



Net-Zero America - rhode island 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.

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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	1,952	2,131	0	0	0	0
Sales of cooking units - Electric Resistance (%)	36.9	49.9	81.2	87.4	87.7	87.7	87.7
Sales of cooking units - Gas (%)	63.1	50.1	18.8	12.6	12.3	12.3	12.3
Sales of space heating units - Electric Heat Pump (%)	2.71	10.5	38.5	72.1	77.6	77.9	78
Sales of space heating units - Electric Resistance (%)	1.36	4.58	16.4	21.3	22	22.1	22
Sales of space heating units - Fossil (%)	27.4	29.9	5.75	0.244	0	0	0
Sales of space heating units - Gas Furnace (%)	68.5	55	39.3	6.28	0.373	0	0
Sales of water heating units - Electric Heat Pump (%)	1.43	3.46	15.8	41.2	45.7	46	46
Sales of water heating units - Electric Resistance (%)	7.28	12.2	23.8	48	52.2	52.5	52.5
Sales of water heating units - Gas Furnace (%)	88.4	80.6	58.5	9.33	0.552	0	0
Sales of water heating units - Other (%)	2.9	3.75	1.86	1.55	1.53	1.53	1.55

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)		0.337	0.347	1.19	1.3	1.08	1.15

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	37.9	36	34.2	31.9	29.5	27.8	26.7
Final energy use - Industry (PJ)	7.41	7.1	7.08	7.12	7.25	7.42	7.63
Final energy use - Residential (PJ)	45.6	42.8	39.4	34.2	28.6	24.4	21.9
Final energy use - Transportation (PJ)	58.1	53.8	47.4	39.2	31.8	27.1	24.9

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	0.886	0.975	0	0	0	0
Sales of cooking units - Electric Resistance (%)	55.1	64.6	94	99.7	100	100	100
Sales of cooking units - Gas (%)	44.9	35.4	6.05	0.305	0	0	0
Sales of space heating units - Electric Heat Pump (%)	4.86	12.4	57.2	90.9	95.9	96.2	96.2
Sales of space heating units - Electric Resistance (%)	3.87	5.87	4.58	1.99	1.51	1.47	1.61
Sales of space heating units - Fossil (%)	37.2	45.9	12.9	2.88	2.05	2.02	1.96
Sales of space heating units - Gas (%)	54.1	35.8	25.3	4.26	0.506	0.272	0.257
Sales of water heating units - Electric Heat Pump (%)	0	1.46	13.8	34.6	38.2	38.4	38.4
Sales of water heating units - Electric Resistance (%)	22.1	39.5	47.7	59.4	61.4	61.5	61.5
Sales of water heating units - Gas Furnace (%)	65.5	51	36.9	5.9	0.348	0	0
Sales of water heating units - Other (%)	12.4	7.96	1.57	0.146	0.084	0.085	0.085

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	167	429	695	1,053	1,145	1,092
Public EV charging plugs - DC Fast (1000 units)	0.024	0	0.247	0	1.08	0	1.74
Public EV charging plugs - L2 (1000 units)	0.374	0	5.92	0	25.9	0	41.8
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 (%)	1.21	1.51	1.13	0.357	0.069	0.013	0
Vehicle sales - Light-duty - EV (%)	5.05	18.7	51.6	83.8	96.6	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88	74	43.5	14.5	3.02	0.582	0
Vehicle sales - Light-duty - hybrid (%)	5.53	5.35	3.58	1.29	0.321	0.072	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.108	0.32	0.176	0.053	0.011	0.002	0
Vehicle sales - Light-duty - other (%)	0.086	0.082	0.05	0.017	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	0.829	1.04	0.454	0	0
Capital invested - Offshore Wind - Constrained (billion \$2018)	0	2.08	0.546	0	0	0	0
Capital invested - Solar PV - Base (billion \$2018)	0	0	0.656	0	0	0	0
Capital invested - Solar PV - Constrained (billion \$2018)	0	0.137	0.725	0	0	0	0
Capital invested - Wind - Base (billion \$2018)	0	0	0	0	0	0	0
Capital invested - Wind - Constrained (billion \$2018)	0	0	0	0	0	0	0
Installed (cumulative) - Offshore Wind - Base land use assumptions (MW)	0	0	268	681	906	906	906
Installed (cumulative) - Rooftop PV (MW)	152	264	310	362	422	489	563
Installed (cumulative) - Solar - Base land use assumptions (MW)	105	105	652	652	652	652	652
Installed (cumulative) - Wind - Base land use assumptions (MW)	91.4	91.4	91.4	91.4	91.4	91.4	91.4

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

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

Item	2020	2025	2030	2035	2040	2045	2050
Biomass w/ccu power plant (GWh)	0	0	0	0	0	0	0
OffshoreWind - Base land use assumptions (GWh)	0	0	1,073	1,644	914	0	0
OffshoreWind - Constrained land use assumptions (GWh)	0	0	1,073	1,644	914	0	0
Solar - Base land use assumptions (GWh)	220	0	983	0	0	0	0
Solar - Constrained land use assumptions (GWh)	0	0	1,788	0	0	0	0
Wind - Base land use assumptions (GWh)	371	0	0	0	0	0	0
Wind - Constrained land use assumptions (GWh)	371	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	46.4
Conversion capital investment - Cumulative 5-yr (million \$2018)	0	0	0	0	0	0	1,155
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	1
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	1.48
Annual - BECCS (MMT)		0	0	0	0	0	1.48
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	1.48
Cumulative - BECCS (MMT)		0	0	0	0	0	1.48
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	79.2
Cumulative investment - All (million \$2018)		0	0	0	0	0	59.3
Cumulative investment - Spur (million \$2018)		0	0	0	0	0	59.3
Cumulative investment - Trunk (million \$2018)		0	0	0	0	0	0
Spur (km)		0	0	0	0	0	79.2
Trunk (km)		0	0	0	0	0	0

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

Item	2020	2025	2030	2035	2040	2045	2050
CO2 storage (MMT)		0	0	0	0	0	0
Injection wells (wells)		0	0	0	0	0	0
Resource characterization, appraisal, permitting costs (million \$2020)		0	0	0	0	0	0
Wells and facilities construction costs (million \$2020)		0	0	0	0	0	0

Table 12: E+ scenario - PILLAR 6: Land sinks - Agriculture

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Aggressive deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-10.3
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-0.327
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-10.7
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-5.39
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-0.164
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-5.55
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)							6.55
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							0.595
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							7.15
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)							3.43
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							0.298
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							3.72

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)							-8.13
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-617
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-165
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-246
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-54.9
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-28.5
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-50.3
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-63.9
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-4.07
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-180
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-27.6
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-94.6
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-18.3
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-9.99
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-3.81
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-21.5
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-6.1
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-399
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-96.5
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-170
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-36.6
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-19.3
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-27
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-42.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							1.33
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							22.4
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							126
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0
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)							2.71
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							1.43
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							21.2
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							175
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							0.665
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							21
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							48.1
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0
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)							1.43
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.247
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							12.8
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							84.3
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							0.997

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							21.7
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							86.8
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0
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)							2.07
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							1.79
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							25.8
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							139

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

Item	2020	2025	2030	2035	2040	2045	2050
Natural gas consumption - Annual (tcf)		78.8	66.4	53.3	40.1	25.2	17.5
Natural gas consumption - Cumulative (tcf)		0	0	0	0	0	1,604
Natural gas production - Annual (tcf)		0	0	0	0	0	0
Oil consumption - Annual (million bbls)		22.6	18.9	13.7	8.88	5.07	2.07
Oil consumption - Cumulative (million bbls)		0	0	0	0	0	426
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\$)		98.2	0.103	0.103	0.098	0.06	0.003
Monetary damages from air pollution - Natural Gas (million 2019\$)		57	28.2	19.5	23.7	14.7	8.71
Monetary damages from air pollution - Transportation (million 2019\$)		330	306	231	132	59.1	21.5
Premature deaths from air pollution - Coal (deaths)		11.1	0.012	0.012	0.011	0.007	0
Premature deaths from air pollution - Natural Gas (deaths)		6.43	3.18	2.2	2.68	1.66	0.983
Premature deaths from air pollution - Transportation (deaths)		37.1	34.4	26	14.9	6.64	2.42

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Agriculture (jobs)		14.1	28.6	10.9	8.49	6.24	78
By economic sector - Construction (jobs)		1,127	1,360	1,278	1,702	1,559	2,007
By economic sector - Manufacturing (jobs)		607	920	878	1,035	1,292	1,856
By economic sector - Mining (jobs)		428	300	186	105	51.4	21.4

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

Item	2020	2025	2030	2035	2040	2045	2050
By economic sector - Other (jobs)		130	186	143	190	191	320
By economic sector - Pipeline (jobs)		101	85	65.4	46.5	28.2	27.1
By economic sector - Professional (jobs)		465	575	581	825	756	1,076
By economic sector - Trade (jobs)		434	457	406	509	464	641
By economic sector - Utilities (jobs)		797	823	1,169	2,041	1,835	2,093
By education level - All sectors - Associates degree or some college (jobs)		1,282	1,487	1,510	2,113	2,020	2,624
By education level - All sectors - Bachelors degree (jobs)		856	955	943	1,277	1,214	1,594
By education level - All sectors - Doctoral degree (jobs)		28.4	32.1	30.6	41	37.6	51.8
By education level - All sectors - High school diploma or less (jobs)		1,736	2,035	2,009	2,720	2,620	3,465
By education level - All sectors - Masters or professional degree (jobs)		201	225	225	311	291	384
By resource sector - Biomass (jobs)		60.5	79	31.2	25.6	22.8	333
By resource sector - CO2 (jobs)		0	0	0	0	0	84.7
By resource sector - Grid (jobs)		558	1,107	1,940	3,132	3,110	3,649
By resource sector - Natural Gas (jobs)		1,212	685	545	1,083	684	568
By resource sector - Nuclear (jobs)		0	0	0	0	0	0
By resource sector - Oil (jobs)		1,004	772	517	310	166	63.6
By resource sector - Solar (jobs)		1,177	1,605	870	1,004	1,331	2,086
By resource sector - Wind (jobs)		92.2	486	814	908	870	1,334
Median wages - Annual - All (\$2019 per job)		67,361	67,136	69,084	70,830	71,152	71,296
On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs)		671	773	781	1,086	1,033	1,335
On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs)		284	317	324	460	423	535
On-Site or In-Plant Training - Total jobs - None (jobs)		665	772	757	1,030	989	1,315
On-Site or In-Plant Training - Total jobs - Over 10 years (jobs)		34.6	40	41.7	59.8	56.4	72.3
On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs)		2,448	2,832	2,814	3,827	3,681	4,862
On-the-Job Training - All sectors - 1 to 4 years (jobs)		864	991	1,007	1,408	1,335	1,719
On-the-Job Training - All sectors - 4 to 10 years (jobs)		275	311	319	457	420	531
On-the-Job Training - All sectors - None (jobs)		227	260	250	334	319	427
On-the-Job Training - All sectors - Over 10 years (jobs)		41.4	48.8	46.2	60.7	59.5	79.1
On-the-Job Training - All sectors - Up to 1 year (jobs)		2,696	3,123	3,096	4,203	4,049	5,363
Related work experience - All sectors - 1 to 4 years (jobs)		1,484	1,697	1,695	2,324	2,215	2,895
Related work experience - All sectors - 4 to 10 years (jobs)		961	1,095	1,102	1,524	1,448	1,878
Related work experience - All sectors - None (jobs)		595	684	684	945	900	1,181
Related work experience - All sectors - Over 10 years (jobs)		254	293	294	402	389	507
Related work experience - All sectors - Up to 1 year (jobs)		810	965	943	1,268	1,232	1,658
Wage income - All (million \$2019)		276	318	326	458	440	579

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	1,952	2,132	0	0	0	0
Sales of cooking units - Electric Resistance (%)	36.9	40.7	44.7	56.5	72.7	82.9	86.4
Sales of cooking units - Gas (%)	63.1	59.3	55.3	43.5	27.3	17.1	13.6
Sales of space heating units - Electric Heat Pump (%)	2.71	7.42	10.6	20.5	40.4	61.4	72.8
Sales of space heating units - Electric Resistance (%)	1.36	2.46	3.76	7.72	14.3	19.2	21.2
Sales of space heating units - Fossil (%)	27.4	34.6	32.4	24.5	11.9	3.78	0.991
Sales of space heating units - Gas Furnace (%)	68.5	55.5	53.2	47.3	33.4	15.6	5.09
Sales of water heating units - Electric Heat Pump (%)	1.43	2.87	4.27	8.98	20.1	34	42.1
Sales of water heating units - Electric Resistance (%)	7.28	11.6	12.8	17.4	28	41.1	48.8
Sales of water heating units - Gas Furnace (%)	88.4	81.4	79.2	70.3	49.5	23.1	7.55
Sales of water heating units - Other (%)	2.9	4.09	3.79	3.25	2.39	1.79	1.62

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)		0.246	0.245	0.466	0.491	0.969	1.05

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	37.9	36	35	34.2	33.1	31.9	30.6
Final energy use - Industry (PJ)	7.41	7.1	7.11	7.23	7.42	7.57	7.74
Final energy use - Residential (PJ)	45.6	43	41.1	39.3	36.3	32.3	28
Final energy use - Transportation (PJ)	58.2	54.4	49.9	45.9	42.7	38.8	34.4

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	0.888	1.03	0	0	0	0
Sales of cooking units - Electric Resistance (%)	54.9	56.1	60.2	71.1	86.2	95.6	98.8
Sales of cooking units - Gas (%)	45.1	43.9	39.8	28.9	13.8	4.45	1.2
Sales of space heating units - Electric Heat Pump (%)	4.86	5.74	10.9	26.2	53.8	78.8	90.8
Sales of space heating units - Electric Resistance (%)	3.87	5.91	5.68	5.25	4.15	2.68	1.92
Sales of space heating units - Fossil (%)	37.2	52.1	48.5	37.5	20.3	8.33	3.72
Sales of space heating units - Gas (%)	54.1	36.3	34.9	31	21.7	10.2	3.52
Sales of water heating units - Electric Heat Pump (%)	0	0.513	1.93	6.5	16.6	28.5	35.2
Sales of water heating units - Electric Resistance (%)	22.1	38.7	39.7	42.7	48.9	55.9	59.7
Sales of water heating units - Gas Furnace (%)	65.5	51.6	49.9	44.4	31.3	14.6	4.75
Sales of water heating units - Other (%)	12.4	9.19	8.47	6.4	3.18	1.08	0.344

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	27.1	56.8	192	604	880
Public EV charging plugs - DC Fast (1000 units)	0.024	0	0.077	0	0.4	0	1.12
Public EV charging plugs - L2 (1000 units)	0.374	0	1.84	0	9.6	0	26.8
Vehicle sales - Heavy-duty - diesel (%)	97.4	96	91.3	79.8	58.2	32.1	13.7
Vehicle sales - Heavy-duty - EV (%)	0.498	1.45	4.11	10.8	23.6	39.5	51
Vehicle sales - Heavy-duty - gasoline (%)	0.228	0.236	0.239	0.225	0.179	0.109	0.051
Vehicle sales - Heavy-duty - hybrid (%)	0.083	0.094	0.104	0.107	0.092	0.06	0.03
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.332	0.969	2.74	7.17	15.7	26.3	34
Vehicle sales - Heavy-duty - other (%)	1.5	1.28	1.46	1.95	2.25	1.96	1.14
Vehicle sales - Light-duty - diesel (%)	1.22	1.69	2	1.57	0.98	0.498	0.214
Vehicle sales - Light-duty - EV (%)	2.29	5.57	13.6	28.7	51.4	74	88.4
Vehicle sales - Light-duty - gasoline (%)	90.5	85.8	76.9	63.1	42.8	22.8	10.1
Vehicle sales - Light-duty - hybrid (%)	5.76	6.51	7.15	6.34	4.59	2.61	1.24
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.37	0.307	0.227	0.157	0.086	0.04
Vehicle sales - Light-duty - other (%)	0.088	0.091	0.082	0.07	0.05	0.027	0.012
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)							-10.3
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-0.327
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-10.7
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-5.39
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-0.164
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-5.55
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)							6.55
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							0.595

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)							7.15
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)							3.43
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							0.298
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							3.72

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Accelerate regeneration (1000 tCO ₂ e/y)							-8.13
Carbon sink potential - High - All (not counting overlap) (1000 tCO ₂ e/y)							-617
Carbon sink potential - High - Avoid deforestation (1000 tCO ₂ e/y)							-165
Carbon sink potential - High - Extend rotation length (1000 tCO ₂ e/y)							-246
Carbon sink potential - High - Improve plantations (1000 tCO ₂ e/y)							0
Carbon sink potential - High - Increase retention of HWP (1000 tCO ₂ e/y)							-54.9
Carbon sink potential - High - Increase trees outside forests (1000 tCO ₂ e/y)							-28.5
Carbon sink potential - High - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO ₂ e/y)							-50.3
Carbon sink potential - High - Restore productivity (1000 tCO ₂ e/y)							-63.9
Carbon sink potential - Low - Accelerate regeneration (1000 tCO ₂ e/y)							-4.07
Carbon sink potential - Low - All (not counting overlap) (1000 tCO ₂ e/y)							-180
Carbon sink potential - Low - Avoid deforestation (1000 tCO ₂ e/y)							-27.6
Carbon sink potential - Low - Extend rotation length (1000 tCO ₂ e/y)							-94.6
Carbon sink potential - Low - Improve plantations (1000 tCO ₂ e/y)							0
Carbon sink potential - Low - Increase retention of HWP (1000 tCO ₂ e/y)							-18.3
Carbon sink potential - Low - Increase trees outside forests (1000 tCO ₂ e/y)							-9.99
Carbon sink potential - Low - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO ₂ e/y)							-3.81
Carbon sink potential - Low - Restore productivity (1000 tCO ₂ e/y)							-21.5
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO ₂ e/y)							-6.1

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 tCO ₂ e/y)							-399
Carbon sink potential - Mid - Avoid deforestation (1000 tCO ₂ e/y)							-96.5
Carbon sink potential - Mid - Extend rotation length (1000 tCO ₂ e/y)							-170
Carbon sink potential - Mid - Improve plantations (1000 tCO ₂ e/y)							0
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO ₂ e/y)							-36.6
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO ₂ e/y)							-19.3
Carbon sink potential - Mid - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO ₂ e/y)							-27
Carbon sink potential - Mid - Restore productivity (1000 tCO ₂ e/y)							-42.7
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							1.33
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							22.4
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							126
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0
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)							2.71
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							1.43
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							21.2
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							175
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							0.665
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							21
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							48.1
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0
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)							1.43
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.247
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							12.8
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							84.3
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							0.997
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							21.7
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							86.8
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0
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)							2.07
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							1.79
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							25.8
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							139

Table 24: E- scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		98.2	0.103	0.103	0.098	0.06	0.003
Monetary damages from air pollution - Natural Gas (million 2019\$)		56	22	8.27	3.44	1.06	2.17
Monetary damages from air pollution - Transportation (million 2019\$)		336	338	327	292	231	157
Premature deaths from air pollution - Coal (deaths)		11.1	0.012	0.012	0.011	0.007	0
Premature deaths from air pollution - Natural Gas (deaths)		6.32	2.49	0.933	0.388	0.119	0.245
Premature deaths from air pollution - Transportation (deaths)		37.8	38	36.8	32.9	26	17.7

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	1,952	2,131	0	0	0	0
Sales of cooking units - Electric Resistance (%)	36.9	49.9	81.2	87.4	87.7	87.7	87.7
Sales of cooking units - Gas (%)	63.1	50.1	18.8	12.6	12.3	12.3	12.3
Sales of space heating units - Electric Heat Pump (%)	2.71	10.5	38.5	72.1	77.6	77.9	78
Sales of space heating units - Electric Resistance (%)	1.36	4.58	16.4	21.3	22	22.1	22
Sales of space heating units - Fossil (%)	27.4	29.9	5.75	0.244	0	0	0
Sales of space heating units - Gas Furnace (%)	68.5	55	39.3	6.28	0.373	0	0
Sales of water heating units - Electric Heat Pump (%)	1.43	3.46	15.8	41.2	45.7	46	46
Sales of water heating units - Electric Resistance (%)	7.28	12.2	23.8	48	52.2	52.5	52.5
Sales of water heating units - Gas Furnace (%)	88.4	80.6	58.5	9.33	0.552	0	0
Sales of water heating units - Other (%)	2.9	3.75	1.86	1.55	1.53	1.53	1.55

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)		0.337	0.347	1.19	1.3	1.08	1.15

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	37.9	36	34.2	31.9	29.5	27.8	26.7
Final energy use - Industry (PJ)	7.41	7.1	7.08	7.12	7.25	7.42	7.63
Final energy use - Residential (PJ)	45.6	42.8	39.4	34.2	28.6	24.4	21.9
Final energy use - Transportation (PJ)	58.1	53.8	47.4	39.2	31.8	27.1	24.9

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	0.886	0.975	0	0	0	0
Sales of cooking units - Electric Resistance (%)	55.1	64.6	94	99.7	100	100	100
Sales of cooking units - Gas (%)	44.9	35.4	6.05	0.305	0	0	0
Sales of space heating units - Electric Heat Pump (%)	4.86	12.4	57.2	90.9	95.9	96.2	96.2
Sales of space heating units - Electric Resistance (%)	3.87	5.87	4.58	1.99	1.51	1.47	1.61
Sales of space heating units - Fossil (%)	37.2	45.9	12.9	2.88	2.05	2.02	1.96
Sales of space heating units - Gas (%)	54.1	35.8	25.3	4.26	0.506	0.272	0.257
Sales of water heating units - Electric Heat Pump (%)	0	1.46	13.8	34.6	38.2	38.4	38.4
Sales of water heating units - Electric Resistance (%)	22.1	39.5	47.7	59.4	61.4	61.5	61.5
Sales of water heating units - Gas Furnace (%)	65.5	51	36.9	5.9	0.348	0	0
Sales of water heating units - Other (%)	12.4	7.96	1.57	0.146	0.084	0.085	0.085

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	167	429	695	1,053	1,145	1,092
Public EV charging plugs - DC Fast (1000 units)	0.024	0	0.247	0	1.08	0	1.74
Public EV charging plugs - L2 (1000 units)	0.374	0	5.92	0	25.9	0	41.8
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 (%)	1.21	1.51	1.13	0.357	0.069	0.013	0
Vehicle sales - Light-duty - EV (%)	5.05	18.7	51.6	83.8	96.6	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88	74	43.5	14.5	3.02	0.582	0
Vehicle sales - Light-duty - hybrid (%)	5.53	5.35	3.58	1.29	0.321	0.072	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.108	0.32	0.176	0.053	0.011	0.002	0
Vehicle sales - Light-duty - other (%)	0.086	0.082	0.05	0.017	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	0.829	1.6	0	0	0
Capital invested - Solar PV - Base (billion \$2018)	0	0	0.656	0	0	0	0
Installed (cumulative) - OffshoreWind - Base land use assumptions (MW)	0	0	268	906	906	906	906
Installed (cumulative) - Solar - Base land use assumptions (MW)	105	105	652	652	652	652	652
Installed (cumulative) - Wind - Base land use assumptions (MW)	91.4	91.4	91.4	91.4	91.4	91.4	91.4

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	1,073	2,558			
OffshoreWind - Constrained land use assumptions (GWh)	297	1,938	936	0			
Solar - Base land use assumptions (GWh)	220	0	987	0			
Solar - Constrained land use assumptions (GWh)	220	0	1,399	0			
Wind - Base land use assumptions (GWh)	371	0	0	0			
Wind - Constrained land use assumptions (GWh)	371	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 tCO ₂ e/y)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO ₂ e/y)							-10.3
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-0.327
Carbon sink potential - Aggressive deployment - Total (1000 tCO ₂ e/y)							-10.7
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO ₂ e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO ₂ e/y)							-5.39
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO ₂ e/y)							-0.164
Carbon sink potential - Moderate deployment - Total (1000 tCO ₂ e/y)							-5.55
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)							6.55
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							0.595
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							7.15
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)							3.43
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							0.298
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							3.72

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 tCO ₂ e/y)							-8.13
Carbon sink potential - High - All (not counting overlap) (1000 tCO ₂ e/y)							-617
Carbon sink potential - High - Avoid deforestation (1000 tCO ₂ e/y)							-165
Carbon sink potential - High - Extend rotation length (1000 tCO ₂ e/y)							-246
Carbon sink potential - High - Improve plantations (1000 tCO ₂ e/y)							0
Carbon sink potential - High - Increase retention of HWP (1000 tCO ₂ e/y)							-54.9

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 tCO ₂ e/y)							-28.5
Carbon sink potential - High - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO ₂ e/y)							-50.3
Carbon sink potential - High - Restore productivity (1000 tCO ₂ e/y)							-63.9
Carbon sink potential - Low - Accelerate regeneration (1000 tCO ₂ e/y)							-4.07
Carbon sink potential - Low - All (not counting overlap) (1000 tCO ₂ e/y)							-180
Carbon sink potential - Low - Avoid deforestation (1000 tCO ₂ e/y)							-27.6
Carbon sink potential - Low - Extend rotation length (1000 tCO ₂ e/y)							-94.6
Carbon sink potential - Low - Improve plantations (1000 tCO ₂ e/y)							0
Carbon sink potential - Low - Increase retention of HWP (1000 tCO ₂ e/y)							-18.3
Carbon sink potential - Low - Increase trees outside forests (1000 tCO ₂ e/y)							-9.99
Carbon sink potential - Low - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO ₂ e/y)							-3.81
Carbon sink potential - Low - Restore productivity (1000 tCO ₂ e/y)							-21.5
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO ₂ e/y)							-6.1
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO ₂ e/y)							-399
Carbon sink potential - Mid - Avoid deforestation (1000 tCO ₂ e/y)							-96.5
Carbon sink potential - Mid - Extend rotation length (1000 tCO ₂ e/y)							-170
Carbon sink potential - Mid - Improve plantations (1000 tCO ₂ e/y)							0
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO ₂ e/y)							-36.6
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO ₂ e/y)							-19.3
Carbon sink potential - Mid - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO ₂ e/y)							-27
Carbon sink potential - Mid - Restore productivity (1000 tCO ₂ e/y)							-42.7
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							1.33
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							22.4
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							126
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0

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)							2.71
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							1.43
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							21.2
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							175
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							0.665
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							21
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							48.1
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0
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)							1.43
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.247
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							12.8
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							84.3
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							0.997
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							21.7
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							86.8
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0
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)							2.07

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
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							1.79
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							25.8
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							139

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		98.2	0.103	0.103	0.098	0.06	0.003
Monetary damages from air pollution - Natural Gas (million 2019\$)		53.9	24.7	13.9	14.4	5.11	3.01
Monetary damages from air pollution - Transportation (million 2019\$)		330	306	231	132	59.1	21.5
Premature deaths from air pollution - Coal (deaths)		11.1	0.012	0.012	0.011	0.007	0
Premature deaths from air pollution - Natural Gas (deaths)		6.09	2.79	1.57	1.63	0.577	0.339
Premature deaths from air pollution - Transportation (deaths)		37.1	34.4	26	14.9	6.64	2.42

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	1,952	2,131	0	0	0	0
Sales of cooking units - Electric Resistance (%)	36.9	49.9	81.2	87.4	87.7	87.7	87.7
Sales of cooking units - Gas (%)	63.1	50.1	18.8	12.6	12.3	12.3	12.3
Sales of space heating units - Electric Heat Pump (%)	2.71	10.5	38.5	72.1	77.6	77.9	78
Sales of space heating units - Electric Resistance (%)	1.36	4.58	16.4	21.3	22	22.1	22
Sales of space heating units - Fossil (%)	27.4	29.9	5.75	0.244	0	0	0
Sales of space heating units - Gas Furnace (%)	68.5	55	39.3	6.28	0.373	0	0
Sales of water heating units - Electric Heat Pump (%)	1.43	3.46	15.8	41.2	45.7	46	46
Sales of water heating units - Electric Resistance (%)	7.28	12.2	23.8	48	52.2	52.5	52.5
Sales of water heating units - Gas Furnace (%)	88.4	80.6	58.5	9.33	0.552	0	0
Sales of water heating units - Other (%)	2.9	3.75	1.86	1.55	1.53	1.53	1.55

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)		0.337	0.347	1.19	1.3	1.08	1.15

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	37.9	36	34.2	31.9	29.5	27.8	26.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Industry (PJ)	7.41	7.1	7.08	7.12	7.25	7.42	7.63
Final energy use - Residential (PJ)	45.6	42.8	39.4	34.2	28.6	24.4	21.9
Final energy use - Transportation (PJ)	58.1	53.8	47.4	39.2	31.8	27.1	24.9

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	0.886	0.975	0	0	0	0
Sales of cooking units - Electric Resistance (%)	55.1	64.6	94	99.7	100	100	100
Sales of cooking units - Gas (%)	44.9	35.4	6.05	0.305	0	0	0
Sales of space heating units - Electric Heat Pump (%)	4.86	12.4	57.2	90.9	95.9	96.2	96.2
Sales of space heating units - Electric Resistance (%)	3.87	5.87	4.58	1.99	1.51	1.47	1.61
Sales of space heating units - Fossil (%)	37.2	45.9	12.9	2.88	2.05	2.02	1.96
Sales of space heating units - Gas (%)	54.1	35.8	25.3	4.26	0.506	0.272	0.257
Sales of water heating units - Electric Heat Pump (%)	0	1.46	13.8	34.6	38.2	38.4	38.4
Sales of water heating units - Electric Resistance (%)	22.1	39.5	47.7	59.4	61.4	61.5	61.5
Sales of water heating units - Gas Furnace (%)	65.5	51	36.9	5.9	0.348	0	0
Sales of water heating units - Other (%)	12.4	7.96	1.57	0.146	0.084	0.085	0.085

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	167	429	695	1,053	1,145	1,092
Public EV charging plugs - DC Fast (1000 units)	0.024	0	0.247	0	1.08	0	1.74
Public EV charging plugs - L2 (1000 units)	0.374	0	5.92	0	25.9	0	41.8
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 (%)	1.21	1.51	1.13	0.357	0.069	0.013	0
Vehicle sales - Light-duty - EV (%)	5.05	18.7	51.6	83.8	96.6	99.3	100
Vehicle sales - Light-duty - gasoline (%)	88	74	43.5	14.5	3.02	0.582	0
Vehicle sales - Light-duty - hybrid (%)	5.53	5.35	3.58	1.29	0.321	0.072	0
Vehicle sales - Light-duty - hydrogen FC (%)	0.108	0.32	0.176	0.053	0.011	0.002	0
Vehicle sales - Light-duty - other (%)	0.086	0.082	0.05	0.017	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 - Base (billion \$2018)		0	1.22	0.529	0	0	0.271
Capital invested - Offshore Wind - Constrained (billion \$2018)		2.75	0	0	0	0	0
Capital invested - Solar PV - Base (billion \$2018)		0	0	0	0	0	0
Capital invested - Solar PV - Constrained (billion \$2018)		0	0	0	0	0	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 - Base land use assumptions (GWh)	0	0	1,567	837			833
OffshoreWind - Constrained land use assumptions (GWh)	297	2,874	0	0			0
Solar - Base land use assumptions (GWh)	220	0	0	0			0
Solar - Constrained land use assumptions (GWh)	583	0	0	0			0
Wind - Base land use assumptions (GWh)	371	0	0	0			0
Wind - Constrained land use assumptions (GWh)	371	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)							-10.3
Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y)							-0.327
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-10.7
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-5.39
Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y)							-0.164
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-5.55
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)							6.55
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							0.595

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							7.15
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)							3.43
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							0.298
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							3.72

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 tCO ₂ e/y)							-8.13
Carbon sink potential - High - All (not counting overlap) (1000 tCO ₂ e/y)							-617
Carbon sink potential - High - Avoid deforestation (1000 tCO ₂ e/y)							-165
Carbon sink potential - High - Extend rotation length (1000 tCO ₂ e/y)							-246
Carbon sink potential - High - Improve plantations (1000 tCO ₂ e/y)							0
Carbon sink potential - High - Increase retention of HWP (1000 tCO ₂ e/y)							-54.9
Carbon sink potential - High - Increase trees outside forests (1000 tCO ₂ e/y)							-28.5
Carbon sink potential - High - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO ₂ e/y)							-50.3
Carbon sink potential - High - Restore productivity (1000 tCO ₂ e/y)							-63.9
Carbon sink potential - Low - Accelerate regeneration (1000 tCO ₂ e/y)							-4.07
Carbon sink potential - Low - All (not counting overlap) (1000 tCO ₂ e/y)							-180
Carbon sink potential - Low - Avoid deforestation (1000 tCO ₂ e/y)							-27.6
Carbon sink potential - Low - Extend rotation length (1000 tCO ₂ e/y)							-94.6
Carbon sink potential - Low - Improve plantations (1000 tCO ₂ e/y)							0
Carbon sink potential - Low - Increase retention of HWP (1000 tCO ₂ e/y)							-18.3
Carbon sink potential - Low - Increase trees outside forests (1000 tCO ₂ e/y)							-9.99
Carbon sink potential - Low - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO ₂ e/y)							-3.81
Carbon sink potential - Low - Restore productivity (1000 tCO ₂ e/y)							-21.5
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO ₂ e/y)							-6.1

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO ₂ e/y)							-399
Carbon sink potential - Mid - Avoid deforestation (1000 tCO ₂ e/y)							-96.5
Carbon sink potential - Mid - Extend rotation length (1000 tCO ₂ e/y)							-170
Carbon sink potential - Mid - Improve plantations (1000 tCO ₂ e/y)							0
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO ₂ e/y)							-36.6
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO ₂ e/y)							-19.3
Carbon sink potential - Mid - Reforest cropland (1000 tCO ₂ e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO ₂ e/y)							-27
Carbon sink potential - Mid - Restore productivity (1000 tCO ₂ e/y)							-42.7
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							1.33
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							22.4
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							126
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0
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)							2.71
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							1.43
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							21.2
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							175
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							0.665
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							21
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							48.1
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0
Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares)							0

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 - Increase trees outside forests (1000 hectares)							1.43
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.247
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							12.8
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							84.3
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							0.997
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							21.7
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							86.8
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0
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)							2.07
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							1.79
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							25.8
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							139

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		98.2	0.103	0.103	0.098	0.06	0.003
Monetary damages from air pollution - Natural Gas (million 2019\$)		56.5	32.3	34.1	25.9	13.8	3.37
Monetary damages from air pollution - Transportation (million 2019\$)		330	306	231	132	59.1	21.5
Premature deaths from air pollution - Coal (deaths)		11.1	0.012	0.012	0.011	0.007	0
Premature deaths from air pollution - Natural Gas (deaths)		6.37	3.65	3.85	2.93	1.56	0.38
Premature deaths from air pollution - Transportation (deaths)		37.1	34.4	26	14.9	6.64	2.42

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	1,952	2,132	0	0	0	0
Sales of cooking units - Electric Resistance (%)	36.9	40.7	44.7	56.5	72.7	82.9	86.4
Sales of cooking units - Gas (%)	63.1	59.3	55.3	43.5	27.3	17.1	13.6
Sales of space heating units - Electric Heat Pump (%)	2.71	7.42	10.6	20.5	40.4	61.4	72.8
Sales of space heating units - Electric Resistance (%)	1.36	2.46	3.76	7.72	14.3	19.2	21.2
Sales of space heating units - Fossil (%)	27.4	34.6	32.4	24.5	11.9	3.78	0.991
Sales of space heating units - Gas Furnace (%)	68.5	55.5	53.2	47.3	33.4	15.6	5.09
Sales of water heating units - Electric Heat Pump (%)	1.43	2.87	4.27	8.98	20.1	34	42.1
Sales of water heating units - Electric Resistance (%)	7.28	11.6	12.8	17.4	28	41.1	48.8
Sales of water heating units - Gas Furnace (%)	88.4	81.4	79.2	70.3	49.5	23.1	7.55
Sales of water heating units - Other (%)	2.9	4.09	3.79	3.25	2.39	1.79	1.62

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)		0.246	0.245	0.466	0.491	0.969	1.05

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	37.9	36	35	34.2	33.1	31.9	30.6
Final energy use - Industry (PJ)	7.41	7.1	7.11	7.23	7.42	7.57	7.74
Final energy use - Residential (PJ)	45.6	43	41.1	39.3	36.3	32.3	28
Final energy use - Transportation (PJ)	58.2	54.4	49.9	45.9	42.7	38.8	34.4

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	0.888	1.03	0	0	0	0
Sales of cooking units - Electric Resistance (%)	54.9	56.1	60.2	71.1	86.2	95.6	98.8
Sales of cooking units - Gas (%)	45.1	43.9	39.8	28.9	13.8	4.45	1.2
Sales of space heating units - Electric Heat Pump (%)	4.86	5.74	10.9	26.2	53.8	78.8	90.8
Sales of space heating units - Electric Resistance (%)	3.87	5.91	5.68	5.25	4.15	2.68	1.92
Sales of space heating units - Fossil (%)	37.2	52.1	48.5	37.5	20.3	8.33	3.72
Sales of space heating units - Gas (%)	54.1	36.3	34.9	31	21.7	10.2	3.52
Sales of water heating units - Electric Heat Pump (%)	0	0.513	1.93	6.5	16.6	28.5	35.2
Sales of water heating units - Electric Resistance (%)	22.1	38.7	39.7	42.7	48.9	55.9	59.7
Sales of water heating units - Gas Furnace (%)	65.5	51.6	49.9	44.4	31.3	14.6	4.75
Sales of water heating units - Other (%)	12.4	9.19	8.47	6.4	3.18	1.08	0.344

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	27.1	56.8	192	604	880
Public EV charging plugs - DC Fast (1000 units)	0.024	0	0.077	0	0.4	0	1.12
Public EV charging plugs - L2 (1000 units)	0.374	0	1.84	0	9.6	0	26.8
Vehicle sales - Heavy-duty - diesel (%)	97.4	96	91.3	79.8	58.2	32.1	13.7
Vehicle sales - Heavy-duty - EV (%)	0.498	1.45	4.11	10.8	23.6	39.5	51
Vehicle sales - Heavy-duty - gasoline (%)	0.228	0.236	0.239	0.225	0.179	0.109	0.051
Vehicle sales - Heavy-duty - hybrid (%)	0.083	0.094	0.104	0.107	0.092	0.06	0.03
Vehicle sales - Heavy-duty - hydrogen FC (%)	0.332	0.969	2.74	7.17	15.7	26.3	34
Vehicle sales - Heavy-duty - other (%)	1.5	1.28	1.46	1.95	2.25	1.96	1.14
Vehicle sales - Light-duty - diesel (%)	1.22	1.69	2	1.57	0.98	0.498	0.214
Vehicle sales - Light-duty - EV (%)	2.29	5.57	13.6	28.7	51.4	74	88.4
Vehicle sales - Light-duty - gasoline (%)	90.5	85.8	76.9	63.1	42.8	22.8	10.1
Vehicle sales - Light-duty - hybrid (%)	5.76	6.51	7.15	6.34	4.59	2.61	1.24
Vehicle sales - Light-duty - hydrogen FC (%)	0.112	0.37	0.307	0.227	0.157	0.086	0.04
Vehicle sales - Light-duty - other (%)	0.088	0.091	0.082	0.07	0.05	0.027	0.012
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	114
Conversion capital investment - Cumulative 5-yr (million \$2018)	0	0	0	0	0	0	1,510
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	1
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

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

Item	2020	2025	2030	2035	2040	2045	2050
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	1.94
Annual - BECCS (MMT)		0	0	0	0	0	1.94
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	1.94
Cumulative - BECCS (MMT)		0	0	0	0	0	1.94
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	79.2
Cumulative investment - All (million \$2018)		0	0	0	0	0	65.6
Cumulative investment - Spur (million \$2018)		0	0	0	0	0	65.6
Cumulative investment - Trunk (million \$2018)		0	0	0	0	0	0
Spur (km)		0	0	0	0	0	79.2
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)							0
Carbon sink potential - Aggressive deployment - Cropland measures (1000 tCO2e/y)							-10.3
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)							-0.327
Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y)							-10.7

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y)							0
Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y)							-5.39
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)							-0.164
Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y)							-5.55
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)							16.2
Land impacted for carbon sink - Aggressive deployment - Cropland to woody energy crops (1000 hectares)							0
Land impacted for carbon sink - Aggressive deployment - Pasture to energy crops (1000 hectares)							0.047
Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares)							0.595
Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares)							16.8
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)							3.43
Land impacted for carbon sink - Moderate deployment - Cropland to woody energy crops (1000 hectares)							0
Land impacted for carbon sink - Moderate deployment - Pasture to energy crops (1000 hectares)							0.047
Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares)							0.298
Land impacted for carbon sink - Moderate deployment - Total (1000 hectares)							3.77

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)							-8.13
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-617
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-165

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

Item	2020	2025	2030	2035	2040	2045	2050
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-246
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-54.9
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-28.5
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-50.3
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-63.9
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-4.07
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-180
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-27.6
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-94.6
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-18.3
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-9.99
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-3.81
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-21.5
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-6.1
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-399
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-96.5
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-170
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-36.6
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-19.3
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-27
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-42.7
Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares)							1.33
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							22.4

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

Item	2020	2025	2030	2035	2040	2045	2050
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							126
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0
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)							2.71
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							1.43
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							21.2
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							175
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							0.665
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							21
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							48.1
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0
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)							1.43
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.247
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							12.8
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							84.3
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							0.997
Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares)							21.7
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							86.8
Land impacted for carbon sink potential - Mid - Improve plantations (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 - Mid - Increase retention of HWP (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Increase trees outside forests (1000 hectares)							2.07
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							1.79
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							25.8
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							139

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

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		98.2	0.103	0.103	0.098	0.06	0.003
Monetary damages from air pollution - Natural Gas (million 2019\$)		56.2	20.8	9.63	7.86	4.93	3.07
Monetary damages from air pollution - Transportation (million 2019\$)		336	338	327	292	231	157
Premature deaths from air pollution - Coal (deaths)		11.1	0.012	0.012	0.011	0.007	0
Premature deaths from air pollution - Natural Gas (deaths)		6.34	2.35	1.09	0.887	0.557	0.347
Premature deaths from air pollution - Transportation (deaths)		37.8	38	36.8	32.9	26	17.7

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	1,928	1,983	0	0	0	0
Sales of cooking units - Electric Resistance (%)	36.9	39	38.6	38.5	38.3	38.5	38.4
Sales of cooking units - Gas (%)	63.1	61	61.4	61.5	61.7	61.5	61.6
Sales of space heating units - Electric Heat Pump (%)	2.71	12.7	40.8	63.9	67.6	67.9	68
Sales of space heating units - Electric Resistance (%)	1.36	2.89	7.67	20	30.2	31.9	32
Sales of space heating units - Fossil (%)	27.4	33.4	23.6	9.33	1.34	0.106	0
Sales of space heating units - Gas Furnace (%)	68.5	51	27.9	6.76	0.86	0.048	0
Sales of water heating units - Electric Heat Pump (%)	1.43	2.35	2.32	2.33	2.32	2.34	2.33
Sales of water heating units - Electric Resistance (%)	7.28	11.1	10.9	11.1	11.1	11	11
Sales of water heating units - Gas Furnace (%)	88.4	82.4	82.7	82.5	82.5	82.7	82.6
Sales of water heating units - Other (%)	2.9	4.16	4.07	4.09	4.16	4	4.05

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)		0.245	0.243	0.8	0.865	0.782	0.829

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

Item	2020	2025	2030	2035	2040	2045	2050
Final energy use - Commercial (PJ)	37.8	36.8	37.1	37.1	37.2	38.2	39.8
Final energy use - Industry (PJ)	7.42	7.31	7.55	7.93	8.42	8.89	9.39
Final energy use - Residential (PJ)	45.6	43.2	42	41.3	40.8	40.5	40.2
Final energy use - Transportation (PJ)	58.1	54.5	50.5	48.1	48.2	49.7	51.5

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	0.864	0.9	0	0	0	0
Sales of cooking units - Electric Resistance (%)	54.5	54.5	54.5	54.5	54.5	54.5	54.5
Sales of cooking units - Gas (%)	45.5	45.5	45.5	45.5	45.5	45.5	45.5
Sales of space heating units - Electric Heat Pump (%)	4.66	8.08	8.4	8.88	9.08	9.28	9.55
Sales of space heating units - Electric Resistance (%)	3.9	5.72	5.6	5.54	5.52	5.25	5.08
Sales of space heating units - Fossil (%)	37.3	45.1	23.2	7.8	6.77	6.71	6.7
Sales of space heating units - Gas (%)	54.2	41.1	62.8	77.8	78.6	78.8	78.7
Sales of water heating units - Electric Heat Pump (%)	0	0	0	0	0	0	0
Sales of water heating units - Electric Resistance (%)	22.1	38.4	38.4	38.4	38.4	38.4	38.4
Sales of water heating units - Gas Furnace (%)	65.5	52.1	52.2	52.1	52.1	52.1	52.1
Sales of water heating units - Other (%)	12.4	9.45	9.45	9.48	9.5	9.51	9.52

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 (%)	1.21	1.68	2.13	1.99	1.78	1.65	1.57
Vehicle sales - Light-duty - EV (%)	4.69	7.07	7.9	9.78	11.8	13.3	14.6
Vehicle sales - Light-duty - gasoline (%)	88.4	84.4	81.9	79.7	77.4	75.6	74.1
Vehicle sales - Light-duty - hybrid (%)	5.55	6.35	7.66	8.19	8.67	9.07	9.32
Vehicle sales - Light-duty - hydrogen FC (%)	0.109	0.365	0.326	0.285	0.28	0.279	0.288
Vehicle sales - Light-duty - other (%)	0.087	0.09	0.087	0.087	0.086	0.085	0.087
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)							-8.13
Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y)							-617
Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)							-165
Carbon sink potential - High - Extend rotation length (1000 tCO2e/y)							-246
Carbon sink potential - High - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y)							-54.9
Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y)							-28.5
Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - High - Reforest pasture (1000 tCO2e/y)							-50.3
Carbon sink potential - High - Restore productivity (1000 tCO2e/y)							-63.9
Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y)							-4.07
Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y)							-180
Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y)							-27.6
Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)							-94.6
Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y)							-18.3
Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y)							-9.99
Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y)							-3.81
Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)							-21.5
Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)							-6.1
Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y)							-399
Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y)							-96.5
Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)							-170
Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y)							0
Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y)							-36.6
Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y)							-19.3
Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)							0
Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)							-27
Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)							-42.7

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 - Accelerate regeneration (1000 hectares)							1.33
Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares)							22.4
Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares)							126
Land impacted for carbon sink potential - High - Improve plantations (1000 hectares)							0
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)							2.71
Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares)							1.43
Land impacted for carbon sink potential - High - Restore productivity (1000 hectares)							21.2
Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares)							175
Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares)							0.665
Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares)							21
Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares)							48.1
Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares)							0
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)							1.43
Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares)							0.247
Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares)							12.8
Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares)							84.3
Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares)							0.997

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 - Avoid deforestation (over 30 years) (1000 hectares)							21.7
Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares)							86.8
Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares)							0
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)							2.07
Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares)							0
Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares)							1.79
Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares)							25.8
Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares)							139

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)	-1.01		-0.322				-0.288
Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y)	-0.015		-0.027				-0.028
Business-as-usual carbon sink - Total (Mt CO2e/y)	-1.02		-0.349				-0.316

Table 66: REF scenario - IMPACTS - Health

Item	2020	2025	2030	2035	2040	2045	2050
Monetary damages from air pollution - Coal (million 2019\$)		271	170	158	154	151	134
Monetary damages from air pollution - Natural Gas (million 2019\$)		44.5	29	38.7	54.4	50.4	45.8
Monetary damages from air pollution - Transportation (million 2019\$)		335	342	348	355	362	369
Premature deaths from air pollution - Coal (deaths)		30.7	19.2	17.8	17.4	17	15.2
Premature deaths from air pollution - Natural Gas (deaths)		5.02	3.28	4.37	6.14	5.69	5.17
Premature deaths from air pollution - Transportation (deaths)		37.7	38.5	39.1	39.9	40.7	41.5