Net-Zero America - delaware state report

2021-03-05

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

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Notes

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

Data by category and subcategory

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	3,472	3,883	0	0	0	0
Sales of cooking units - Electric Resistance (%)	32	46	79.9	86.5	86.9	86.9	86.9
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Sales of space heating units - Electric Heat Pump (%)	1.53	28.2	70.6	83.7	85	85.1	85.1
Sales of space heating units - Electric Resistance (%)	1.94	8.4	10.6	12.7	13.1	13.1	13.1
Sales of space heating units - Fossil (%)	12.2	4.23	0.808	0.035	0	0	0
Sales of space heating units - Gas Furnace (%)	84.3	59.2	18.1	3.53	1.88	1.85	1.84
Sales of water heating units - Electric Heat Pump (%)	0.078	10.5	54.6	64.4	64.9	64.9	64.9
Sales of water heating units - Electric Resistance (%)	1.96	10.8	28.3	32.2	32.4	32.4	32.4
Sales of water heating units - Gas Furnace (%)	93.3	74.5	14.1	0.593	0	0	0
Sales of water heating units - Other (%)	4.67	4.25	3.03	2.72	2.72	2.72	2.71

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)		0.526	0.536	0.919	0.973	0.907	0.947

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	29.9	29.8	28.5	26.5	24.9	24.3	24.6
Final energy use - Industry (PJ)	16	16.3	16.6	16.9	17.1	17.5	18
Final energy use - Residential (PJ)	41.7	39.3	35.9	31.4	27.7	25.3	24.4
Final energy use - Transportation (PJ)	81.4	75.7	67	56.1	46.1	40	37.3

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	0.774	0.771	0	0	0	0
Sales of cooking units - Electric Resistance (%)	50.1	60.7	93.3	99.7	100	100	100
Sales of cooking units - Gas (%)	49.9	39.3	6.72	0.338	0	0	0
Sales of space heating units - Electric Heat Pump (%)	14.3	32.1	79.9	90.6	91	91	91
Sales of space heating units - Electric Resistance (%)	9.9	10.8	4.53	3.11	3.02	3.06	3.07
Sales of space heating units - Fossil (%)	20.5	26.2	6.99	2.7	2.51	2.5	2.49
Sales of space heating units - Gas (%)	55.3	30.9	8.61	3.64	3.44	3.45	3.44
Sales of water heating units - Electric Heat Pump (%)	0	9.43	49.9	59	59.4	59.4	59.4
Sales of water heating units - Electric Resistance (%)	30.2	45.9	40.3	39	38.9	38.9	38.9
Sales of water heating units - Gas Furnace (%)	65.2	41.3	7.81	0.329	0	0	0
Sales of water heating units - Other (%)	4.6	3.33	1.97	1.68	1.67	1.69	1.7

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	193	496	803	1,217	1,325	1,263
Public EV charging plugs - DC Fast (1000 units)	0.065	0	0.324	0	1.42	0	2.3
Public EV charging plugs - L2 (1000 units)	0.118	0	7.8	0	34.2	0	55.3
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 (%)	1.43	1.71	1.21	0.386	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.31	16.4	48.3	82.5	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.2	76.6	46.9	15.8	3.2	0.587	0
Vehicle sales - Light-duty - hybrid (%)	4.8	4.82	3.34	1.23	0.301	0.066	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.333	0.194	0.06	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.096	0.092	0.059	0.021	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	0	0
Capital invested - Biomass w/ccu power plant (billion $2018)	0	0	0	0	0	0	0
Capital invested - Offshore Wind - Base (billion $2018)	0	0	0	0	0	5.99	5.64
Capital invested - Offshore Wind - Constrained (billion $2018)	0	0	0	0	0	3.3	8.06
Capital invested - Solar PV - Base (billion $2018)	0	0.167	0.173	0.318	0	0	0
Capital invested - Solar PV - Constrained (billion $2018)	0	0.144	0.276	0.328	0	0	0
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	0	4,059	8,319
Installed (cumulative) - Rooftop PV (MW)	110	165	219	290	375	472	584
Installed (cumulative) - Solar - Base land use assumptions (MW)	39.5	164	309	597	597	597	597
Installed (cumulative) - Wind - Base land use assumptions (MW)	2	2	2	2	2	2	2

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu allam power plant (GWh)	0	0	0	0	0	0	0
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0
OffshoreWind - Base land use assumptions (GWh)	0	0	0	0	0	17,643	19,972

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

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0	0	0	17,643	19,972
Solar - Base land use assumptions (GWh)	75.2	233	271	543	0	0	0
Solar - Constrained land use assumptions (GWh)	0	0	180	342	0	0	0
Wind - Base land use assumptions (GWh)	8.07	0	0	0	0	0	0
Wind - Constrained land use assumptions (GWh)	8.07	0	0	0	0	0	0

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	0	0
Conversion capital investment - Cumulative 5-yr (million $2018)	0	0	0	0	0	0	0
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	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	0
Number of facilities - Pyrolysis ccu (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng (quantity)	0	0	0	0	0	0	0
Number of facilities - Sng ccu (quantity)	0	0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Annual - All (MMT)		0	0	0	0	0	0
Annual - BECCS (MMT)		0	0	0	0	0	0
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
Cumulative - BECCS (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	0	0	0	0	166
Cumulative investment - All (million $2018)		0	0	0	0	0	122
Cumulative investment - Spur (million $2018)		0	0	0	0	0	122
Cumulative investment - Trunk (million $2018)		0	0	0	0	0	0
Spur (km)		0	0	0	0	0	166
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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)							-244
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-6.43
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-250
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-126
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-3.22
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-129
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)							171
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							11.7
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							183
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)							88.6
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							5.85
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							94.5

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)							-6.94
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-901

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-206
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-201
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-27.3
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-208
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-83.5
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-5.4
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-85.9
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-76.6
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-3.48
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-263
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-34.3
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-77.3
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-13.9
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-69.4
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-29.2
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-2.7
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-6.51
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-25.8
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-5.21
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-581
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-120
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-139
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-20.4
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-139
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-56.4
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4.05
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-46.2
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-51.2
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							1.13

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 - Avoid deforestation (over 30 years) (1000 hectares)							27.8
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							103
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							10.1
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)							7.93
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0.357
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							2.44
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							25.4
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							178
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							0.567
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							26.1
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							39.3
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							5.03
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)							4.17
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0.179
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.423
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							15.4
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							91.2
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							0.851
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							27

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 - Extend rotation length (1000 hectares)							71
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							7.57
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)							6.05
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0.268
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							3.06
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							30.9
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							147

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		73.9	62.3	50	37.6	23.7	16.4
Natural gas consumption - Cumulative (tcf)		0	0	0	0	0	1,505
Natural gas production - Annual (tcf)		0	0	0	0	0	0
Oil consumption - Annual (million bbls)		13.1	10.7	7.3	4.21	1.8	0
Oil consumption - Cumulative (million bbls)		0	0	0	0	0	229
Oil production - Annual (million bbls)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		129	0.09	0.089	0.082	0.057	0.005
Monetary damages from air pollution - Natural Gas (million 2019$)		52.5	38.6	25.7	23.3	15.7	6.52
Monetary damages from air pollution - Transportation (million 2019$)		232	218	166	96.2	43.7	16.6
Premature deaths from air pollution - Coal (deaths)		14.6	0.01	0.01	0.009	0.006	0.001
Premature deaths from air pollution - Natural Gas (deaths)		5.93	4.36	2.9	2.63	1.77	0.736
Premature deaths from air pollution - Transportation (deaths)		26.1	24.5	18.7	10.8	4.91	1.87

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		3.8	7.71	2.95	2.29	1.68	1.25
By economic sector - Construction (jobs)		1,159	1,095	1,419	1,414	4,193	7,337
By economic sector - Manufacturing (jobs)		1,426	2,601	2,635	2,094	2,841	2,826
By economic sector - Mining (jobs)		287	197	119	64.2	27.8	8.9
By economic sector - Other (jobs)		116	123	181	172	423	786
By economic sector - Pipeline (jobs)		81.8	67.9	52	36.7	21.4	39.3
By economic sector - Professional (jobs)		476	427	558	573	2,181	4,081

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Trade (jobs)		359	317	376	364	1,221	2,325
By economic sector - Utilities (jobs)		1,300	1,156	1,571	1,840	5,242	8,746
By education level - All sectors - Associates degree or some college (jobs)		1,678	1,926	2,244	2,150	5,290	8,572
By education level - All sectors - Bachelors degree (jobs)		1,049	1,188	1,348	1,271	3,178	5,187
By education level - All sectors - Doctoral degree (jobs)		29.2	28.5	33.8	32.7	102	183
By education level - All sectors - High school diploma or less (jobs)		2,216	2,597	2,993	2,820	6,801	10,887
By education level - All sectors - Masters or professional degree (jobs)		238	253	295	286	782	1,321
By resource sector - Biomass (jobs)		16.3	21.3	8.39	6.88	6.13	5.33
By resource sector - CO2 (jobs)		0	0	0	0	0	224
By resource sector - Coal (jobs)		60.3	0	0	0	0	0
By resource sector - Grid (jobs)		1,544	1,578	2,444	2,815	10,088	16,956
By resource sector - Natural Gas (jobs)		1,224	934	898	1,048	701	713
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		583	435	275	147	58.8	0
By resource sector - Solar (jobs)		1,777	2,924	3,212	2,308	2,259	2,349
By resource sector - Wind (jobs)		4.99	99.5	77	236	3,040	5,904
Median wages - Annual - All ($2019 per job)		64,185	63,423	64,501	66,169	68,740	70,482
On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs)		860	972	1,135	1,091	2,713	4,412
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)		338	340	414	417	1,130	1,912
On-Site or In-Plant Training - Total jobs - None (jobs)		840	979	1,121	1,053	2,568	4,154
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)		45.4	50.2	59.7	58.7	150	246
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)		3,126	3,652	4,184	3,941	9,592	15,426
On-the-Job Training - All sectors - 1 to 4 years (jobs)		1,107	1,241	1,453	1,403	3,514	5,735
On-the-Job Training - All sectors - 4 to 10 years (jobs)		329	328	404	411	1,127	1,916
On-the-Job Training - All sectors - None (jobs)		272	311	356	334	827	1,349
On-the-Job Training - All sectors - Over 10 years (jobs)		53.6	66.8	74.5	67.3	150	233
On-the-Job Training - All sectors - Up to 1 year (jobs)		3,447	4,047	4,626	4,345	10,535	16,918
Related work experience - All sectors - 1 to 4 years (jobs)		1,867	2,125	2,453	2,336	5,797	9,419
Related work experience - All sectors - 4 to 10 years (jobs)		1,218	1,376	1,592	1,524	3,800	6,192
Related work experience - All sectors - None (jobs)		754	856	994	952	2,345	3,805
Related work experience - All sectors - Over 10 years (jobs)		335	399	453	424	1,014	1,614
Related work experience - All sectors - Up to 1 year (jobs)		1,036	1,238	1,421	1,325	3,197	5,121
Wage income - All (million $2019)		334	380	446	434	1,110	1,843

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	3,468	3,852	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of cooking units - Electric Resistance (%)	32	36.2	40.9	53.4	71	81.7	85.5
Sales of cooking units - Gas (%)	68	63.8	59.1	46.6	29	18.3	14.5
Sales of space heating units - Electric Heat Pump (%)	1.53	20.1	24.9	38.9	61.1	76.8	82.8
Sales of space heating units - Electric Resistance (%)	1.94	8.06	8.33	9.15	10.6	12	12.8
Sales of space heating units - Fossil (%)	12.2	4.9	4.55	3.47	1.71	0.536	0.14
Sales of space heating units - Gas Furnace (%)	84.3	66.9	62.2	48.4	26.6	10.7	4.3
Sales of water heating units - Electric Heat Pump (%)	0.078	2.03	7.05	21.5	43.6	58.1	63.1
Sales of water heating units - Electric Resistance (%)	1.96	7.38	9.33	15.1	24	29.7	31.7
Sales of water heating units - Gas Furnace (%)	93.3	86.1	79.2	59.5	29.1	9.29	2.42
Sales of water heating units - Other (%)	4.67	4.49	4.43	3.93	3.32	2.91	2.76

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)		0.457	0.458	0.597	0.614	0.89	0.939

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	29.9	29.9	29.5	28.9	28	27	26.5
Final energy use - Industry (PJ)	16	16.3	16.7	17.1	17.5	17.9	18.4
Final energy use - Residential (PJ)	41.7	39.5	38.4	37	34.6	31.5	28.6
Final energy use - Transportation (PJ)	81.5	76.4	70.2	64.9	60.8	55.9	50.1

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	0.769	0.798	0	0	0	0
Sales of cooking units - Electric Resistance (%)	49.9	51.2	55.8	67.9	84.7	95.1	98.7
Sales of cooking units - Gas (%)	50.1	48.8	44.2	32.1	15.3	4.94	1.33
Sales of space heating units - Electric Heat Pump (%)	14.3	22.9	28.3	44	68	83.7	89.1
Sales of space heating units - Electric Resistance (%)	9.9	12	11.2	9.09	5.93	3.95	3.26
Sales of space heating units - Fossil (%)	20.5	29.9	27.8	21.5	11.8	5.49	3.29
Sales of space heating units - Gas (%)	55.3	35.2	32.6	25.4	14.2	6.89	4.33
Sales of water heating units - Electric Heat Pump (%)	0	1.62	6.23	19.5	39.9	53.2	57.8
Sales of water heating units - Electric Resistance (%)	30.2	47	46.3	44.4	41.6	39.8	39.1
Sales of water heating units - Gas Furnace (%)	65.2	47.8	44	33.1	16.2	5.18	1.35
Sales of water heating units - Other (%)	4.6	3.59	3.44	3	2.33	1.9	1.75

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	31.3	65.7	222	699	1,018

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

Item	2020	2025	2030	2035	2040	2045	2050
Public EV charging plugs - DC Fast (1000 units)	0.065	0	0.1	0	0.527	0	1.47
Public EV charging plugs - L2 (1000 units)	0.118	0	2.42	0	12.7	0	35.4
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 (%)	1.45	1.88	2.04	1.61	1.02	0.523	0.225
Vehicle sales - Light-duty - EV (%)	2.03	4.99	12.5	26.8	49.4	72.7	87.8
Vehicle sales - Light-duty - gasoline (%)	91.3	86.9	78.6	65.4	45	24.1	10.7
Vehicle sales - Light-duty - hybrid (%)	4.99	5.77	6.44	5.81	4.29	2.5	1.2
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.377	0.319	0.241	0.169	0.094	0.044
Vehicle sales - Light-duty - other (%)	0.098	0.101	0.091	0.079	0.057	0.031	0.014
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)							-244
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-6.43
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-250
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-126
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-3.22
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-129
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)							171
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							11.7

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)							183
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)							88.6
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							5.85
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							94.5

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)							-6.94
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-901
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-206
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-201
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-27.3
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-208
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-83.5
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-5.4
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-85.9
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-76.6
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-3.48
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-263
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-34.3
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-77.3
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-13.9
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-69.4
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-29.2
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-2.7
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-6.51
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-25.8
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-5.21

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)							-581
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-120
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-139
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-20.4
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-139
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-56.4
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4.05
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-46.2
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-51.2
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							1.13
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							27.8
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							103
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							10.1
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)							7.93
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0.357
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							2.44
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							25.4
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							178
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							0.567
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							26.1
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							39.3
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							5.03
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)							4.17
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0.179
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.423
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							15.4
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							91.2
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							0.851
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							27
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							71
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							7.57
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)							6.05
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0.268
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							3.06
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							30.9
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							147

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		129	0.09	0.089	0.082	0.057	0.005
Monetary damages from air pollution - Natural Gas (million 2019$)		47.6	30.8	13.4	5.77	1.89	1.29
Monetary damages from air pollution - Transportation (million 2019$)		237	240	234	212	169	116
Premature deaths from air pollution - Coal (deaths)		14.6	0.01	0.01	0.009	0.006	0.001
Premature deaths from air pollution - Natural Gas (deaths)		5.37	3.48	1.51	0.651	0.213	0.146
Premature deaths from air pollution - Transportation (deaths)		26.6	27	26.4	23.8	19	13.1

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)	0	3,472	3,883	0	0	0	0
Sales of cooking units - Electric Resistance (%)	32	46	79.9	86.5	86.9	86.9	86.9
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Sales of space heating units - Electric Heat Pump (%)	1.53	28.2	70.6	83.7	85	85.1	85.1
Sales of space heating units - Electric Resistance (%)	1.94	8.4	10.6	12.7	13.1	13.1	13.1
Sales of space heating units - Fossil (%)	12.2	4.23	0.808	0.035	0	0	0
Sales of space heating units - Gas Furnace (%)	84.3	59.2	18.1	3.53	1.88	1.85	1.84
Sales of water heating units - Electric Heat Pump (%)	0.078	10.5	54.6	64.4	64.9	64.9	64.9
Sales of water heating units - Electric Resistance (%)	1.96	10.8	28.3	32.2	32.4	32.4	32.4
Sales of water heating units - Gas Furnace (%)	93.3	74.5	14.1	0.593	0	0	0
Sales of water heating units - Other (%)	4.67	4.25	3.03	2.72	2.72	2.72	2.71

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)		0.526	0.536	0.919	0.973	0.907	0.947

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	29.9	29.8	28.5	26.5	24.9	24.3	24.6
Final energy use - Industry (PJ)	16	16.3	16.6	16.9	17.1	17.5	18
Final energy use - Residential (PJ)	41.7	39.3	35.9	31.4	27.7	25.3	24.4
Final energy use - Transportation (PJ)	81.4	75.7	67	56.1	46.1	40	37.3

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	0.774	0.771	0	0	0	0
Sales of cooking units - Electric Resistance (%)	50.1	60.7	93.3	99.7	100	100	100
Sales of cooking units - Gas (%)	49.9	39.3	6.72	0.338	0	0	0
Sales of space heating units - Electric Heat Pump (%)	14.3	32.1	79.9	90.6	91	91	91
Sales of space heating units - Electric Resistance (%)	9.9	10.8	4.53	3.11	3.02	3.06	3.07
Sales of space heating units - Fossil (%)	20.5	26.2	6.99	2.7	2.51	2.5	2.49
Sales of space heating units - Gas (%)	55.3	30.9	8.61	3.64	3.44	3.45	3.44
Sales of water heating units - Electric Heat Pump (%)	0	9.43	49.9	59	59.4	59.4	59.4
Sales of water heating units - Electric Resistance (%)	30.2	45.9	40.3	39	38.9	38.9	38.9
Sales of water heating units - Gas Furnace (%)	65.2	41.3	7.81	0.329	0	0	0
Sales of water heating units - Other (%)	4.6	3.33	1.97	1.68	1.67	1.69	1.7

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	193	496	803	1,217	1,325	1,263
Public EV charging plugs - DC Fast (1000 units)	0.065	0	0.324	0	1.42	0	2.3
Public EV charging plugs - L2 (1000 units)	0.118	0	7.8	0	34.2	0	55.3
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 (%)	1.43	1.71	1.21	0.386	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.31	16.4	48.3	82.5	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.2	76.6	46.9	15.8	3.2	0.587	0
Vehicle sales - Light-duty - hybrid (%)	4.8	4.82	3.34	1.23	0.301	0.066	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.333	0.194	0.06	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.096	0.092	0.059	0.021	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 - Offshore Wind - Base (billion $2018)	0	0	0	0	3.88	7.84	1.02
Capital invested - Solar PV - Base (billion $2018)	0	0	0.242	0	0	0	2.91
Capital invested - Wind - Base (billion $2018)	0	0	0	0	0	0	0.246
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	0	0	2,235	7,552	8,319
Installed (cumulative) - Solar - Base land use assumptions (MW)	39.5	39.5	241	241	241	241	3,383
Installed (cumulative) - Wind - Base land use assumptions (MW)	2	2	2	2	2	2	131

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		9,506	24,461	3,648
OffshoreWind - Constrained land use assumptions (GWh)	0	0	0		9,526	0	28,109
Solar - Base land use assumptions (GWh)	75.2	0	378		0	0	5,898
Solar - Constrained land use assumptions (GWh)	75.2	199	1,119		0	0	5,572
Wind - Base land use assumptions (GWh)	8.07	0	0		0	0	395
Wind - Constrained land use assumptions (GWh)	8.07	0	0		0	0	0

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)							-244
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-6.43
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-250
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-126
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-3.22
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-129
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)							171
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							11.7
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							183
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)							88.6
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							5.85
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							94.5

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)							-6.94
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-901
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-206
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-201
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-27.3
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-208

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)							-83.5
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-5.4
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-85.9
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-76.6
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-3.48
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-263
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-34.3
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-77.3
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-13.9
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-69.4
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-29.2
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-2.7
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-6.51
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-25.8
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-5.21
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-581
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-120
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-139
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-20.4
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-139
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-56.4
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4.05
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-46.2
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-51.2
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							1.13
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							27.8
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							103
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							10.1

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)							7.93
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0.357
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							2.44
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							25.4
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							178
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							0.567
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							26.1
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							39.3
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							5.03
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)							4.17
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0.179
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.423
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							15.4
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							91.2
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							0.851
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							27
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							71
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							7.57
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)							6.05

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)							0.268
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							3.06
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							30.9
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							147

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		129	0.09	0.089	0.082	0.057	0.005
Monetary damages from air pollution - Natural Gas (million 2019$)		43.7	32.3	19.8	13.5	4.78	0.946
Monetary damages from air pollution - Transportation (million 2019$)		232	218	166	96.2	43.7	16.6
Premature deaths from air pollution - Coal (deaths)		14.6	0.01	0.01	0.009	0.006	0.001
Premature deaths from air pollution - Natural Gas (deaths)		4.93	3.65	2.23	1.52	0.539	0.107
Premature deaths from air pollution - Transportation (deaths)		26.1	24.5	18.7	10.8	4.91	1.87

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	3,472	3,883	0	0	0	0
Sales of cooking units - Electric Resistance (%)	32	46	79.9	86.5	86.9	86.9	86.9
Sales of cooking units - Gas (%)	68	54	20.1	13.5	13.1	13.1	13.1
Sales of space heating units - Electric Heat Pump (%)	1.53	28.2	70.6	83.7	85	85.1	85.1
Sales of space heating units - Electric Resistance (%)	1.94	8.4	10.6	12.7	13.1	13.1	13.1
Sales of space heating units - Fossil (%)	12.2	4.23	0.808	0.035	0	0	0
Sales of space heating units - Gas Furnace (%)	84.3	59.2	18.1	3.53	1.88	1.85	1.84
Sales of water heating units - Electric Heat Pump (%)	0.078	10.5	54.6	64.4	64.9	64.9	64.9
Sales of water heating units - Electric Resistance (%)	1.96	10.8	28.3	32.2	32.4	32.4	32.4
Sales of water heating units - Gas Furnace (%)	93.3	74.5	14.1	0.593	0	0	0
Sales of water heating units - Other (%)	4.67	4.25	3.03	2.72	2.72	2.72	2.71

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)		0.526	0.536	0.919	0.973	0.907	0.947

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	29.9	29.8	28.5	26.5	24.9	24.3	24.6

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	16	16.3	16.6	16.9	17.1	17.5	18
Final energy use - Residential (PJ)	41.7	39.3	35.9	31.4	27.7	25.3	24.4
Final energy use - Transportation (PJ)	81.4	75.7	67	56.1	46.1	40	37.3

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	0.774	0.771	0	0	0	0
Sales of cooking units - Electric Resistance (%)	50.1	60.7	93.3	99.7	100	100	100
Sales of cooking units - Gas (%)	49.9	39.3	6.72	0.338	0	0	0
Sales of space heating units - Electric Heat Pump (%)	14.3	32.1	79.9	90.6	91	91	91
Sales of space heating units - Electric Resistance (%)	9.9	10.8	4.53	3.11	3.02	3.06	3.07
Sales of space heating units - Fossil (%)	20.5	26.2	6.99	2.7	2.51	2.5	2.49
Sales of space heating units - Gas (%)	55.3	30.9	8.61	3.64	3.44	3.45	3.44
Sales of water heating units - Electric Heat Pump (%)	0	9.43	49.9	59	59.4	59.4	59.4
Sales of water heating units - Electric Resistance (%)	30.2	45.9	40.3	39	38.9	38.9	38.9
Sales of water heating units - Gas Furnace (%)	65.2	41.3	7.81	0.329	0	0	0
Sales of water heating units - Other (%)	4.6	3.33	1.97	1.68	1.67	1.69	1.7

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	193	496	803	1,217	1,325	1,263
Public EV charging plugs - DC Fast (1000 units)	0.065	0	0.324	0	1.42	0	2.3
Public EV charging plugs - L2 (1000 units)	0.118	0	7.8	0	34.2	0	55.3
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 (%)	1.43	1.71	1.21	0.386	0.073	0.013	0
Vehicle sales - Light-duty - EV (%)	4.31	16.4	48.3	82.5	96.4	99.3	100
Vehicle sales - Light-duty - gasoline (%)	89.2	76.6	46.9	15.8	3.2	0.587	0
Vehicle sales - Light-duty - hybrid (%)	4.8	4.82	3.34	1.23	0.301	0.066	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.333	0.194	0.06	0.012	0.002	0
Vehicle sales - Light-duty - other (%)	0.096	0.092	0.059	0.021	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 - Offshore Wind - Constrained (billion $2018)		0	0	0	0	0.356	0.106
Capital invested - Solar PV - Base (billion $2018)		0	0	0	0	0	0
Capital invested - Solar PV - Constrained (billion $2018)		0	0.127	0.275	0	0.217	0
Capital invested - Wind - Base (billion $2018)		0	0	0	0	0	0
Capital invested - Wind - Constrained (billion $2018)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
OffshoreWind - Constrained land use assumptions (GWh)	0		0	0		1,008	340
Solar - Base land use assumptions (GWh)	75.2		0	0		0	0
Solar - Constrained land use assumptions (GWh)	75.2		199	469		414	0
Wind - Base land use assumptions (GWh)	8.07		0	0		0	0
Wind - Constrained land use assumptions (GWh)	8.07		0	0		0	0

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)							-244
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-6.43
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-250
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-126
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-3.22
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-129
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)							171
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							11.7
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							183

Table 42: *E+RE- 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)							0
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							88.6
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							5.85
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							94.5

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)							-6.94
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-901
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-206
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-201
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-27.3
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-208
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-83.5
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-5.4
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-85.9
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-76.6
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-3.48
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-263
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-34.3
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-77.3
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-13.9
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-69.4
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-29.2
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-2.7
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-6.51
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-25.8
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-5.21
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-581
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-120

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-139
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-20.4
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-139
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-56.4
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4.05
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-46.2
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-51.2
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							1.13
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							27.8
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							103
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							10.1
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)							7.93
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0.357
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							2.44
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							25.4
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							178
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							0.567
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							26.1
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							39.3
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							5.03
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)							4.17

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 - Reforest cropland (1000 hectares)							0.179
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.423
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							15.4
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							91.2
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							0.851
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							27
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							71
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							7.57
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)							6.05
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0.268
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							3.06
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							30.9
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							147

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		129	0.09	0.089	0.082	0.057	0.005
Monetary damages from air pollution - Natural Gas (million 2019$)		51.3	41.8	48.2	36.9	14.7	4.27
Monetary damages from air pollution - Transportation (million 2019$)		232	218	166	96.2	43.7	16.6
Premature deaths from air pollution - Coal (deaths)		14.6	0.01	0.01	0.009	0.006	0.001
Premature deaths from air pollution - Natural Gas (deaths)		5.79	4.72	5.44	4.16	1.66	0.482
Premature deaths from air pollution - Transportation (deaths)		26.1	24.5	18.7	10.8	4.91	1.87

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	3,468	3,852	0	0	0	0
Sales of cooking units - Electric Resistance (%)	32	36.2	40.9	53.4	71	81.7	85.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Sales of cooking units - Gas (%)	68	63.8	59.1	46.6	29	18.3	14.5
Sales of space heating units - Electric Heat Pump (%)	1.53	20.1	24.9	38.9	61.1	76.8	82.8
Sales of space heating units - Electric Resistance (%)	1.94	8.06	8.33	9.15	10.6	12	12.8
Sales of space heating units - Fossil (%)	12.2	4.9	4.55	3.47	1.71	0.536	0.14
Sales of space heating units - Gas Furnace (%)	84.3	66.9	62.2	48.4	26.6	10.7	4.3
Sales of water heating units - Electric Heat Pump (%)	0.078	2.03	7.05	21.5	43.6	58.1	63.1
Sales of water heating units - Electric Resistance (%)	1.96	7.38	9.33	15.1	24	29.7	31.7
Sales of water heating units - Gas Furnace (%)	93.3	86.1	79.2	59.5	29.1	9.29	2.42
Sales of water heating units - Other (%)	4.67	4.49	4.43	3.93	3.32	2.91	2.76

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)		0.457	0.458	0.597	0.614	0.89	0.939

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	29.9	29.9	29.5	28.9	28	27	26.5
Final energy use - Industry (PJ)	16	16.3	16.7	17.1	17.5	17.9	18.4
Final energy use - Residential (PJ)	41.7	39.5	38.4	37	34.6	31.5	28.6
Final energy use - Transportation (PJ)	81.5	76.4	70.2	64.9	60.8	55.9	50.1

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	0.769	0.798	0	0	0	0
Sales of cooking units - Electric Resistance (%)	49.9	51.2	55.8	67.9	84.7	95.1	98.7
Sales of cooking units - Gas (%)	50.1	48.8	44.2	32.1	15.3	4.94	1.33
Sales of space heating units - Electric Heat Pump (%)	14.3	22.9	28.3	44	68	83.7	89.1
Sales of space heating units - Electric Resistance (%)	9.9	12	11.2	9.09	5.93	3.95	3.26
Sales of space heating units - Fossil (%)	20.5	29.9	27.8	21.5	11.8	5.49	3.29
Sales of space heating units - Gas (%)	55.3	35.2	32.6	25.4	14.2	6.89	4.33
Sales of water heating units - Electric Heat Pump (%)	0	1.62	6.23	19.5	39.9	53.2	57.8
Sales of water heating units - Electric Resistance (%)	30.2	47	46.3	44.4	41.6	39.8	39.1
Sales of water heating units - Gas Furnace (%)	65.2	47.8	44	33.1	16.2	5.18	1.35
Sales of water heating units - Other (%)	4.6	3.59	3.44	3	2.33	1.9	1.75

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	31.3	65.7	222	699	1,018
Public EV charging plugs - DC Fast (1000 units)	0.065	0	0.1	0	0.527	0	1.47
Public EV charging plugs - L2 (1000 units)	0.118	0	2.42	0	12.7	0	35.4

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

Item	2020	2025	2030	2035	2040	2045	2050
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 (%)	1.45	1.88	2.04	1.61	1.02	0.523	0.225
Vehicle sales - Light-duty - EV (%)	2.03	4.99	12.5	26.8	49.4	72.7	87.8
Vehicle sales - Light-duty - gasoline (%)	91.3	86.9	78.6	65.4	45	24.1	10.7
Vehicle sales - Light-duty - hybrid (%)	4.99	5.77	6.44	5.81	4.29	2.5	1.2
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.377	0.319	0.241	0.169	0.094	0.044
Vehicle sales - Light-duty - other (%)	0.098	0.101	0.091	0.079	0.057	0.031	0.014
Vehicle sales - Medium-duty - diesel (%)	64.8	62.2	57.7	49.4	35.6	19.6	8.37
Vehicle sales - Medium-duty - EV (%)	0.664	1.94	5.49	14.3	31.4	52.6	68
Vehicle sales - Medium-duty - gasoline (%)	33.8	34.7	34.7	31.9	24.4	14.2	6.33
Vehicle sales - Medium-duty - hybrid (%)	0.363	0.418	0.464	0.478	0.414	0.275	0.141
Vehicle sales - Medium-duty - hydrogen FC (%)	0.166	0.485	1.37	3.58	7.86	13.2	17
Vehicle sales - Medium-duty - other (%)	0.253	0.266	0.279	0.286	0.258	0.184	0.102

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

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

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

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass purchases (million $2018/year)	0	0	0	0	0	0	69.2
Conversion capital investment - Cumulative 5-yr (million $2018)	0	0	0	0	0	0	772
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	0
Number of facilities - Pyrolysis (quantity)	0	0	0	0	0	0	1
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
Annual - BECCS (MMT)		0	0	0	0	0	0
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
Cumulative - BECCS (MMT)		0	0	0	0	0	0
Cumulative - Cement and lime (MMT)		0	0	0	0	0	0
Cumulative - NGCC (MMT)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
All (km)		0	0	0	0	0	0
Cumulative investment - All (million $2018)		0	0	0	0	0	0
Cumulative investment - Spur (million $2018)		0	0	0	0	0	0
Cumulative investment - Trunk (million $2018)		0	0	0	0	0	0
Spur (km)		0	0	0	0	0	0
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)							-25.9
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-225
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)							-5.61
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-257
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							-25.9
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-116
Carbon sink potential - Moderate 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 - Moderate deployment - Pasture to energy crops (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-2.8
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-145
Land impacted for carbon sink - Aggressive deployment - Corn-ethanol to energy grasses (1000 hectares)							13.8
Land impacted for carbon sink - Aggressive deployment - Cropland measures (1000 hectares)							390
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							3.07
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							0.14
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							10.2
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							417
Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares)							13.8
Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares)							81.5
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							3.07
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							0.14
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							5.1
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							104

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)							-6.94
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-901
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-206
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-201
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-27.3
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-208
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-83.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-5.4
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-85.9
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-76.6
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-3.48
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-263
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-34.3
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-77.3
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-13.9
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-69.4
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-29.2
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-2.7
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-6.51
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-25.8
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-5.21
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-581
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-120
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-139
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-20.4
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-139
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-56.4
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4.05
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-46.2
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-51.2
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							1.13
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							27.8
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							103
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							10.1
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0

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 - Increase trees outside forests (1000 hectares)							7.93
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0.357
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							2.44
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							25.4
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							178
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							0.567
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							26.1
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							39.3
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							5.03
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)							4.17
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0.179
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.423
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							15.4
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							91.2
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							0.851
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							27
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							71
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							7.57
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)							6.05
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0.268

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 - Reforest pasture (1000 hectares)							3.06
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							30.9
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							147

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		129	0.09	0.089	0.082	0.057	0.005
Monetary damages from air pollution - Natural Gas (million 2019$)		46.6	28.3	15.9	11.4	6.65	1.97
Monetary damages from air pollution - Transportation (million 2019$)		237	240	234	212	169	116
Premature deaths from air pollution - Coal (deaths)		14.6	0.01	0.01	0.009	0.006	0.001
Premature deaths from air pollution - Natural Gas (deaths)		5.26	3.19	1.79	1.29	0.751	0.223
Premature deaths from air pollution - Transportation (deaths)		26.6	27	26.4	23.8	19	13.1

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)	0	3,421	3,558	0	0	0	0
Sales of cooking units - Electric Resistance (%)	32	34.3	34.3	34.3	34.4	34.3	34.3
Sales of cooking units - Gas (%)	68	65.7	65.7	65.7	65.6	65.7	65.7
Sales of space heating units - Electric Heat Pump (%)	1.53	24.1	48.5	68.4	71.7	72.1	72.1
Sales of space heating units - Electric Resistance (%)	1.94	8.79	12.8	20.1	25.2	25.9	26
Sales of space heating units - Fossil (%)	12.2	4.76	3.52	1.51	0.221	0.018	0
Sales of space heating units - Gas Furnace (%)	84.3	62.4	35.2	9.91	2.84	1.91	1.84
Sales of water heating units - Electric Heat Pump (%)	0.078	0.268	0.265	0.267	0.268	0.267	0.268
Sales of water heating units - Electric Resistance (%)	1.96	6.67	6.62	6.62	6.65	6.63	6.65
Sales of water heating units - Gas Furnace (%)	93.3	88.5	88.5	88.6	88.5	88.5	88.5
Sales of water heating units - Other (%)	4.67	4.54	4.63	4.53	4.56	4.58	4.53

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)		0.488	0.492	0.647	0.67	0.83	0.869

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	29.9	30.3	30.5	30.5	30.7	31.5	33.2
Final energy use - Industry (PJ)	16	16.8	17.7	18.8	20	21.3	22.7
Final energy use - Residential (PJ)	41.7	39.3	38.7	38.6	39	40	41.1
Final energy use - Transportation (PJ)	81.4	76.3	70.4	66.8	66.7	68.4	70.6

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	0.756	0.716	0	0	0	0
Sales of cooking units - Electric Resistance (%)	49.4	49.4	49.4	49.4	49.4	49.4	49.4
Sales of cooking units - Gas (%)	50.6	50.6	50.6	50.6	50.6	50.6	50.6
Sales of space heating units - Electric Heat Pump (%)	11.1	37.9	39.1	40.3	41.2	41.9	42.9
Sales of space heating units - Electric Resistance (%)	10.4	9.91	9.75	9.4	9.02	8.38	7.34
Sales of space heating units - Fossil (%)	21.2	21.3	11.8	7.55	7.21	7.18	7.25
Sales of space heating units - Gas (%)	57.3	30.9	39.4	42.7	42.6	42.6	42.6
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	30.2	47.2	47.2	47.1	47	47	46.9
Sales of water heating units - Gas Furnace (%)	65.2	49.1	49.2	49.2	49.3	49.4	49.4
Sales of water heating units - Other (%)	4.6	3.64	3.64	3.65	3.66	3.66	3.67

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 (%)	1.44	1.87	2.16	2.02	1.81	1.69	1.6
Vehicle sales - Light-duty - EV (%)	3.95	6.1	6.91	8.53	10.3	11.9	13.1
Vehicle sales - Light-duty - gasoline (%)	89.6	85.9	83.6	81.6	79.5	77.5	76
Vehicle sales - Light-duty - hybrid (%)	4.82	5.65	6.89	7.44	7.98	8.51	8.88
Vehicle sales - Light-duty - hydrogen FC (%)	0.11	0.373	0.339	0.3	0.296	0.295	0.306
Vehicle sales - Light-duty - other (%)	0.097	0.101	0.097	0.097	0.097	0.095	0.098
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)							-6.94
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-901
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-206
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-201
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							-27.3
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-208
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-83.5

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							-5.4
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-85.9
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-76.6
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-3.48
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-263
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-34.3
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-77.3
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							-13.9
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-69.4
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-29.2
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							-2.7
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-6.51
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-25.8
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-5.21
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-581
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-120
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-139
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							-20.4
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-139
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-56.4
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							-4.05
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-46.2
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-51.2
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							1.13
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							27.8
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							103
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							10.1
Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares)							0

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares)							7.93
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0.357
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							2.44
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							25.4
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							178
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							0.567
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							26.1
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							39.3
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							5.03
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)							4.17
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0.179
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.423
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							15.4
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							91.2
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							0.851
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							27
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							71
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							7.57
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)							6.05
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0.268

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							3.06
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							30.9
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							147

Table 65: *REF scenario - PILLAR 6: Land sinks - Forests - REF only*

Item	2020	2025	2030	2035	2040	2045	2050
Business-as-usual carbon sink - Natural uptake (Mt CO2e/y)	-0.69		-0.314				-0.281
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.057		-0.102				-0.106
Business-as-usual carbon sink - Total (Mt CO2e/y)	-0.747		-0.416				-0.387

Table 66: *REF scenario - IMPACTS - Health*

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019$)		344	215	201	196	193	177
Monetary damages from air pollution - Natural Gas (million 2019$)		36.8	41	53.9	55.9	55.9	52.3
Monetary damages from air pollution - Transportation (million 2019$)		236	243	249	257	265	272
Premature deaths from air pollution - Coal (deaths)		38.9	24.3	22.8	22.2	21.8	19.9
Premature deaths from air pollution - Natural Gas (deaths)		4.15	4.63	6.08	6.31	6.31	5.9
Premature deaths from air pollution - Transportation (deaths)		26.6	27.3	28.1	28.9	29.8	30.6