3,578
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)							-105
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-5,986
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							1,204
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							8,939
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							400
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							67.8
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							383
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							10,994

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							1,204
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							1,906
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							400
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							67.8
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							192
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							3,769

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)							-77.5
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-14,566
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,952
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-2,158
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-168
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-1,834
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,006
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,264
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-3,822
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-1,284
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-38.8
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-3,947
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-325
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-829
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-85.6
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-611
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-702
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-632
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-290
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-433

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-58.2
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-9,255
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,138
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-1,493
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-125
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-1,223
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,354
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-948
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,056
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-858
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							12.7
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							264
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,100
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							62
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)							191
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							83.6
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							109
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							426
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							2,248
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							6.34
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							248
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							422
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							31

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares)							100
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							41.8
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							18.8
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							258
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,125
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							9.51
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							256
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							761
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							46.6
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)							145
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							62.7
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							136
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							519
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,936

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		822	1	0.991	0.866	0.63	0.056
Monetary damages from air pollution - Natural Gas (million 2019$)		222	127	73.6	51.7	26.7	8.73
Monetary damages from air pollution - Transportation (million 2019$)		1,843	1,859	1,807	1,625	1,292	887
Premature deaths from air pollution - Coal (deaths)		92.9	0.113	0.112	0.098	0.071	0.006
Premature deaths from air pollution - Natural Gas (deaths)		25.1	14.4	8.31	5.84	3.01	0.985
Premature deaths from air pollution - Transportation (deaths)		207	209	203	183	145	99.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Commercial HVAC investment in 2020s - Cumulative 5-yr (million $2018)	0	19,774	20,475	0	0	0	0
Sales of cooking units - Electric Resistance (%)	41	44.2	44.3	44.3	44.3	44.4	44.5
Sales of cooking units - Gas (%)	59	55.8	55.7	55.7	55.7	55.6	55.5
Sales of space heating units - Electric Heat Pump (%)	2.05	13.1	45	71.1	75.4	75.9	75.9
Sales of space heating units - Electric Resistance (%)	6.04	4.34	8.93	17.2	22.8	23.7	23.7
Sales of space heating units - Fossil (%)	3.02	2.48	1.25	0.221	0.025	0.001	0
Sales of space heating units - Gas Furnace (%)	88.9	80.1	44.8	11.5	1.77	0.439	0.36
Sales of water heating units - Electric Heat Pump (%)	0.622	0.346	0.35	0.35	0.344	0.346	0.347
Sales of water heating units - Electric Resistance (%)	5.71	3.27	3.23	3.24	3.22	3.2	3.2
Sales of water heating units - Gas Furnace (%)	93.3	96.2	96.2	96.2	96.3	96.3	96.3
Sales of water heating units - Other (%)	0.34	0.189	0.189	0.191	0.19	0.19	0.19

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)		4.26	4.35	4.69	4.81	5.72	5.94

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	190	190	188	184	179	179	183
Final energy use - Industry (PJ)	681	703	718	717	727	733	738
Final energy use - Residential (PJ)	311	289	277	269	264	262	259
Final energy use - Transportation (PJ)	653	615	563	533	532	548	569

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	5.46	5.93	0	0	0	0
Sales of cooking units - Electric Resistance (%)	67.2	67.2	67.2	67.2	67.2	67.2	67.2
Sales of cooking units - Gas (%)	32.8	32.8	32.8	32.8	32.8	32.8	32.8
Sales of space heating units - Electric Heat Pump (%)	5.73	19.2	19.7	20.7	21.5	22.5	23.7
Sales of space heating units - Electric Resistance (%)	18.5	23.4	23.1	22.7	21.9	20.9	19.8
Sales of space heating units - Fossil (%)	6.24	8.46	8.19	7.99	8.01	8.01	8.02
Sales of space heating units - Gas (%)	69.5	49	48.9	48.6	48.6	48.6	48.5
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	39.3	55.6	55.5	55.3	55.3	55.2	55.1
Sales of water heating units - Gas Furnace (%)	60.6	44.2	44.3	44.5	44.5	44.6	44.7
Sales of water heating units - Other (%)	0.101	0.202	0.203	0.204	0.204	0.205	0.206

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 (%)	1.59	2	2.19	2.04	1.84	1.71	1.63
Vehicle sales - Light-duty - EV (%)	3.44	5.44	6.21	7.63	9.3	10.8	12
Vehicle sales - Light-duty - gasoline (%)	90.4	86.9	84.8	83	81	79	77.4
Vehicle sales - Light-duty - hybrid (%)	4.32	5.17	6.34	6.91	7.48	8.08	8.56
Vehicle sales - Light-duty - hydrogen FC (%)	0.111	0.378	0.348	0.31	0.307	0.308	0.319
Vehicle sales - Light-duty - other (%)	0.104	0.108	0.104	0.105	0.104	0.103	0.106
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)							-77.5
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-14,566
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-1,952
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-2,158
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-168
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-1,834
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-2,006
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-1,264
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-3,822
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-1,284
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-38.8
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-3,947
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-325
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-829
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-85.6
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-611
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-702
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-632

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-290
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-433
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-58.2
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-9,255
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-1,138
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-1,493
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-125
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-1,223
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-1,354
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-948
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-2,056
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-858
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							12.7
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							264
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							1,100
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							62
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)							191
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							83.6
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							109
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							426
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							2,248
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							6.34
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							248
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							422

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							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)							100
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							41.8
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							18.8
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							258
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							1,125
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							9.51
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							256
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							761
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							46.6
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)							145
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							62.7
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							136
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							519
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							1,936

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)	-6.5		-4.24				-3.79
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.499		-0.898				-0.933
Business-as-usual carbon sink - Total (Mt CO2e/y)	-7		-5.14				-4.73

Table 66: *REF scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		2,667	1,763	1,360	1,160	1,089	1,064
Monetary damages from air pollution - Natural Gas (million 2019$)		202	233	287	306	265	235
Monetary damages from air pollution - Transportation (million 2019$)		1,842	1,885	1,926	1,975	2,025	2,076
Premature deaths from air pollution - Coal (deaths)		301	199	154	131	123	120
Premature deaths from air pollution - Natural Gas (deaths)		22.8	26.3	32.3	34.5	29.9	26.5
Premature deaths from air pollution - Transportation (deaths)		207	212	217	222	228	234