# Net-Zero America - nevada 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 | 7,465 | 8,314 | 0 | 0 | 0 | 0 |
| Sales of cooking units - Electric Resistance (%) | 41.9 | 54.6 | 83 | 88.6 | 88.9 | 88.9 | 88.9 |
| Sales of cooking units - Gas (%) | 58.1 | 45.4 | 17 | 11.4 | 11.1 | 11.1 | 11.1 |
| Sales of space heating units - Electric Heat Pump (%) | 3.34 | 20.2 | 63.4 | 88.9 | 92.5 | 92.6 | 92.7 |
| Sales of space heating units - Electric Resistance (%) | 3.3 | 3.45 | 4.17 | 6.37 | 6.82 | 6.85 | 6.84 |
| Sales of space heating units - Fossil (%) | 0.985 | 0.209 | 0.04 | 0.002 | 0 | 0 | 0 |
| Sales of space heating units - Gas Furnace (%) | 92.4 | 76.1 | 32.4 | 4.78 | 0.723 | 0.51 | 0.507 |
| Sales of water heating units - Electric Heat Pump (%) | 0.03 | 8.12 | 45.4 | 61.3 | 63.2 | 63.3 | 63.3 |
| Sales of water heating units - Electric Resistance (%) | 1.46 | 5.07 | 23 | 34.6 | 36.2 | 36.3 | 36.3 |
| Sales of water heating units - Gas Furnace (%) | 98.1 | 86.4 | 31.1 | 3.68 | 0.19 | 0 | 0 |
| Sales of water heating units - Other (%) | 0.365 | 0.384 | 0.383 | 0.384 | 0.383 | 0.384 | 0.383 |

Table 2: *E+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Electricity distribution capital invested - Cumulative 5-yr (billion $2018) | | 2.23 | 2.35 | 3.09 | 3.28 | 3.08 | 3.22 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Final energy use - Commercial (PJ) | 89.2 | 89 | 85.7 | 80.3 | 75.1 | 72.2 | 71.6 |
| Final energy use - Industry (PJ) | 73.7 | 73.6 | 72.2 | 72.9 | 75.5 | 77.3 | 79.1 |
| Final energy use - Residential (PJ) | 94.5 | 92.3 | 87.6 | 79.2 | 71.6 | 67.4 | 65.8 |
| Final energy use - Transportation (PJ) | 291 | 274 | 249 | 218 | 190 | 171 | 162 |

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 | 3.41 | 4.55 | 0 | 0 | 0 | 0 |
| Sales of cooking units - Electric Resistance (%) | 66.4 | 73.5 | 95.5 | 99.8 | 100 | 100 | 100 |
| Sales of cooking units - Gas (%) | 33.6 | 26.5 | 4.53 | 0.228 | 0 | 0 | 0 |
| Sales of space heating units - Electric Heat Pump (%) | 9.66 | 27.4 | 68.8 | 88.9 | 91.4 | 91.5 | 91.4 |
| Sales of space heating units - Electric Resistance (%) | 13.5 | 20.2 | 10.8 | 6.22 | 5.65 | 5.68 | 5.75 |
| Sales of space heating units - Fossil (%) | 2.25 | 3.38 | 1.94 | 1.18 | 1.02 | 0.999 | 1.02 |
| Sales of space heating units - Gas (%) | 74.6 | 49 | 18.5 | 3.73 | 1.9 | 1.81 | 1.81 |
| Sales of water heating units - Electric Heat Pump (%) | 0 | 8.43 | 46.6 | 60.9 | 62.4 | 62.5 | 62.5 |
| Sales of water heating units - Electric Resistance (%) | 23.2 | 37.5 | 32.8 | 35.1 | 35.7 | 35.8 | 35.8 |
| Sales of water heating units - Gas Furnace (%) | 75.1 | 52.3 | 18.8 | 2.22 | 0.114 | 0 | 0 |
| Sales of water heating units - Other (%) | 1.72 | 1.82 | 1.81 | 1.8 | 1.78 | 1.78 | 1.78 |

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 | 477 | 1,240 | 1,983 | 3,014 | 3,269 | 3,123 |
| Public EV charging plugs - DC Fast (1000 units) | 0.256 | 0 | 0.746 | 0 | 3.11 | 0 | 4.99 |
| Public EV charging plugs - L2 (1000 units) | 0.619 | 0 | 17.9 | 0 | 74.7 | 0 | 120 |
| 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 (%) | 1.44 | 1.72 | 1.21 | 0.387 | 0.073 | 0.013 | 0 |
| Vehicle sales - Light-duty - EV (%) | 4.28 | 16.3 | 48.1 | 82.5 | 96.4 | 99.3 | 100 |
| Vehicle sales - Light-duty - gasoline (%) | 89.3 | 76.8 | 47.1 | 15.8 | 3.2 | 0.587 | 0 |
| Vehicle sales - Light-duty - hybrid (%) | 4.77 | 4.8 | 3.33 | 1.22 | 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 (%) | 0.097 | 0.093 | 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 - Solar PV - Base (billion $2018) | 0 | 0 | 0 | 9.55 | 6.1 | 4.81 | 4.06 |
| Capital invested - Solar PV - Constrained (billion $2018) | 0 | 3.93 | 0 | 4.62 | 3.7 | 2.12 | 1.58 |
| Capital invested - Wind - Base (billion $2018) | 0 | 0.755 | 3.61 | 4.44 | 2.11 | 0.898 | 2.84 |
| Capital invested - Wind - Constrained (billion $2018) | 0 | 0.262 | 1.01 | 0.429 | 0.94 | 0.089 | 0.787 |
| Installed (cumulative) - OffshoreWind - Base land use assumptions (MW) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Installed (cumulative) - Rooftop PV (MW) | 675 | 1,040 | 1,389 | 1,810 | 2,310 | 2,893 | 3,583 |
| Installed (cumulative) - Solar - Base land use assumptions (MW) | 4,971 | 4,971 | 4,971 | 13,631 | 19,500 | 24,398 | 28,779 |
| Installed (cumulative) - Wind - Base land use assumptions (MW) | 822 | 1,335 | 4,050 | 7,632 | 9,418 | 10,219 | 12,897 |

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 |
| Solar - Base land use assumptions (GWh) | 13,021 | 0 | 0 | 21,541 | 14,515 | 12,087 | 10,775 |
| Solar - Constrained land use assumptions (GWh) | 12,657 | 0 | 0 | 3,812 | 4,423 | 3,148 | 8,802 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Wind - Base land use assumptions (GWh) | 2,421 | 1,498 | 7,621 | 9,902 | 4,883 | 2,157 | 7,226 |
| Wind - Constrained land use assumptions (GWh) | 657 | 538 | 1,658 | 1,092 | 1,453 | 76.4 | 1,732 |

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 | 0.01 | 0.03 | 0.05 | 0.04 | 0.03 |
| Annual - BECCS (MMT) | | 0 | 0 | 0 | 0 | 0 | 0 |
| Annual - Cement and lime (MMT) | | 0 | 0 | 0 | 0 | 0 | 0 |
| Annual - NGCC (MMT) | | 0 | 0.01 | 0.03 | 0.05 | 0.04 | 0.03 |
| Cumulative - All (MMT) | | 0 | 0.01 | 0.04 | 0.09 | 0.13 | 0.16 |
| Cumulative - BECCS (MMT) | | 0 | 0 | 0 | 0 | 0 | 0 |
| Cumulative - Cement and lime (MMT) | | 0 | 0 | 0 | 0 | 0 | 0 |
| Cumulative - NGCC (MMT) | | 0 | 0.01 | 0.04 | 0.09 | 0.13 | 0.16 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| All (km) | | 0 | 51.1 | 102 | 102 | 102 | 102 |
| Cumulative investment - All (million $2018) | | 0 | 26.6 | 53.3 | 53.4 | 53.4 | 53.3 |
| Cumulative investment - Spur (million $2018) | | 0 | 26.6 | 53.3 | 53.4 | 53.4 | 53.3 |
| Cumulative investment - Trunk (million $2018) | | 0 | 0 | 0 | 0 | 0 | 0 |
| Spur (km) | | 0 | 51.1 | 102 | 102 | 102 | 102 |
| 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) | | | | | | | -227 |
| Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y) | | | | | | | -1.61 |
| Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y) | | | | | | | -229 |
| Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y) | | | | | | | -114 |
| Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y) | | | | | | | -0.807 |
| Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y) | | | | | | | -115 |
| 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) | | | | | | | 319 |
| Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares) | | | | | | | 2.48 |
| Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares) | | | | | | | 322 |
| 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) | | | | | | | 160 |
| Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares) | | | | | | | 1.24 |
| Land impacted for carbon sink - Moderate deployment - Total (1000 hectares) | | | | | | | 162 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y) | | | | | | | -1,579 |
| Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y) | | | | | | | -10,254 |
| Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y) | | | | | | | -691 |
| Carbon sink potential - High - Extend rotation length (1000 tCO2e/y) | | | | | | | -4,703 |
| Carbon sink potential - High - Improve plantations (1000 tCO2e/y) | | | | | | | -2.49 |
| Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y) | | | | | | | -4.57 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y) | | | | | | | -186 |
| Carbon sink potential - High - Reforest cropland (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - High - Reforest pasture (1000 tCO2e/y) | | | | | | | -593 |
| Carbon sink potential - High - Restore productivity (1000 tCO2e/y) | | | | | | | -2,495 |
| Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y) | | | | | | | -791 |
| Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y) | | | | | | | -3,666 |
| Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y) | | | | | | | -115 |
| Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y) | | | | | | | -1,806 |
| Carbon sink potential - Low - Improve plantations (1000 tCO2e/y) | | | | | | | -1.27 |
| Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y) | | | | | | | -1.52 |
| Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y) | | | | | | | -65.1 |
| Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y) | | | | | | | -44.9 |
| Carbon sink potential - Low - Restore productivity (1000 tCO2e/y) | | | | | | | -841 |
| Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y) | | | | | | | -1,185 |
| Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y) | | | | | | | -6,960 |
| Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y) | | | | | | | -403 |
| Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y) | | | | | | | -3,254 |
| Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y) | | | | | | | -1.86 |
| Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y) | | | | | | | -3.05 |
| Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y) | | | | | | | -126 |
| Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y) | | | | | | | -319 |
| Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y) | | | | | | | -1,668 |
| Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares) | | | | | | | 258 |
| Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares) | | | | | | | 93.6 |
| Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares) | | | | | | | 2,398 |
| Land impacted for carbon sink potential - High - Improve plantations (1000 hectares) | | | | | | | 0.918 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares) | | | | | | | 17.7 |
| Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares) | | | | | | | 16.8 |
| Land impacted for carbon sink potential - High - Restore productivity (1000 hectares) | | | | | | | 827 |
| Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares) | | | | | | | 3,612 |
| Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares) | | | | | | | 129 |
| Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares) | | | | | | | 87.9 |
| Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares) | | | | | | | 919 |
| Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares) | | | | | | | 0.459 |
| 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) | | | | | | | 9.3 |
| Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares) | | | | | | | 2.92 |
| Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares) | | | | | | | 500 |
| Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) | | | | | | | 1,649 |
| Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares) | | | | | | | 194 |
| Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares) | | | | | | | 90.7 |
| Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares) | | | | | | | 1,658 |
| Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares) | | | | | | | 0.69 |
| 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) | | | | | | | 13.5 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares) | | | | | | | 21.1 |
| Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares) | | | | | | | 1,008 |
| Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares) | | | | | | | 2,986 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Natural gas consumption - Annual (tcf) | | 232 | 196 | 157 | 118 | 74.3 | 51.5 |
| Natural gas consumption - Cumulative (tcf) | | 0 | 0 | 0 | 0 | 0 | 4,725 |
| Natural gas production - Annual (tcf) | | 0.004 | 0.003 | 0.003 | 0.003 | 0.002 | 0.002 |
| Oil consumption - Annual (million bbls) | | 44.9 | 38.5 | 29.3 | 20.6 | 13.8 | 8.32 |
| Oil consumption - Cumulative (million bbls) | | 0 | 0 | 0 | 0 | 0 | 906 |
| Oil production - Annual (million bbls) | | 0.33 | 0.332 | 0.331 | 0.262 | 0.213 | 0.142 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Monetary damages from air pollution - Coal (million 2019$) | | 49.7 | 0.067 | 0.067 | 0.044 | 0.027 | 0 |
| Monetary damages from air pollution - Natural Gas (million 2019$) | | 40.7 | 21.6 | 18.5 | 17.4 | 11.7 | 4.81 |
| Monetary damages from air pollution - Transportation (million 2019$) | | 473 | 466 | 372 | 224 | 105 | 40.3 |
| Premature deaths from air pollution - Coal (deaths) | | 5.62 | 0.008 | 0.008 | 0.005 | 0.003 | 0 |
| Premature deaths from air pollution - Natural Gas (deaths) | | 4.59 | 2.44 | 2.09 | 1.96 | 1.32 | 0.543 |
| Premature deaths from air pollution - Transportation (deaths) | | 53.2 | 52.4 | 41.8 | 25.2 | 11.8 | 4.54 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| By economic sector - Agriculture (jobs) | | 4.73 | 9.61 | 3.67 | 2.85 | 2.09 | 1.56 |
| By economic sector - Construction (jobs) | | 6,041 | 7,276 | 15,232 | 15,004 | 14,345 | 16,626 |
| By economic sector - Manufacturing (jobs) | | 3,127 | 5,003 | 6,673 | 6,273 | 5,545 | 6,319 |
| By economic sector - Mining (jobs) | | 1,000 | 705 | 460 | 278 | 154 | 81.4 |
| By economic sector - Other (jobs) | | 731 | 874 | 2,560 | 2,642 | 2,750 | 3,658 |
| By economic sector - Pipeline (jobs) | | 264 | 236 | 203 | 156 | 109 | 61.4 |
| By economic sector - Professional (jobs) | | 2,457 | 3,297 | 6,883 | 7,165 | 7,159 | 8,679 |
| By economic sector - Trade (jobs) | | 1,734 | 2,077 | 4,320 | 4,514 | 4,619 | 5,832 |
| By economic sector - Utilities (jobs) | | 5,031 | 6,499 | 10,552 | 11,485 | 11,333 | 12,433 |
| By education level - All sectors - Associates degree or some college (jobs) | | 6,552 | 8,394 | 15,220 | 15,480 | 15,019 | 17,509 |
| By education level - All sectors - Bachelors degree (jobs) | | 4,039 | 5,140 | 9,091 | 9,253 | 8,989 | 10,525 |
| By education level - All sectors - Doctoral degree (jobs) | | 133 | 169 | 330 | 337 | 332 | 398 |
| By education level - All sectors - High school diploma or less (jobs) | | 8,698 | 11,043 | 19,997 | 20,143 | 19,413 | 22,591 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| By education level - All sectors - Masters or professional degree (jobs) | | 968 | 1,232 | 2,246 | 2,308 | 2,263 | 2,668 |
| By resource sector - Biomass (jobs) | | 20.3 | 26.5 | 10.5 | 8.58 | 7.64 | 6.65 |
| By resource sector - CO2 (jobs) | | 0 | 116 | 233 | 232 | 231 | 61.2 |
| By resource sector - Coal (jobs) | | 173 | 32.1 | 0 | 0 | 0 | 0 |
| By resource sector - Grid (jobs) | | 7,640 | 10,855 | 19,010 | 20,735 | 20,480 | 23,582 |
| By resource sector - Natural Gas (jobs) | | 2,984 | 2,544 | 2,232 | 2,373 | 2,272 | 1,564 |
| By resource sector - Nuclear (jobs) | | 0 | 0.004 | 0.007 | 0 | 0 | 0 |
| By resource sector - Oil (jobs) | | 2,072 | 1,639 | 1,165 | 767 | 485 | 276 |
| By resource sector - Solar (jobs) | | 5,502 | 5,726 | 17,180 | 16,390 | 16,260 | 21,032 |
| By resource sector - Wind (jobs) | | 1,998 | 5,038 | 7,054 | 7,015 | 6,281 | 7,168 |
| Median wages - Annual - All ($2019 per job) | | 60,296 | 60,802 | 61,169 | 62,341 | 63,413 | 64,215 |
| On-Site or In-Plant Training - Total jobs - 1 to 4 years (jobs) | | 3,400 | 4,322 | 7,823 | 7,938 | 7,685 | 8,928 |
| On-Site or In-Plant Training - Total jobs - 4 to 10 years (jobs) | | 1,442 | 1,792 | 3,345 | 3,406 | 3,309 | 3,829 |
| On-Site or In-Plant Training - Total jobs - None (jobs) | | 3,281 | 4,192 | 7,631 | 7,716 | 7,472 | 8,753 |
| On-Site or In-Plant Training - Total jobs - Over 10 years (jobs) | | 181 | 232 | 422 | 432 | 419 | 485 |
| On-Site or In-Plant Training - Total jobs - Up to 1 year (jobs) | | 12,085 | 15,439 | 27,663 | 28,029 | 27,131 | 31,695 |
| On-the-Job Training - All sectors - 1 to 4 years (jobs) | | 4,393 | 5,582 | 10,115 | 10,274 | 9,951 | 11,548 |
| On-the-Job Training - All sectors - 4 to 10 years (jobs) | | 1,427 | 1,775 | 3,353 | 3,417 | 3,324 | 3,851 |
| On-the-Job Training - All sectors - None (jobs) | | 1,091 | 1,375 | 2,542 | 2,566 | 2,490 | 2,936 |
| On-the-Job Training - All sectors - Over 10 years (jobs) | | 202 | 259 | 468 | 464 | 442 | 513 |
| On-the-Job Training - All sectors - Up to 1 year (jobs) | | 13,275 | 16,988 | 30,407 | 30,800 | 29,809 | 34,842 |
| Related work experience - All sectors - 1 to 4 years (jobs) | | 7,314 | 9,297 | 16,720 | 16,981 | 16,466 | 19,218 |
| Related work experience - All sectors - 4 to 10 years (jobs) | | 4,774 | 6,077 | 10,924 | 11,095 | 10,750 | 12,504 |
| Related work experience - All sectors - None (jobs) | | 2,963 | 3,759 | 6,814 | 6,922 | 6,717 | 7,840 |
| Related work experience - All sectors - Over 10 years (jobs) | | 1,260 | 1,624 | 2,855 | 2,890 | 2,787 | 3,239 |
| Related work experience - All sectors - Up to 1 year (jobs) | | 4,079 | 5,220 | 9,572 | 9,632 | 9,296 | 10,890 |
| Wage income - All (million $2019) | | 1,230 | 1,580 | 2,868 | 2,963 | 2,919 | 3,448 |

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 | 7,460 | 8,285 | 0 | 0 | 0 | 0 |
| Sales of cooking units - Electric Resistance (%) | 41.9 | 46.2 | 50.2 | 60.8 | 75.4 | 84.6 | 87.8 |
| Sales of cooking units - Gas (%) | 58.1 | 53.8 | 49.8 | 39.2 | 24.6 | 15.4 | 12.2 |
| Sales of space heating units - Electric Heat Pump (%) | 3.34 | 13 | 18 | 32.6 | 57.8 | 78.9 | 88.5 |
| Sales of space heating units - Electric Resistance (%) | 3.3 | 3.43 | 3.51 | 3.82 | 4.64 | 5.8 | 6.5 |
| Sales of space heating units - Fossil (%) | 0.985 | 0.242 | 0.226 | 0.167 | 0.082 | 0.026 | 0.007 |
| Sales of space heating units - Gas Furnace (%) | 92.4 | 83.3 | 78.3 | 63.4 | 37.5 | 15.3 | 4.96 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Sales of water heating units - Electric Heat Pump (%) | 0.03 | 1.53 | 5.79 | 18.2 | 38.6 | 54.2 | 60.6 |
| Sales of water heating units - Electric Resistance (%) | 1.46 | 2.2 | 4.25 | 10.4 | 21 | 30.2 | 34.5 |
| Sales of water heating units - Gas Furnace (%) | 98.1 | 95.9 | 89.6 | 71 | 39.9 | 15.3 | 4.5 |
| Sales of water heating units - Other (%) | 0.365 | 0.384 | 0.383 | 0.384 | 0.383 | 0.384 | 0.383 |

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) | | 2 | 2.09 | 2.43 | 2.55 | 2.99 | 3.14 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Final energy use - Commercial (PJ) | 89.2 | 89.2 | 88.5 | 87.3 | 84.9 | 81.8 | 79 |
| Final energy use - Industry (PJ) | 73.7 | 73.6 | 72.4 | 73.5 | 76.5 | 78.3 | 80 |
| Final energy use - Residential (PJ) | 94.5 | 92.7 | 91.9 | 90.1 | 85.9 | 79.9 | 74.4 |
| Final energy use - Transportation (PJ) | 291 | 276 | 258 | 242 | 229 | 214 | 195 |

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 | 3.39 | 4.49 | 0 | 0 | 0 | 0 |
| Sales of cooking units - Electric Resistance (%) | 66.2 | 67.1 | 70.2 | 78.4 | 89.7 | 96.7 | 99.1 |
| Sales of cooking units - Gas (%) | 33.8 | 32.9 | 29.8 | 21.6 | 10.3 | 3.33 | 0.896 |
| Sales of space heating units - Electric Heat Pump (%) | 9.66 | 20.3 | 25 | 38.9 | 62.1 | 80.4 | 88.2 |
| Sales of space heating units - Electric Resistance (%) | 13.5 | 21.8 | 20.6 | 17.6 | 12.4 | 8.21 | 6.44 |
| Sales of space heating units - Fossil (%) | 2.25 | 3.63 | 3.53 | 2.94 | 1.99 | 1.35 | 1.13 |
| Sales of space heating units - Gas (%) | 74.6 | 54.3 | 50.8 | 40.6 | 23.5 | 10.1 | 4.22 |
| Sales of water heating units - Electric Heat Pump (%) | 0 | 1.53 | 5.88 | 18.5 | 39 | 54 | 60.1 |
| Sales of water heating units - Electric Resistance (%) | 23.2 | 38.6 | 38.2 | 36.7 | 35.1 | 35 | 35.4 |
| Sales of water heating units - Gas Furnace (%) | 75.1 | 58 | 54.2 | 42.9 | 24.1 | 9.21 | 2.71 |
| Sales of water heating units - Other (%) | 1.72 | 1.82 | 1.82 | 1.82 | 1.8 | 1.79 | 1.78 |

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 | 80.1 | 162 | 553 | 1,721 | 2,514 |
| Public EV charging plugs - DC Fast (1000 units) | 0.256 | 0 | 0.253 | 0 | 1.17 | 0 | 3.2 |
| Public EV charging plugs - L2 (1000 units) | 0.619 | 0 | 6.09 | 0 | 28.1 | 0 | 76.9 |
| 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 | 0.524 | 0.225 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Vehicle sales - Light-duty - EV (%) | 2.01 | 4.96 | 12.4 | 26.8 | 49.4 | 72.7 | 87.8 |
| Vehicle sales - Light-duty - gasoline (%) | 91.4 | 86.9 | 78.7 | 65.5 | 45.1 | 24.2 | 10.7 |
| Vehicle sales - Light-duty - hybrid (%) | 4.96 | 5.74 | 6.41 | 5.78 | 4.28 | 2.5 | 1.2 |
| Vehicle sales - Light-duty - hydrogen FC (%) | 0.112 | 0.377 | 0.32 | 0.242 | 0.17 | 0.094 | 0.044 |
| Vehicle sales - Light-duty - other (%) | 0.098 | 0.102 | 0.092 | 0.08 | 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) | | | | | | | -227 |
| Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y) | | | | | | | -1.61 |
| Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y) | | | | | | | -229 |
| Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y) | | | | | | | -114 |
| Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y) | | | | | | | -0.807 |
| Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y) | | | | | | | -115 |
| 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) | | | | | | | 319 |
| Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares) | | | | | | | 2.48 |
| Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares) | | | | | | | 322 |
| 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) | | | | | | | 160 |
| Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares) | | | | | | | 1.24 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Land impacted for carbon sink - Moderate deployment - Total (1000 hectares) | | | | | | | 162 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y) | | | | | | | -1,579 |
| Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y) | | | | | | | -10,254 |
| Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y) | | | | | | | -691 |
| Carbon sink potential - High - Extend rotation length (1000 tCO2e/y) | | | | | | | -4,703 |
| Carbon sink potential - High - Improve plantations (1000 tCO2e/y) | | | | | | | -2.49 |
| Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y) | | | | | | | -4.57 |
| Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y) | | | | | | | -186 |
| Carbon sink potential - High - Reforest cropland (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - High - Reforest pasture (1000 tCO2e/y) | | | | | | | -593 |
| Carbon sink potential - High - Restore productivity (1000 tCO2e/y) | | | | | | | -2,495 |
| Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y) | | | | | | | -791 |
| Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y) | | | | | | | -3,666 |
| Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y) | | | | | | | -115 |
| Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y) | | | | | | | -1,806 |
| Carbon sink potential - Low - Improve plantations (1000 tCO2e/y) | | | | | | | -1.27 |
| Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y) | | | | | | | -1.52 |
| Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y) | | | | | | | -65.1 |
| Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y) | | | | | | | -44.9 |
| Carbon sink potential - Low - Restore productivity (1000 tCO2e/y) | | | | | | | -841 |
| Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y) | | | | | | | -1,185 |
| Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y) | | | | | | | -6,960 |
| Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y) | | | | | | | -403 |
| Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y) | | | | | | | -3,254 |
| Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y) | | | | | | | -1.86 |
| Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y) | | | | | | | -3.05 |
| Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y) | | | | | | | -126 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y) | | | | | | | -319 |
| Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y) | | | | | | | -1,668 |
| Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares) | | | | | | | 258 |
| Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares) | | | | | | | 93.6 |
| Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares) | | | | | | | 2,398 |
| Land impacted for carbon sink potential - High - Improve plantations (1000 hectares) | | | | | | | 0.918 |
| 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) | | | | | | | 17.7 |
| Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares) | | | | | | | 16.8 |
| Land impacted for carbon sink potential - High - Restore productivity (1000 hectares) | | | | | | | 827 |
| Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares) | | | | | | | 3,612 |
| Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares) | | | | | | | 129 |
| Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares) | | | | | | | 87.9 |
| Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares) | | | | | | | 919 |
| Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares) | | | | | | | 0.459 |
| 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) | | | | | | | 9.3 |
| Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares) | | | | | | | 2.92 |
| Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares) | | | | | | | 500 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) | | | | | | | 1,649 |
| Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares) | | | | | | | 194 |
| Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares) | | | | | | | 90.7 |
| Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares) | | | | | | | 1,658 |
| Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares) | | | | | | | 0.69 |
| 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) | | | | | | | 13.5 |
| Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares) | | | | | | | 21.1 |
| Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares) | | | | | | | 1,008 |
| Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares) | | | | | | | 2,986 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Monetary damages from air pollution - Coal (million 2019$) | | 49.7 | 0.067 | 0.067 | 0.044 | 0.027 | 0 |
| Monetary damages from air pollution - Natural Gas (million 2019$) | | 41.5 | 16.3 | 10.7 | 5.53 | 2.61 | 1.34 |
| Monetary damages from air pollution - Transportation (million 2019$) | | 482 | 515 | 527 | 497 | 413 | 295 |
| Premature deaths from air pollution - Coal (deaths) | | 5.62 | 0.008 | 0.008 | 0.005 | 0.003 | 0 |
| Premature deaths from air pollution - Natural Gas (deaths) | | 4.68 | 1.85 | 1.21 | 0.624 | 0.295 | 0.151 |
| Premature deaths from air pollution - Transportation (deaths) | | 54.2 | 57.9 | 59.3 | 55.9 | 46.5 | 33.1 |

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 | 7,465 | 8,314 | 0 | 0 | 0 | 0 |
| Sales of cooking units - Electric Resistance (%) | 41.9 | 54.6 | 83 | 88.6 | 88.9 | 88.9 | 88.9 |
| Sales of cooking units - Gas (%) | 58.1 | 45.4 | 17 | 11.4 | 11.1 | 11.1 | 11.1 |
| Sales of space heating units - Electric Heat Pump (%) | 3.34 | 20.2 | 63.4 | 88.9 | 92.5 | 92.6 | 92.7 |
| Sales of space heating units - Electric Resistance (%) | 3.3 | 3.45 | 4.17 | 6.37 | 6.82 | 6.85 | 6.84 |
| Sales of space heating units - Fossil (%) | 0.985 | 0.209 | 0.04 | 0.002 | 0 | 0 | 0 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Sales of space heating units - Gas Furnace (%) | 92.4 | 76.1 | 32.4 | 4.78 | 0.723 | 0.51 | 0.507 |
| Sales of water heating units - Electric Heat Pump (%) | 0.03 | 8.12 | 45.4 | 61.3 | 63.2 | 63.3 | 63.3 |
| Sales of water heating units - Electric Resistance (%) | 1.46 | 5.07 | 23 | 34.6 | 36.2 | 36.3 | 36.3 |
| Sales of water heating units - Gas Furnace (%) | 98.1 | 86.4 | 31.1 | 3.68 | 0.19 | 0 | 0 |
| Sales of water heating units - Other (%) | 0.365 | 0.384 | 0.383 | 0.384 | 0.383 | 0.384 | 0.383 |

Table 26: *E+RE+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Electricity distribution capital invested - Cumulative 5-yr (billion $2018) | | 2.23 | 2.35 | 3.09 | 3.28 | 3.08 | 3.22 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Final energy use - Commercial (PJ) | 89.2 | 89 | 85.7 | 80.3 | 75.1 | 72.2 | 71.6 |
| Final energy use - Industry (PJ) | 73.7 | 73.6 | 72.2 | 72.9 | 75.5 | 77.3 | 79.1 |
| Final energy use - Residential (PJ) | 94.5 | 92.3 | 87.6 | 79.2 | 71.6 | 67.4 | 65.8 |
| Final energy use - Transportation (PJ) | 291 | 274 | 249 | 218 | 190 | 171 | 162 |

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 | 3.41 | 4.55 | 0 | 0 | 0 | 0 |
| Sales of cooking units - Electric Resistance (%) | 66.4 | 73.5 | 95.5 | 99.8 | 100 | 100 | 100 |
| Sales of cooking units - Gas (%) | 33.6 | 26.5 | 4.53 | 0.228 | 0 | 0 | 0 |
| Sales of space heating units - Electric Heat Pump (%) | 9.66 | 27.4 | 68.8 | 88.9 | 91.4 | 91.5 | 91.4 |
| Sales of space heating units - Electric Resistance (%) | 13.5 | 20.2 | 10.8 | 6.22 | 5.65 | 5.68 | 5.75 |
| Sales of space heating units - Fossil (%) | 2.25 | 3.38 | 1.94 | 1.18 | 1.02 | 0.999 | 1.02 |
| Sales of space heating units - Gas (%) | 74.6 | 49 | 18.5 | 3.73 | 1.9 | 1.81 | 1.81 |
| Sales of water heating units - Electric Heat Pump (%) | 0 | 8.43 | 46.6 | 60.9 | 62.4 | 62.5 | 62.5 |
| Sales of water heating units - Electric Resistance (%) | 23.2 | 37.5 | 32.8 | 35.1 | 35.7 | 35.8 | 35.8 |
| Sales of water heating units - Gas Furnace (%) | 75.1 | 52.3 | 18.8 | 2.22 | 0.114 | 0 | 0 |
| Sales of water heating units - Other (%) | 1.72 | 1.82 | 1.81 | 1.8 | 1.78 | 1.78 | 1.78 |

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 | 477 | 1,240 | 1,983 | 3,014 | 3,269 | 3,123 |
| Public EV charging plugs - DC Fast (1000 units) | 0.256 | 0 | 0.746 | 0 | 3.11 | 0 | 4.99 |
| Public EV charging plugs - L2 (1000 units) | 0.619 | 0 | 17.9 | 0 | 74.7 | 0 | 120 |
| Vehicle sales - Heavy-duty - diesel (%) | 97.2 | 92.1 | 67 | 23.3 | 4.22 | 0.628 | 0 |
| Vehicle sales - Heavy-duty - EV (%) | 0.588 | 3.81 | 19 | 45.6 | 57.4 | 59.6 | 60 |
| Vehicle sales - Heavy-duty - gasoline (%) | 0.227 | 0.227 | 0.176 | 0.066 | 0.013 | 0.002 | 0 |
| Vehicle sales - Heavy-duty - hybrid (%) | 0.082 | 0.09 | 0.077 | 0.031 | 0.007 | 0.001 | 0 |
| Vehicle sales - Heavy-duty - hydrogen FC (%) | 0.392 | 2.54 | 12.7 | 30.4 | 38.2 | 39.7 | 40 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Vehicle sales - Heavy-duty - other (%) | 1.5 | 1.23 | 1.07 | 0.568 | 0.163 | 0.038 | 0 |
| Vehicle sales - Light-duty - diesel (%) | 1.44 | 1.72 | 1.21 | 0.387 | 0.073 | 0.013 | 0 |
| Vehicle sales - Light-duty - EV (%) | 4.28 | 16.3 | 48.1 | 82.5 | 96.4 | 99.3 | 100 |
| Vehicle sales - Light-duty - gasoline (%) | 89.3 | 76.8 | 47.1 | 15.8 | 3.2 | 0.587 | 0 |
| Vehicle sales - Light-duty - hybrid (%) | 4.77 | 4.8 | 3.33 | 1.22 | 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 (%) | 0.097 | 0.093 | 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 - Solar PV - Base (billion $2018) | 0 | 0 | 1.54 | 12.5 | 7.67 | 7.2 | 6.58 |
| Capital invested - Wind - Base (billion $2018) | 0 | 1.35 | 3.98 | 5.69 | 4.12 | 3.06 | 6.92 |
| Installed (cumulative) - OffshoreWind - Base land use assumptions (MW) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Installed (cumulative) - Solar - Base land use assumptions (MW) | 4,971 | 4,971 | 6,259 | 17,580 | 24,957 | 32,297 | 39,397 |
| Installed (cumulative) - Wind - Base land use assumptions (MW) | 822 | 1,738 | 4,729 | 9,316 | 12,802 | 15,530 | 22,067 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Solar - Base land use assumptions (GWh) | 13,021 | 0 | 3,207 | 28,043 | 18,212 | 17,901 | 17,428 |
| Solar - Constrained land use assumptions (GWh) | 13,021 | 0 | 2,777 | 4,885 | 7,544 | 10,378 | 13,224 |
| Wind - Base land use assumptions (GWh) | 2,421 | 2,665 | 8,336 | 12,652 | 9,440 | 7,094 | 16,351 |
| Wind - Constrained land use assumptions (GWh) | 657 | 1,372 | 1,108 | 2,374 | 808 | 234 | 1,058 |

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) | | | | | | | -227 |
| Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y) | | | | | | | -1.61 |
| Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y) | | | | | | | -229 |
| Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y) | | | | | | | -114 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y) | | | | | | | -0.807 |
| Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y) | | | | | | | -115 |
| 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) | | | | | | | 319 |
| Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares) | | | | | | | 2.48 |
| Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares) | | | | | | | 322 |
| 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) | | | | | | | 160 |
| Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares) | | | | | | | 1.24 |
| Land impacted for carbon sink - Moderate deployment - Total (1000 hectares) | | | | | | | 162 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y) | | | | | | | -1,579 |
| Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y) | | | | | | | -10,254 |
| Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y) | | | | | | | -691 |
| Carbon sink potential - High - Extend rotation length (1000 tCO2e/y) | | | | | | | -4,703 |
| Carbon sink potential - High - Improve plantations (1000 tCO2e/y) | | | | | | | -2.49 |
| Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y) | | | | | | | -4.57 |
| Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y) | | | | | | | -186 |
| Carbon sink potential - High - Reforest cropland (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - High - Reforest pasture (1000 tCO2e/y) | | | | | | | -593 |
| Carbon sink potential - High - Restore productivity (1000 tCO2e/y) | | | | | | | -2,495 |
| Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y) | | | | | | | -791 |
| Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y) | | | | | | | -3,666 |
| Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y) | | | | | | | -115 |
| Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y) | | | | | | | -1,806 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Carbon sink potential - Low - Improve plantations (1000 tCO2e/y) | | | | | | | -1.27 |
| Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y) | | | | | | | -1.52 |
| Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y) | | | | | | | -65.1 |
| Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y) | | | | | | | -44.9 |
| Carbon sink potential - Low - Restore productivity (1000 tCO2e/y) | | | | | | | -841 |
| Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y) | | | | | | | -1,185 |
| Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y) | | | | | | | -6,960 |
| Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y) | | | | | | | -403 |
| Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y) | | | | | | | -3,254 |
| Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y) | | | | | | | -1.86 |
| Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y) | | | | | | | -3.05 |
| Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y) | | | | | | | -126 |
| Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y) | | | | | | | -319 |
| Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y) | | | | | | | -1,668 |
| Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares) | | | | | | | 258 |
| Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares) | | | | | | | 93.6 |
| Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares) | | | | | | | 2,398 |
| Land impacted for carbon sink potential - High - Improve plantations (1000 hectares) | | | | | | | 0.918 |
| 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) | | | | | | | 17.7 |
| Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares) | | | | | | | 16.8 |
| Land impacted for carbon sink potential - High - Restore productivity (1000 hectares) | | | | | | | 827 |
| Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares) | | | | | | | 3,612 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares) | | | | | | | 129 |
| Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares) | | | | | | | 87.9 |
| Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares) | | | | | | | 919 |
| Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares) | | | | | | | 0.459 |
| 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) | | | | | | | 9.3 |
| Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares) | | | | | | | 2.92 |
| Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares) | | | | | | | 500 |
| Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) | | | | | | | 1,649 |
| Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares) | | | | | | | 194 |
| Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares) | | | | | | | 90.7 |
| Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares) | | | | | | | 1,658 |
| Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares) | | | | | | | 0.69 |
| 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) | | | | | | | 13.5 |
| Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares) | | | | | | | 21.1 |
| Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares) | | | | | | | 1,008 |
| Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares) | | | | | | | 2,986 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Monetary damages from air pollution - Coal (million 2019$) | | 49.7 | 0.067 | 0.067 | 0.044 | 0.027 | 0 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Monetary damages from air pollution - Natural Gas (million 2019$) | | 37.3 | 19.5 | 10.2 | 6.87 | 3.43 | 1.19 |
| Monetary damages from air pollution - Transportation (million 2019$) | | 473 | 466 | 372 | 224 | 105 | 40.3 |
| Premature deaths from air pollution - Coal (deaths) | | 5.62 | 0.008 | 0.008 | 0.005 | 0.003 | 0 |
| Premature deaths from air pollution - Natural Gas (deaths) | | 4.21 | 2.21 | 1.15 | 0.775 | 0.387 | 0.134 |
| Premature deaths from air pollution - Transportation (deaths) | | 53.2 | 52.4 | 41.8 | 25.2 | 11.8 | 4.54 |

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 | 7,465 | 8,314 | 0 | 0 | 0 | 0 |
| Sales of cooking units - Electric Resistance (%) | 41.9 | 54.6 | 83 | 88.6 | 88.9 | 88.9 | 88.9 |
| Sales of cooking units - Gas (%) | 58.1 | 45.4 | 17 | 11.4 | 11.1 | 11.1 | 11.1 |
| Sales of space heating units - Electric Heat Pump (%) | 3.34 | 20.2 | 63.4 | 88.9 | 92.5 | 92.6 | 92.7 |
| Sales of space heating units - Electric Resistance (%) | 3.3 | 3.45 | 4.17 | 6.37 | 6.82 | 6.85 | 6.84 |
| Sales of space heating units - Fossil (%) | 0.985 | 0.209 | 0.04 | 0.002 | 0 | 0 | 0 |
| Sales of space heating units - Gas Furnace (%) | 92.4 | 76.1 | 32.4 | 4.78 | 0.723 | 0.51 | 0.507 |
| Sales of water heating units - Electric Heat Pump (%) | 0.03 | 8.12 | 45.4 | 61.3 | 63.2 | 63.3 | 63.3 |
| Sales of water heating units - Electric Resistance (%) | 1.46 | 5.07 | 23 | 34.6 | 36.2 | 36.3 | 36.3 |
| Sales of water heating units - Gas Furnace (%) | 98.1 | 86.4 | 31.1 | 3.68 | 0.19 | 0 | 0 |
| Sales of water heating units - Other (%) | 0.365 | 0.384 | 0.383 | 0.384 | 0.383 | 0.384 | 0.383 |

Table 36: *E+RE- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Electricity distribution capital invested - Cumulative 5-yr (billion $2018) | | 2.23 | 2.35 | 3.09 | 3.28 | 3.08 | 3.22 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Final energy use - Commercial (PJ) | 89.2 | 89 | 85.7 | 80.3 | 75.1 | 72.2 | 71.6 |
| Final energy use - Industry (PJ) | 73.7 | 73.6 | 72.2 | 72.9 | 75.5 | 77.3 | 79.1 |
| Final energy use - Residential (PJ) | 94.5 | 92.3 | 87.6 | 79.2 | 71.6 | 67.4 | 65.8 |
| Final energy use - Transportation (PJ) | 291 | 274 | 249 | 218 | 190 | 171 | 162 |

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 | 3.41 | 4.55 | 0 | 0 | 0 | 0 |
| Sales of cooking units - Electric Resistance (%) | 66.4 | 73.5 | 95.5 | 99.8 | 100 | 100 | 100 |
| Sales of cooking units - Gas (%) | 33.6 | 26.5 | 4.53 | 0.228 | 0 | 0 | 0 |
| Sales of space heating units - Electric Heat Pump (%) | 9.66 | 27.4 | 68.8 | 88.9 | 91.4 | 91.5 | 91.4 |
| Sales of space heating units - Electric Resistance (%) | 13.5 | 20.2 | 10.8 | 6.22 | 5.65 | 5.68 | 5.75 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Sales of space heating units - Fossil (%) | 2.25 | 3.38 | 1.94 | 1.18 | 1.02 | 0.999 | 1.02 |
| Sales of space heating units - Gas (%) | 74.6 | 49 | 18.5 | 3.73 | 1.9 | 1.81 | 1.81 |
| Sales of water heating units - Electric Heat Pump (%) | 0 | 8.43 | 46.6 | 60.9 | 62.4 | 62.5 | 62.5 |
| Sales of water heating units - Electric Resistance (%) | 23.2 | 37.5 | 32.8 | 35.1 | 35.7 | 35.8 | 35.8 |
| Sales of water heating units - Gas Furnace (%) | 75.1 | 52.3 | 18.8 | 2.22 | 0.114 | 0 | 0 |
| Sales of water heating units - Other (%) | 1.72 | 1.82 | 1.81 | 1.8 | 1.78 | 1.78 | 1.78 |

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 | 477 | 1,240 | 1,983 | 3,014 | 3,269 | 3,123 |
| Public EV charging plugs - DC Fast (1000 units) | 0.256 | 0 | 0.746 | 0 | 3.11 | 0 | 4.99 |
| Public EV charging plugs - L2 (1000 units) | 0.619 | 0 | 17.9 | 0 | 74.7 | 0 | 120 |
| 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 (%) | 1.44 | 1.72 | 1.21 | 0.387 | 0.073 | 0.013 | 0 |
| Vehicle sales - Light-duty - EV (%) | 4.28 | 16.3 | 48.1 | 82.5 | 96.4 | 99.3 | 100 |
| Vehicle sales - Light-duty - gasoline (%) | 89.3 | 76.8 | 47.1 | 15.8 | 3.2 | 0.587 | 0 |
| Vehicle sales - Light-duty - hybrid (%) | 4.77 | 4.8 | 3.33 | 1.22 | 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 (%) | 0.097 | 0.093 | 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 - Solar PV - Base (billion $2018) | | 1.02 | 1.25 | 4.31 | 3.28 | 1.17 | 0 |
| Capital invested - Solar PV - Constrained (billion $2018) | | 1.21 | 1.27 | 1.83 | 1.36 | 0.252 | 0 |
| Capital invested - Wind - Base (billion $2018) | | 0.732 | 0.847 | 2.48 | 2.62 | 1.24 | 1.86 |
| Capital invested - Wind - Constrained (billion $2018) | | 0.158 | 0.176 | 0.868 | 0.274 | 0.093 | 0.954 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Solar - Base land use assumptions (GWh) | 13,021 | 1,892 | 2,611 | 9,695 | 7,775 | 2,943 | 0 |
| Solar - Constrained land use assumptions (GWh) | 13,021 | 2,227 | 2,572 | 3,934 | 2,977 | 583 | 0 |
| Wind - Base land use assumptions (GWh) | 1,971 | 1,451 | 1,859 | 5,579 | 6,102 | 3,067 | 4,832 |
| Wind - Constrained land use assumptions (GWh) | 448 | 309 | 328 | 1,683 | 554 | 198 | 1,760 |

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) | | | | | | | -227 |
| Carbon sink potential - Aggressive deployment - Permanent conservation cover (1000 tCO2e/y) | | | | | | | -1.61 |
| Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y) | | | | | | | -229 |
| Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y) | | | | | | | -114 |
| Carbon sink potential - Moderate deployment - Permanent conservation cover (1000 tCO2e/y) | | | | | | | -0.807 |
| Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y) | | | | | | | -115 |
| 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) | | | | | | | 319 |
| Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares) | | | | | | | 2.48 |
| Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares) | | | | | | | 322 |
| 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) | | | | | | | 160 |
| Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares) | | | | | | | 1.24 |
| Land impacted for carbon sink - Moderate deployment - Total (1000 hectares) | | | | | | | 162 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y) | | | | | | | -1,579 |
| Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y) | | | | | | | -10,254 |
| Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y) | | | | | | | -691 |
| Carbon sink potential - High - Extend rotation length (1000 tCO2e/y) | | | | | | | -4,703 |
| Carbon sink potential - High - Improve plantations (1000 tCO2e/y) | | | | | | | -2.49 |
| Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y) | | | | | | | -4.57 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y) | | | | | | | -186 |
| Carbon sink potential - High - Reforest cropland (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - High - Reforest pasture (1000 tCO2e/y) | | | | | | | -593 |
| Carbon sink potential - High - Restore productivity (1000 tCO2e/y) | | | | | | | -2,495 |
| Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y) | | | | | | | -791 |
| Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y) | | | | | | | -3,666 |
| Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y) | | | | | | | -115 |
| Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y) | | | | | | | -1,806 |
| Carbon sink potential - Low - Improve plantations (1000 tCO2e/y) | | | | | | | -1.27 |
| Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y) | | | | | | | -1.52 |
| Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y) | | | | | | | -65.1 |
| Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y) | | | | | | | -44.9 |
| Carbon sink potential - Low - Restore productivity (1000 tCO2e/y) | | | | | | | -841 |
| Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y) | | | | | | | -1,185 |
| Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y) | | | | | | | -6,960 |
| Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y) | | | | | | | -403 |
| Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y) | | | | | | | -3,254 |
| Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y) | | | | | | | -1.86 |
| Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y) | | | | | | | -3.05 |
| Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y) | | | | | | | -126 |
| Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y) | | | | | | | -319 |
| Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y) | | | | | | | -1,668 |
| Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares) | | | | | | | 258 |
| Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares) | | | | | | | 93.6 |
| Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares) | | | | | | | 2,398 |
| Land impacted for carbon sink potential - High - Improve plantations (1000 hectares) | | | | | | | 0.918 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Land impacted for carbon sink potential - High - Increase retention of HWP (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - High - Increase trees outside forests (1000 hectares) | | | | | | | 17.7 |
| Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares) | | | | | | | 16.8 |
| Land impacted for carbon sink potential - High - Restore productivity (1000 hectares) | | | | | | | 827 |
| Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares) | | | | | | | 3,612 |
| Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares) | | | | | | | 129 |
| Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares) | | | | | | | 87.9 |
| Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares) | | | | | | | 919 |
| Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares) | | | | | | | 0.459 |
| 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) | | | | | | | 9.3 |
| Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares) | | | | | | | 2.92 |
| Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares) | | | | | | | 500 |
| Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) | | | | | | | 1,649 |
| Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares) | | | | | | | 194 |
| Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares) | | | | | | | 90.7 |
| Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares) | | | | | | | 1,658 |
| Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares) | | | | | | | 0.69 |
| 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) | | | | | | | 13.5 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares) | | | | | | | 21.1 |
| Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares) | | | | | | | 1,008 |
| Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares) | | | | | | | 2,986 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Monetary damages from air pollution - Coal (million 2019$) | | 49.7 | 0.067 | 0.067 | 0.044 | 0.027 | 0 |
| Monetary damages from air pollution - Natural Gas (million 2019$) | | 46.7 | 28.6 | 29.1 | 34.3 | 22.5 | 5.07 |
| Monetary damages from air pollution - Transportation (million 2019$) | | 473 | 466 | 372 | 224 | 105 | 40.3 |
| Premature deaths from air pollution - Coal (deaths) | | 5.62 | 0.008 | 0.008 | 0.005 | 0.003 | 0 |
| Premature deaths from air pollution - Natural Gas (deaths) | | 5.27 | 3.23 | 3.28 | 3.87 | 2.54 | 0.573 |
| Premature deaths from air pollution - Transportation (deaths) | | 53.2 | 52.4 | 41.8 | 25.2 | 11.8 | 4.54 |

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 | 7,460 | 8,285 | 0 | 0 | 0 | 0 |
| Sales of cooking units - Electric Resistance (%) | 41.9 | 46.2 | 50.2 | 60.8 | 75.4 | 84.6 | 87.8 |
| Sales of cooking units - Gas (%) | 58.1 | 53.8 | 49.8 | 39.2 | 24.6 | 15.4 | 12.2 |
| Sales of space heating units - Electric Heat Pump (%) | 3.34 | 13 | 18 | 32.6 | 57.8 | 78.9 | 88.5 |
| Sales of space heating units - Electric Resistance (%) | 3.3 | 3.43 | 3.51 | 3.82 | 4.64 | 5.8 | 6.5 |
| Sales of space heating units - Fossil (%) | 0.985 | 0.242 | 0.226 | 0.167 | 0.082 | 0.026 | 0.007 |
| Sales of space heating units - Gas Furnace (%) | 92.4 | 83.3 | 78.3 | 63.4 | 37.5 | 15.3 | 4.96 |
| Sales of water heating units - Electric Heat Pump (%) | 0.03 | 1.53 | 5.79 | 18.2 | 38.6 | 54.2 | 60.6 |
| Sales of water heating units - Electric Resistance (%) | 1.46 | 2.2 | 4.25 | 10.4 | 21 | 30.2 | 34.5 |
| Sales of water heating units - Gas Furnace (%) | 98.1 | 95.9 | 89.6 | 71 | 39.9 | 15.3 | 4.5 |
| Sales of water heating units - Other (%) | 0.365 | 0.384 | 0.383 | 0.384 | 0.383 | 0.384 | 0.383 |

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) | | 2 | 2.09 | 2.43 | 2.55 | 2.99 | 3.14 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Final energy use - Commercial (PJ) | 89.2 | 89.2 | 88.5 | 87.3 | 84.9 | 81.8 | 79 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Final energy use - Industry (PJ) | 73.7 | 73.6 | 72.4 | 73.5 | 76.5 | 78.3 | 80 |
| Final energy use - Residential (PJ) | 94.5 | 92.7 | 91.9 | 90.1 | 85.9 | 79.9 | 74.4 |
| Final energy use - Transportation (PJ) | 291 | 276 | 258 | 242 | 229 | 214 | 195 |

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 | 3.39 | 4.49 | 0 | 0 | 0 | 0 |
| Sales of cooking units - Electric Resistance (%) | 66.2 | 67.1 | 70.2 | 78.4 | 89.7 | 96.7 | 99.1 |
| Sales of cooking units - Gas (%) | 33.8 | 32.9 | 29.8 | 21.6 | 10.3 | 3.33 | 0.896 |
| Sales of space heating units - Electric Heat Pump (%) | 9.66 | 20.3 | 25 | 38.9 | 62.1 | 80.4 | 88.2 |
| Sales of space heating units - Electric Resistance (%) | 13.5 | 21.8 | 20.6 | 17.6 | 12.4 | 8.21 | 6.44 |
| Sales of space heating units - Fossil (%) | 2.25 | 3.63 | 3.53 | 2.94 | 1.99 | 1.35 | 1.13 |
| Sales of space heating units - Gas (%) | 74.6 | 54.3 | 50.8 | 40.6 | 23.5 | 10.1 | 4.22 |
| Sales of water heating units - Electric Heat Pump (%) | 0 | 1.53 | 5.88 | 18.5 | 39 | 54 | 60.1 |
| Sales of water heating units - Electric Resistance (%) | 23.2 | 38.6 | 38.2 | 36.7 | 35.1 | 35 | 35.4 |
| Sales of water heating units - Gas Furnace (%) | 75.1 | 58 | 54.2 | 42.9 | 24.1 | 9.21 | 2.71 |
| Sales of water heating units - Other (%) | 1.72 | 1.82 | 1.82 | 1.82 | 1.8 | 1.79 | 1.78 |

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 | 80.1 | 162 | 553 | 1,721 | 2,514 |
| Public EV charging plugs - DC Fast (1000 units) | 0.256 | 0 | 0.253 | 0 | 1.17 | 0 | 3.2 |
| Public EV charging plugs - L2 (1000 units) | 0.619 | 0 | 6.09 | 0 | 28.1 | 0 | 76.9 |
| 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 | 0.524 | 0.225 |
| Vehicle sales - Light-duty - EV (%) | 2.01 | 4.96 | 12.4 | 26.8 | 49.4 | 72.7 | 87.8 |
| Vehicle sales - Light-duty - gasoline (%) | 91.4 | 86.9 | 78.7 | 65.5 | 45.1 | 24.2 | 10.7 |
| Vehicle sales - Light-duty - hybrid (%) | 4.96 | 5.74 | 6.41 | 5.78 | 4.28 | 2.5 | 1.2 |
| Vehicle sales - Light-duty - hydrogen FC (%) | 0.112 | 0.377 | 0.32 | 0.242 | 0.17 | 0.094 | 0.044 |
| Vehicle sales - Light-duty - other (%) | 0.098 | 0.102 | 0.092 | 0.08 | 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 | 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 53: *E-B+ scenario - PILLAR 4: CCUS - CO2 capture*

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Annual - All (MMT) | | 0 | 0.01 | 0.04 | 0.06 | 0.04 | 0.05 |
| Annual - BECCS (MMT) | | 0 | 0 | 0 | 0 | 0 | 0 |
| Annual - Cement and lime (MMT) | | 0 | 0 | 0 | 0 | 0 | 0 |
| Annual - NGCC (MMT) | | 0 | 0.01 | 0.04 | 0.06 | 0.04 | 0.05 |
| Cumulative - All (MMT) | | 0 | 0.01 | 0.05 | 0.11 | 0.15 | 0.2 |
| Cumulative - BECCS (MMT) | | 0 | 0 | 0 | 0 | 0 | 0 |
| Cumulative - Cement and lime (MMT) | | 0 | 0 | 0 | 0 | 0 | 0 |
| Cumulative - NGCC (MMT) | | 0 | 0.01 | 0.05 | 0.11 | 0.15 | 0.2 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| All (km) | | 0 | 51.1 | 102 | 102 | 102 | 102 |
| Cumulative investment - All (million $2018) | | 0 | 26.6 | 53.4 | 53.5 | 53.4 | 53.4 |
| Cumulative investment - Spur (million $2018) | | 0 | 26.6 | 53.4 | 53.5 | 53.4 | 53.4 |
| Cumulative investment - Trunk (million $2018) | | 0 | 0 | 0 | 0 | 0 | 0 |
| Spur (km) | | 0 | 51.1 | 102 | 102 | 102 | 102 |
| 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) | | | | | | | -227 |
| 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) | | | | | | | -1.61 |
| Carbon sink potential - Aggressive deployment - Total (1000 tCO2e/y) | | | | | | | -229 |
| Carbon sink potential - Moderate deployment - Corn-ethanol to energy grasses (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - Moderate deployment - Cropland measures (1000 tCO2e/y) | | | | | | | -114 |
| 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) | | | | | | | -0.807 |
| Carbon sink potential - Moderate deployment - Total (1000 tCO2e/y) | | | | | | | -115 |
| 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) | | | | | | | 789 |
| 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 |
| Land impacted for carbon sink - Aggressive deployment - Permanent conservation cover (1000 hectares) | | | | | | | 2.48 |
| Land impacted for carbon sink - Aggressive deployment - Total (1000 hectares) | | | | | | | 791 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Land impacted for carbon sink - Moderate deployment - Corn-ethanol to energy grasses (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink - Moderate deployment - Cropland measures (1000 hectares) | | | | | | | 160 |
| 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 |
| Land impacted for carbon sink - Moderate deployment - Permanent conservation cover (1000 hectares) | | | | | | | 1.24 |
| Land impacted for carbon sink - Moderate deployment - Total (1000 hectares) | | | | | | | 162 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Carbon sink potential - High - Accelerate regeneration (1000 tCO2e/y) | | | | | | | -1,579 |
| Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y) | | | | | | | -10,254 |
| Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y) | | | | | | | -691 |
| Carbon sink potential - High - Extend rotation length (1000 tCO2e/y) | | | | | | | -4,703 |
| Carbon sink potential - High - Improve plantations (1000 tCO2e/y) | | | | | | | -2.49 |
| Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y) | | | | | | | -4.57 |
| Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y) | | | | | | | -186 |
| Carbon sink potential - High - Reforest cropland (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - High - Reforest pasture (1000 tCO2e/y) | | | | | | | -593 |
| Carbon sink potential - High - Restore productivity (1000 tCO2e/y) | | | | | | | -2,495 |
| Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y) | | | | | | | -791 |
| Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y) | | | | | | | -3,666 |
| Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y) | | | | | | | -115 |
| Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y) | | | | | | | -1,806 |
| Carbon sink potential - Low - Improve plantations (1000 tCO2e/y) | | | | | | | -1.27 |
| Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y) | | | | | | | -1.52 |
| Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y) | | | | | | | -65.1 |
| Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y) | | | | | | | -44.9 |
| Carbon sink potential - Low - Restore productivity (1000 tCO2e/y) | | | | | | | -841 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y) | | | | | | | -1,185 |
| Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y) | | | | | | | -6,960 |
| Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y) | | | | | | | -403 |
| Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y) | | | | | | | -3,254 |
| Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y) | | | | | | | -1.86 |
| Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y) | | | | | | | -3.05 |
| Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y) | | | | | | | -126 |
| Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y) | | | | | | | -319 |
| Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y) | | | | | | | -1,668 |
| Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares) | | | | | | | 258 |
| Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares) | | | | | | | 93.6 |
| Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares) | | | | | | | 2,398 |
| Land impacted for carbon sink potential - High - Improve plantations (1000 hectares) | | | | | | | 0.918 |
| 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) | | | | | | | 17.7 |
| Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares) | | | | | | | 16.8 |
| Land impacted for carbon sink potential - High - Restore productivity (1000 hectares) | | | | | | | 827 |
| Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares) | | | | | | | 3,612 |
| Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares) | | | | | | | 129 |
| Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares) | | | | | | | 87.9 |
| Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares) | | | | | | | 919 |
| Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares) | | | | | | | 0.459 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Land impacted for carbon sink potential - Low - Increase retention of HWP (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - Low - Increase trees outside forests (1000 hectares) | | | | | | | 9.3 |
| Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares) | | | | | | | 2.92 |
| Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares) | | | | | | | 500 |
| Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) | | | | | | | 1,649 |
| Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares) | | | | | | | 194 |
| Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares) | | | | | | | 90.7 |
| Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares) | | | | | | | 1,658 |
| Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares) | | | | | | | 0.69 |
| 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) | | | | | | | 13.5 |
| Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares) | | | | | | | 21.1 |
| Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares) | | | | | | | 1,008 |
| Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares) | | | | | | | 2,986 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Monetary damages from air pollution - Coal (million 2019$) | | 49.7 | 0.067 | 0.067 | 0.044 | 0.027 | 0 |
| Monetary damages from air pollution - Natural Gas (million 2019$) | | 39.2 | 16.1 | 11.5 | 9.69 | 6.41 | 3.23 |
| Monetary damages from air pollution - Transportation (million 2019$) | | 482 | 515 | 527 | 497 | 413 | 295 |
| Premature deaths from air pollution - Coal (deaths) | | 5.62 | 0.008 | 0.008 | 0.005 | 0.003 | 0 |
| Premature deaths from air pollution - Natural Gas (deaths) | | 4.43 | 1.82 | 1.3 | 1.09 | 0.723 | 0.365 |
| Premature deaths from air pollution - Transportation (deaths) | | 54.2 | 57.9 | 59.3 | 55.9 | 46.5 | 33.1 |

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 | 7,365 | 7,706 | 0 | 0 | 0 | 0 |
| Sales of cooking units - Electric Resistance (%) | 41.9 | 44.7 | 44.7 | 44.6 | 44.4 | 44.5 | 44.6 |
| Sales of cooking units - Gas (%) | 58.1 | 55.3 | 55.3 | 55.4 | 55.6 | 55.5 | 55.4 |
| Sales of space heating units - Electric Heat Pump (%) | 3.34 | 23.9 | 63.4 | 77.1 | 78.7 | 78.8 | 78.8 |
| Sales of space heating units - Electric Resistance (%) | 3.3 | 5.04 | 10.6 | 16 | 20 | 20.6 | 20.7 |
| Sales of space heating units - Fossil (%) | 0.985 | 0.211 | 0.092 | 0.03 | 0.004 | 0 | 0 |
| Sales of space heating units - Gas Furnace (%) | 92.4 | 70.9 | 25.9 | 6.85 | 1.34 | 0.57 | 0.508 |
| Sales of water heating units - Electric Heat Pump (%) | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| Sales of water heating units - Electric Resistance (%) | 1.46 | 1.47 | 1.47 | 1.48 | 1.47 | 1.48 | 1.47 |
| Sales of water heating units - Gas Furnace (%) | 98.1 | 98.1 | 98.1 | 98.1 | 98.1 | 98.1 | 98.1 |
| Sales of water heating units - Other (%) | 0.365 | 0.384 | 0.383 | 0.384 | 0.383 | 0.384 | 0.383 |

Table 60: *REF scenario - PILLAR 1: Efficiency/Electrification - Electricity demand*

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Electricity distribution capital invested - Cumulative 5-yr (billion $2018) | | 2.15 | 2.25 | 2.49 | 2.61 | 2.9 | 3.04 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Final energy use - Commercial (PJ) | 89.2 | 90.9 | 92 | 92.1 | 92.8 | 95.6 | 100 |
| Final energy use - Industry (PJ) | 73.8 | 76.5 | 78.3 | 81.6 | 85.7 | 92 | 98.7 |
| Final energy use - Residential (PJ) | 94.5 | 93.4 | 95 | 97.3 | 101 | 105 | 108 |
| Final energy use - Transportation (PJ) | 291 | 280 | 269 | 263 | 267 | 277 | 288 |

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 | 3.21 | 3.39 | 0 | 0 | 0 | 0 |
| Sales of cooking units - Electric Resistance (%) | 65.9 | 65.9 | 65.9 | 65.9 | 65.9 | 65.9 | 65.9 |
| Sales of cooking units - Gas (%) | 34.1 | 34.1 | 34.1 | 34.1 | 34.1 | 34.1 | 34.1 |
| Sales of space heating units - Electric Heat Pump (%) | 8.46 | 27.8 | 28.5 | 29.6 | 30.6 | 31.8 | 33.4 |
| Sales of space heating units - Electric Resistance (%) | 13.8 | 20.2 | 19.9 | 19.6 | 18.9 | 17.9 | 16.3 |
| Sales of space heating units - Fossil (%) | 2.27 | 2.79 | 2.82 | 2.75 | 2.59 | 2.52 | 2.58 |
| Sales of space heating units - Gas (%) | 75.5 | 49.2 | 48.8 | 48.1 | 47.9 | 47.8 | 47.7 |
| Sales of water heating units - Electric Heat Pump (%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sales of water heating units - Electric Resistance (%) | 23.2 | 38.8 | 38.9 | 38.9 | 39 | 39 | 39 |
| Sales of water heating units - Gas Furnace (%) | 75.1 | 59.4 | 59.3 | 59.3 | 59.2 | 59.2 | 59.2 |
| Sales of water heating units - Other (%) | 1.72 | 1.82 | 1.82 | 1.82 | 1.81 | 1.81 | 1.81 |

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 (%) | 1.45 | 1.88 | 2.17 | 2.02 | 1.81 | 1.69 | 1.6 |
| Vehicle sales - Light-duty - EV (%) | 3.92 | 6.06 | 6.87 | 8.47 | 10.3 | 11.8 | 13 |
| Vehicle sales - Light-duty - gasoline (%) | 89.6 | 86 | 83.7 | 81.7 | 79.6 | 77.6 | 76.1 |
| Vehicle sales - Light-duty - hybrid (%) | 4.79 | 5.62 | 6.85 | 7.41 | 7.95 | 8.48 | 8.86 |
| Vehicle sales - Light-duty - hydrogen FC (%) | 0.11 | 0.373 | 0.34 | 0.3 | 0.296 | 0.296 | 0.306 |
| Vehicle sales - Light-duty - other (%) | 0.097 | 0.101 | 0.097 | 0.098 | 0.097 | 0.096 | 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) | | | | | | | -1,579 |
| Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y) | | | | | | | -10,254 |
| Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y) | | | | | | | -691 |
| Carbon sink potential - High - Extend rotation length (1000 tCO2e/y) | | | | | | | -4,703 |
| Carbon sink potential - High - Improve plantations (1000 tCO2e/y) | | | | | | | -2.49 |
| Carbon sink potential - High - Increase retention of HWP (1000 tCO2e/y) | | | | | | | -4.57 |
| Carbon sink potential - High - Increase trees outside forests (1000 tCO2e/y) | | | | | | | -186 |
| Carbon sink potential - High - Reforest cropland (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - High - Reforest pasture (1000 tCO2e/y) | | | | | | | -593 |
| Carbon sink potential - High - Restore productivity (1000 tCO2e/y) | | | | | | | -2,495 |
| Carbon sink potential - Low - Accelerate regeneration (1000 tCO2e/y) | | | | | | | -791 |
| Carbon sink potential - Low - All (not counting overlap) (1000 tCO2e/y) | | | | | | | -3,666 |
| Carbon sink potential - Low - Avoid deforestation (1000 tCO2e/y) | | | | | | | -115 |
| Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y) | | | | | | | -1,806 |
| Carbon sink potential - Low - Improve plantations (1000 tCO2e/y) | | | | | | | -1.27 |
| Carbon sink potential - Low - Increase retention of HWP (1000 tCO2e/y) | | | | | | | -1.52 |
| Carbon sink potential - Low - Increase trees outside forests (1000 tCO2e/y) | | | | | | | -65.1 |
| Carbon sink potential - Low - Reforest cropland (1000 tCO2e/y) | | | | | | | 0 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Carbon sink potential - Low - Reforest pasture (1000 tCO2e/y) | | | | | | | -44.9 |
| Carbon sink potential - Low - Restore productivity (1000 tCO2e/y) | | | | | | | -841 |
| Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y) | | | | | | | -1,185 |
| Carbon sink potential - Mid - All (not counting overlap) (1000 tCO2e/y) | | | | | | | -6,960 |
| Carbon sink potential - Mid - Avoid deforestation (1000 tCO2e/y) | | | | | | | -403 |
| Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y) | | | | | | | -3,254 |
| Carbon sink potential - Mid - Improve plantations (1000 tCO2e/y) | | | | | | | -1.86 |
| Carbon sink potential - Mid - Increase retention of HWP (1000 tCO2e/y) | | | | | | | -3.05 |
| Carbon sink potential - Mid - Increase trees outside forests (1000 tCO2e/y) | | | | | | | -126 |
| Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y) | | | | | | | 0 |
| Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y) | | | | | | | -319 |
| Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y) | | | | | | | -1,668 |
| Land impacted for carbon sink potential - High - Accelerate regeneration (1000 hectares) | | | | | | | 258 |
| Land impacted for carbon sink potential - High - Avoid deforestation (over 30 years) (1000 hectares) | | | | | | | 93.6 |
| Land impacted for carbon sink potential - High - Extend rotation length (1000 hectares) | | | | | | | 2,398 |
| Land impacted for carbon sink potential - High - Improve plantations (1000 hectares) | | | | | | | 0.918 |
| 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) | | | | | | | 17.7 |
| Land impacted for carbon sink potential - High - Reforest cropland (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - High - Reforest pasture (1000 hectares) | | | | | | | 16.8 |
| Land impacted for carbon sink potential - High - Restore productivity (1000 hectares) | | | | | | | 827 |
| Land impacted for carbon sink potential - High - Total impacted (over 30 years) (1000 hectares) | | | | | | | 3,612 |
| Land impacted for carbon sink potential - Low - Accelerate regeneration (1000 hectares) | | | | | | | 129 |
| Land impacted for carbon sink potential - Low - Avoid deforestation (over 30 years) (1000 hectares) | | | | | | | 87.9 |
| Land impacted for carbon sink potential - Low - Extend rotation length (1000 hectares) | | | | | | | 919 |

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

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Land impacted for carbon sink potential - Low - Improve plantations (1000 hectares) | | | | | | | 0.459 |
| 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) | | | | | | | 9.3 |
| Land impacted for carbon sink potential - Low - Reforest cropland (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - Low - Reforest pasture (1000 hectares) | | | | | | | 2.92 |
| Land impacted for carbon sink potential - Low - Restore productivity (1000 hectares) | | | | | | | 500 |
| Land impacted for carbon sink potential - Low - Total impacted (over 30 years) (1000 hectares) | | | | | | | 1,649 |
| Land impacted for carbon sink potential - Mid - Accelerate regeneration (1000 hectares) | | | | | | | 194 |
| Land impacted for carbon sink potential - Mid - Avoid deforestation (over 30 years) (1000 hectares) | | | | | | | 90.7 |
| Land impacted for carbon sink potential - Mid - Extend rotation length (1000 hectares) | | | | | | | 1,658 |
| Land impacted for carbon sink potential - Mid - Improve plantations (1000 hectares) | | | | | | | 0.69 |
| 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) | | | | | | | 13.5 |
| Land impacted for carbon sink potential - Mid - Reforest cropland (1000 hectares) | | | | | | | 0 |
| Land impacted for carbon sink potential - Mid - Reforest pasture (1000 hectares) | | | | | | | 21.1 |
| Land impacted for carbon sink potential - Mid - Restore productivity (1000 hectares) | | | | | | | 1,008 |
| Land impacted for carbon sink potential - Mid - Total impacted (over 30 years) (1000 hectares) | | | | | | | 2,986 |

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) | 0.51 | | 1.5 | | | | 0.43 |
| Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y) | -0.001 | | -0.003 | | | | -0.003 |
| Business-as-usual carbon sink - Total (Mt CO2e/y) | 0.509 | | 1.5 | | | | 0.428 |

Table 66: *REF scenario - IMPACTS - Health*

| Item | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|
| Monetary damages from air pollution - Coal (million 2019$) | | 79.7 | 47.1 | 25.4 | 19.3 | 18 | 16.9 |
| Monetary damages from air pollution - Natural Gas (million 2019$) | | 47.8 | 32.2 | 35 | 32.9 | 50.9 | 46.9 |
| Monetary damages from air pollution - Transportation (million 2019$) | | 480 | 521 | 561 | 604 | 648 | 695 |
| Premature deaths from air pollution - Coal (deaths) | | 9.01 | 5.31 | 2.87 | 2.18 | 2.03 | 1.91 |
| Premature deaths from air pollution - Natural Gas (deaths) | | 5.4 | 3.64 | 3.95 | 3.71 | 5.74 | 5.29 |
| Premature deaths from air pollution - Transportation (deaths) | | 54 | 58.6 | 63.1 | 67.9 | 72.9 | 78.1 |