

# Net-Zero America - massachusetts state report

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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 <a href="https://netzeroamerica.prince-ton.edu">https://netzeroamerica.prince-ton.edu</a>.
- 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 statelevel results.
- Within results for a given scenario, data tables are organized into corresponding sections of the full net-zero study (e.g., Pillar 1, Pillar 2, etc.)
- For Pillar 6 (Land sinks), values shown are maximum carbon storage potentials.

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

| Item  | 2020 | 2025   | 2030   | 2035  | 2040  | 2045 | 2050 |
|---|------|--------|--------|-------|-------|------|------|
| Commercial HVAC investment in 2020s -<br>Cumulative 5-yr (million \$2018) | 0    | 13,317 | 14,546 | 0     | 0     | 0    | 0    |
| Sales of cooking units - Electric<br>Resistance (%)                       | 36.9 | 49.9   | 81.2   | 87.4  | 87.7  | 87.7 | 87.7 |
| Sales of cooking units - Gas (%)  | 63.1 | 50.1   | 18.8   | 12.6  | 12.3  | 12.3 | 12.3 |
| Sales of space heating units - Electric<br>Heat Pump (%)                  | 4.31 | 10.7   | 38.6   | 72.2  | 77.8  | 78.1 | 78.1 |
| Sales of space heating units - Electric<br>Resistance (%)                 | 2.07 | 4.58   | 16.4   | 21.3  | 21.9  | 21.9 | 21.9 |
| Sales of space heating units - Fossil (%)                                 | 23.7 | 29.9   | 5.74   | 0.244 | 0     | 0    | 0    |
| Sales of space heating units - Gas Furnace (%)                            | 69.9 | 54.9   | 39.2   | 6.26  | 0.372 | 0    | 0    |
| Sales of water heating units - Electric<br>Heat Pump (%)                  | 2.04 | 3.48   | 15.8   | 41.1  | 45.6  | 46   | 45.9 |
| Sales of water heating units - Electric<br>Resistance (%)                 | 10.2 | 12.4   | 23.9   | 48    | 52.3  | 52.5 | 52.5 |
| Sales of water heating units - Gas Furnace (%)                            | 84.8 | 80.4   | 58.4   | 9.31  | 0.551 | 0    | 0    |
| Sales of water heating units - Other (%)                                  | 2.99 | 3.76   | 1.89   | 1.58  | 1.56  | 1.56 | 1.58 |

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

| Item  | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|------|------|------|------|------|------|------|
| Electricity distribution capital invested - |      | 2.59 | 2.67 | 6.63 | 7.17 | 6.63 | 7.04 |
| Cumulative 5-yr (billion \$2018)            |      |      |      |      |      |      |      |

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

| Item                                   | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|--|------|------|------|------|------|------|------|
| Final energy use - Commercial (PJ)     | 253  | 241  | 230  | 215  | 199  | 188  | 181  |
| Final energy use - Industry (PJ)       | 81.4 | 79.3 | 79.4 | 79.4 | 80.6 | 81.8 | 83.4 |
| Final energy use - Residential (PJ)    | 286  | 269  | 250  | 218  | 185  | 159  | 144  |
| Final energy use - Transportation (PJ) | 500  | 466  | 414  | 349  | 289  | 250  | 231  |

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

| Item                                       | 2020 | 2025 | 2030 | 2035  | 2040  | 2045  | 2050  |
|--|------|------|------|-------|-------|-------|-------|
| Residential HVAC investment in 2020s vs.   | 0    | 5.62 | 6.19 | 0     | 0     | 0     | 0     |
| REF - Cumulative 5-yr (billion \$2018)     |      |      |      |       |       |       |       |
| Sales of cooking units - Electric          | 64.1 | 71.7 | 95.2 | 99.8  | 100   | 100   | 100   |
| Resistance (%)                             |      |      |      |       |       |       |       |
| Sales of cooking units - Gas (%)           | 35.9 | 28.3 | 4.84 | 0.243 | 0     | 0     | 0     |
| Sales of space heating units - Electric    | 6.91 | 13.1 | 53.5 | 87.8  | 93.1  | 93.4  | 93.4  |
| Heat Pump (%)                              |      |      |      |       |       |       |       |
| Sales of space heating units - Electric    | 6.17 | 9.15 | 7.14 | 3.07  | 2.34  | 2.27  | 2.46  |
| Resistance (%)                             |      |      |      |       |       |       |       |
| Sales of space heating units - Fossil (%)  | 32.4 | 41.6 | 13.8 | 4.85  | 4.07  | 4.05  | 3.91  |
| Sales of space heating units - Gas (%)     | 54.5 | 36.2 | 25.6 | 4.29  | 0.5   | 0.264 | 0.249 |
| Sales of water heating units - Electric    | 0    | 1.22 | 12.2 | 31.8  | 35.2  | 35.4  | 35.4  |
| Heat Pump (%)                              |      |      |      |       |       |       |       |
| Sales of water heating units - Electric    | 30.5 | 48.9 | 54.7 | 62.9  | 64.4  | 64.5  | 64.5  |
| Resistance (%)                             |      |      |      |       |       |       |       |
| Sales of water heating units - Gas Furnace | 60   | 44.2 | 31.9 | 5.09  | 0.3   | 0     | 0     |
| (%)  |      |      |      |       |       |       |       |
| Sales of water heating units - Other (%)   | 9.47 | 5.72 | 1.16 | 0.145 | 0.102 | 0.103 | 0.103 |

 $\underline{ \ \ \text{Table 5: } \textit{E+ scenario - PILLAR 1: Efficiency/Electrification - Transportation } }$ 

| Item                                       | 2020  | 2025  | 2030  | 2035  | 2040  | 2045  | 2050  |
|--|-------|-------|-------|-------|-------|-------|-------|
| Light-duty vehicle capital costs -         | 0     | 962   | 2,495 | 3,997 | 6,074 | 6,591 | 6,294 |
| Cumulative 5-yr (million \$2018)           |       |       |       |       |       |       |       |
| Public EV charging plugs - DC Fast (1000   | 0.317 | 0     | 1.49  | 0     | 6.24  | 0     | 10    |
| units)                                     |       |       |       |       |       |       |       |
| Public EV charging plugs - L2 (1000 units) | 2.26  | 0     | 35.7  | 0     | 150   | 0     | 241   |
| 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 (%)    | 1.4   | 1.68  | 1.2   | 0.382 | 0.072 | 0.013 | 0     |
| Vehicle sales - Light-duty - EV (%)        | 4.41  | 16.7  | 48.7  | 82.7  | 96.4  | 99.3  | 100   |
| Vehicle sales - Light-duty - gasoline (%)  | 89.1  | 76.3  | 46.4  | 15.6  | 3.17  | 0.586 | 0     |
| Vehicle sales - Light-duty - hybrid (%)    | 4.9   | 4.89  | 3.38  | 1.24  | 0.304 | 0.067 | 0     |
| Vehicle sales - Light-duty - hydrogen FC   | 0.11  | 0.331 | 0.191 | 0.059 | 0.012 | 0.002 | 0     |
| (%)  |       |       |       |       |       |       |       |
| Vehicle sales - Light-duty - other (%)     | 0.095 | 0.091 | 0.058 | 0.02  | 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     | 0.196 | 1.27  | 6.33  | 15.2  | 19.1  | 19.9  | 20    |
| FC (%)                                     |       |       |       |       |       |       |       |
| 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     | 1.13  | 0      | 0      | 0      | 0      |
| Capital invested - Biomass w/ccu allam power plant (billion \$2018)       | 0     | 0     | 0     | 0.005  | 0.001  | 0      | 0      |
| Capital invested - Biomass w/ccu power plant (billion \$2018)             | 0     | 0     | 0.006 | 0      | 0.001  | 0      | 0.015  |
| Capital invested - Offshore Wind - Base (billion \$2018)                  | 0     | 1.95  | 8.25  | 14.1   | 18.8   | 9.71   | 0.655  |
| Capital invested - Offshore Wind -<br>Constrained (billion \$2018)        | 0     | 0     | 8.66  | 15.6   | 15     | 0      | 4.55   |
| Capital invested - Solar PV - Base (billion \$2018)                       | 0     | 0     | 1.33  | 1.91   | 4.38   | 5.83   | 0      |
| Capital invested - Solar PV - Constrained (billion \$2018)                | 0     | 0.202 | 0.495 | 3.92   | 2.72   | 7.22   | 0      |
| Capital invested - Wind - Base (billion<br>\$2018)                        | 0     | 0.105 | 1.71  | 0.488  | 0.32   | 0      | 0.218  |
| Capital invested - Wind - Constrained (billion \$2018)                    | 0     | 0.105 | 1.92  | 0.167  | 0.279  | 0.17   | 0.21   |
| Installed (cumulative) - OffshoreWind -<br>Base land use assumptions (MW) | 70.3  | 758   | 3,920 | 10,140 | 19,410 | 25,645 | 26,167 |
| Installed (cumulative) - Rooftop PV (MW)                                  | 2,978 | 5,185 | 6,070 | 7,104  | 8,278  | 9,583  | 11,044 |
| Installed (cumulative) - Solar - Base land use assumptions (MW)           | 672   | 672   | 1,786 | 3,515  | 7,733  | 13,671 | 13,671 |
| Installed (cumulative) - Wind - Base land use assumptions (MW)            | 125   | 165   | 878   | 1,096  | 1,247  | 1,247  | 1,361  |

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

| Item                                  | 2020 | 2025 | 2030  | 2035  | 2040  | 2045  | 2050  |
|---------------------------------------|------|------|-------|-------|-------|-------|-------|
| Biomass power plant (GWh)             | 0    | 0    | 2,220 | 2,220 | 2,220 | 2,220 | 2,220 |
| Biomass w/ccu allam power plant (GWh) | 0    | 0    | 0     | 5.42  | 6.26  | 6.26  | 6.26  |

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

| Item                                     | 2020 | 2025  | 2030   | 2035   | 2040   | 2045   | 2050  |
|--|------|-------|--------|--------|--------|--------|-------|
| Biomass w/ccu power plant (GWh)          | 0    | 0     | 6.99   | 6.99   | 7.72   | 7.72   | 24.1  |
| OffshoreWind - Base land use             | 282  | 2,772 | 12,880 | 26,328 | 39,406 | 27,308 | 2,448 |
| assumptions (GWh)                        |      |       |        |        |        |        |       |
| OffshoreWind - Constrained land use      | 282  | 2,772 | 12,880 | 26,328 | 39,406 | 27,308 | 2,448 |
| assumptions (GWh)                        |      |       |        |        |        |        |       |
| Solar - Base land use assumptions (GWh)  | 744  | 0     | 1,962  | 3,077  | 7,380  | 10,303 | 0     |
| Solar - Constrained land use assumptions | 0    | 0     | 3,587  | 5,146  | 7,192  | 13,396 | 0     |
| (GWh)                                    |      |       |        |        |        |        |       |
| Wind - Base land use assumptions (GWh)   | 502  | 153   | 2,604  | 775    | 538    | 0      | 405   |
| Wind - Constrained land use assumptions  | 502  | 153   | 2,904  | 423    | 307    | 298    | 498   |
| (GWh)                                    |      |       |        |        |        |        |       |

Table 8: E+ scenario - PILLAR 3: Clean fuels - Bioenergy

| Item   | 2020 | 2025 | 2030  | 2035 | 2040 | 2045 | 2050  |
|--|------|------|-------|------|------|------|-------|
| Biomass purchases (million \$2018/year)      | 0    | 0    | 73.3  | 74.6 | 75   | 75.5 | 151   |
| Conversion capital investment -              | 0    | 0    | 1,267 | 43.3 | 12.5 | 12.6 | 2,040 |
| Cumulative 5-yr (million \$2018)             |      |      |       |      |      |      |       |
| Number of facilities - Allam power w ccu     | 0    | 0    | 0     | 1    | 1    | 1    | 1     |
| (quantity)                                   |      |      |       |      |      |      |       |
| Number of facilities - Beccs hydrogen        | 0    | 0    | 0     | 1    | 1    | 1    | 2     |
| (quantity)                                   |      |      |       |      |      |      |       |
| Number of facilities - Diesel (quantity)     | 0    | 0    | 0     | 1    | 1    | 1    | 1     |
| Number of facilities - Diesel ccu (quantity) | 0    | 0    | 0     | 1    | 1    | 1    | 1     |
| Number of facilities - Power (quantity)      | 0    | 0    | 2     | 2    | 2    | 2    | 2     |
| Number of facilities - Power ccu             | 0    | 0    | 1     | 1    | 1    | 1    | 2     |
| (quantity)                                   |      |      |       |      |      |      |       |
| Number of facilities - Pyrolysis (quantity)  | 0    | 0    | 0     | 1    | 1    | 1    | 2     |
| Number of facilities - Pyrolysis ccu         | 0    | 0    | 0     | 1    | 1    | 1    | 2     |
| (quantity)                                   |      |      |       |      |      |      |       |
| Number of facilities - Sng (quantity)        | 0    | 0    | 1     | 1    | 1    | 1    | 1     |
| Number of facilities - Sng ccu (quantity)    | 0    | 0    | 1     | 1    | 1    | 1    | 1     |

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

| Item                               | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|------------------------------------|------|------|------|------|------|------|------|
| Annual - All (MMT)                 |      | 0    | 0.01 | 0.02 | 0.03 | 0.03 | 1.32 |
| Annual - BECCS (MMT)               |      | 0    | 0.01 | 0.02 | 0.02 | 0.02 | 1.31 |
| Annual - Cement and lime (MMT)     |      | 0    | 0    | 0    | 0    | 0    | 0    |
| Annual - NGCC (MMT)                |      | 0    | 0    | 0.01 | 0.01 | 0    | 0.01 |
| Cumulative - All (MMT)             |      | 0    | 0.01 | 0.03 | 0.06 | 0.09 | 1.41 |
| Cumulative - BECCS (MMT)           |      | 0    | 0.01 | 0.03 | 0.05 | 0.07 | 1.38 |
| Cumulative - Cement and lime (MMT) |      | 0    | 0    | 0    | 0    | 0    | 0    |
| Cumulative - NGCC (MMT)            |      | 0    | 0    | 0.01 | 0.02 | 0.02 | 0.03 |

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

| Item   | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|--|------|------|------|------|------|------|------|
| All (km)                                       |      | 0    | 171  | 314  | 314  | 314  | 549  |
| Cumulative investment - All (million \$2018)   |      | 0    | 264  | 339  | 339  | 339  | 494  |
| Cumulative investment - Spur (million \$2018)  |      | 0    | 19.1 | 94.2 | 94.2 | 94.2 | 249  |
| Cumulative investment - Trunk (million \$2018) |      | 0    | 245  | 245  | 245  | 245  | 245  |
| Spur (km)                                      |      | 0    | 36.2 | 179  | 179  | 179  | 414  |
| Trunk (km)                                     |      | 0    | 135  | 135  | 135  | 135  | 135  |

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

| Table 12: E+ Scenario - PILLAR 6: Land Sink |      |      | 0000 | 0005 | 007.0 | 00/5 | 0050  |
|---|------|------|------|------|-------|------|-------|
| Item  | 2020 | 2025 | 2030 | 2035 | 2040  | 2045 | 2050  |
| Carbon sink potential - Aggressive          |      |      |      |      |       |      | 0     |
| deployment - Corn-ethanol to energy         |      |      |      |      |       |      |       |
| grasses (1000 tC02e/y)                      |      |      |      |      |       |      | 105   |
| Carbon sink potential - Aggressive          |      |      |      |      |       |      | -105  |
| deployment - Cropland measures (1000        |      |      |      |      |       |      |       |
| tCO2e/y)                                    |      |      |      |      |       |      | 0.00  |
| Carbon sink potential - Aggressive          |      |      |      |      |       |      | -3.29 |
| deployment - Permanent conservation         |      |      |      |      |       |      |       |
| cover (1000 tC02e/y)                        |      |      |      |      |       |      |       |
| Carbon sink potential - Aggressive          |      |      |      |      |       |      | -109  |
| deployment - Total (1000 tC02e/y)           |      |      |      |      |       |      |       |
| Carbon sink potential - Moderate            |      |      |      |      |       |      | 0     |
| deployment - Corn-ethanol to energy         |      |      |      |      |       |      |       |
| grasses (1000 tC02e/y)                      |      |      |      |      |       |      |       |
| Carbon sink potential - Moderate            |      |      | П    |      | T     |      | -55   |
| deployment - Cropland measures (1000        |      |      |      |      |       |      |       |
| tCO2e/y)                                    |      |      |      |      |       |      |       |
| Carbon sink potential - Moderate            |      |      |      |      |       |      | -1.64 |
| deployment - Permanent conservation         |      |      |      |      |       |      |       |
| cover (1000 tCO2e/y)                        |      |      |      |      |       |      |       |
| Carbon sink potential - Moderate            |      |      |      |      |       |      | -56.7 |
| deployment - Total (1000 tCO2e/y)           |      |      |      |      |       |      |       |
| Land impacted for carbon sink -             |      |      |      |      |       |      | 0     |
| Aggressive deployment - Corn-ethanol to     |      |      |      |      |       |      |       |
| energy grasses (1000 hectares)              |      |      |      |      |       |      |       |
| Land impacted for carbon sink -             |      |      |      |      |       |      | 63.5  |
| Aggressive deployment - Cropland            |      |      |      |      |       |      |       |
| measures (1000 hectares)                    |      |      |      |      |       |      |       |
| Land impacted for carbon sink -             |      |      |      |      |       |      | 5.98  |
| Aggressive deployment - Permanent           |      |      |      |      |       |      |       |
| conservation cover (1000 hectares)          |      |      |      |      |       |      |       |
| Land impacted for carbon sink -             |      |      |      |      |       |      | 69.5  |
| Aggressive deployment - Total (1000         |      |      |      |      |       |      |       |
| hectares)                                   |      |      |      |      |       |      |       |
| Land impacted for carbon sink - Moderate    |      |      |      |      |       |      | 0     |
| deployment - Corn-ethanol to energy         |      |      |      |      |       |      |       |
| grasses (1000 hectares)                     |      |      |      |      |       |      |       |
| Land impacted for carbon sink - Moderate    |      |      |      |      |       |      | 33.2  |
| deployment - Cropland measures (1000        |      |      |      |      |       |      | 55.2  |
| hectares)                                   |      |      |      |      |       |      |       |
| Land impacted for carbon sink - Moderate    |      |      |      |      |       |      | 2.99  |
| deployment - Permanent conservation         |      |      |      |      |       |      | 2.,,  |
| cover (1000 hectares)                       |      |      |      |      |       |      |       |
| Land impacted for carbon sink - Moderate    |      |      |      |      |       |      | 36.2  |
| deployment - Total (1000 hectares)          |      |      |      |      |       |      | 50.2  |
| acproyment - rotar (1000 nectal es)         |      |      |      |      |       |      |       |

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

| 2035   2040   2045   2050   -36.4     -4,728     -1,146     -1,955     0     -518     -210 |
|---|
| -4,728<br>-1,146<br>-1,955<br>0<br>-518   |
| -1,146<br>-1,955<br>0<br>-518   |
| -1,146<br>-1,955<br>0<br>-518   |
| -1,955<br>0<br>-518   |
| -1,955<br>0<br>-518   |
| -518  |
| -518  |
| -518  |
| -518  |
|   |
|   |
| 210   |
| 010   |
| -210  |
|   |
| 0   |
|   |
| -307  |
|   |
| -555  |
|   |
| -18.3   |
|   |
| -1,417  |
|   |
| -191  |
|   |
| -751  |
| -101  |
| 0   |
|   |
| -173  |
| -113  |
| -73.7   |
| -13.1   |
|   |
| 0   |
| 00.0  |
| -23.3   |
|   |
| -187  |
|   |
| -27.4   |
|   |
| -3,072  |
|   |
| -669  |
|   |
| -1,353  |
|   |
| 0   |
|   |
| -345  |
|   |
| -142  |
|   |
| 0   |
|   |
| -165  |
|   |
| -371  |
|   |
|   |

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

| Item                                       | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050  |
|--|------|------|------|------|------|------|-------|
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 5.96  |
| High - Accelerate regeneration (1000       |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 155   |
| High - Avoid deforestation (over 30 years) |      |      |      |      |      |      |       |
| (1000 hectares)                            |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 997   |
| High - Extend rotation length (1000        |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 0     |
| High - Improve plantations (1000           |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 0     |
| High - Increase retention of HWP (1000     |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 20    |
| High - Increase trees outside forests      |      |      |      |      |      |      |       |
| (1000 hectares)                            |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 0     |
| High - Reforest cropland (1000 hectares)   |      |      |      |      |      |      | J     |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 8.73  |
| High - Reforest pasture (1000 hectares)    |      |      |      |      |      |      | 0.10  |
| Land impacted for carbon sink potential -  | +    | +    |      |      |      |      | 184   |
| High - Restore productivity (1000          |      |      |      |      |      |      | 104   |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 1,371 |
| High - Total impacted (over 30 years)      |      |      |      |      |      |      | 1,311 |
| (1000 hectares)                            |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      | -    |      |      |      |      | 2.98  |
|  |      |      |      |      |      |      | 2.70  |
| Low - Accelerate regeneration (1000        |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      | 1//   |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 146   |
| Low - Avoid deforestation (over 30 years)  |      |      |      |      |      |      |       |
| (1000 hectares)                            |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 382   |
| Low - Extend rotation length (1000         |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 0     |
| Low - Improve plantations (1000            |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 0     |
| Low - Increase retention of HWP (1000      |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 10.5  |
| Low - Increase trees outside forests       |      |      |      |      |      |      |       |
| (1000 hectares)                            |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 0     |
| Low - Reforest cropland (1000 hectares)    |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 1.51  |
| Low - Reforest pasture (1000 hectares)     |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 111   |
| Low - Restore productivity (1000           |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 654   |
| Low - Total impacted (over 30 years)       |      |      |      |      |      |      |       |
| (1000 hectares)                            |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 4.47  |
| Mid - Accelerate regeneration (1000        |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |

| Table 13: E+ | econario - | DTIIAP 6. | I and sinks - | Enrocte | (continued) |
|--------------|------------|-----------|---------------|---------|-------------|
| Table 15. E+ | SCEHUITO - | PILLAR D. | LUHU SHIKS -  | FULESTS | COMUNICEUR  |

| Item                                       | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050  |
|--|------|------|------|------|------|------|-------|
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 150   |
| Mid - Avoid deforestation (over 30 years)  |      |      |      |      |      |      |       |
| (1000 hectares)                            |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 689   |
| Mid - Extend rotation length (1000         |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 0     |
| Mid - Improve plantations (1000 hectares)  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 0     |
| Mid - Increase retention of HWP (1000      |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 15.3  |
| Mid - Increase trees outside forests (1000 |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 0     |
| Mid - Reforest cropland (1000 hectares)    |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 10.9  |
| Mid - Reforest pasture (1000 hectares)     |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 224   |
| Mid - Restore productivity (1000           |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 1,095 |
| Mid - Total impacted (over 30 years) (1000 |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |

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

| Item  | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050  |
|---|------|------|------|------|------|------|-------|
| Natural gas consumption - Annual (tcf)      |      | 340  | 286  | 230  | 173  | 109  | 75.5  |
| Natural gas consumption - Cumulative (tcf)  |      | 0    | 0    | 0    | 0    | 0    | 6,921 |
| Natural gas production - Annual (tcf)       |      | 0    | 0    | 0    | 0    | 0    | 0     |
| Oil consumption - Annual (million bbls)     |      | 88.4 | 76.2 | 58.5 | 42.2 | 29.3 | 19.2  |
| Oil consumption - Cumulative (million bbls) |      | 0    | 0    | 0    | 0    | 0    | 1,813 |
| Oil production - Annual (million bbls)      |      | 0    | 0    | 0    | 0    | 0    | 0     |

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

| Item   | 2020 | 2025  | 2030  | 2035  | 2040  | 2045  | 2050  |
|--|------|-------|-------|-------|-------|-------|-------|
| Monetary damages from air pollution -<br>Coal (million 2019\$)           |      | 557   | 0.598 | 0.597 | 0.568 | 0.345 | 0.018 |
| Monetary damages from air pollution -<br>Natural Gas (million 2019\$)    |      | 288   | 155   | 107   | 108   | 66.1  | 35.6  |
| Monetary damages from air pollution -<br>Transportation (million 2019\$) |      | 2,027 | 1,872 | 1,408 | 804   | 356   | 128   |
| Premature deaths from air pollution -<br>Coal (deaths)                   |      | 62.9  | 0.068 | 0.067 | 0.064 | 0.039 | 0.002 |
| Premature deaths from air pollution -<br>Natural Gas (deaths)            |      | 32.5  | 17.5  | 12.1  | 12.2  | 7.46  | 4.02  |
| Premature deaths from air pollution -<br>Transportation (deaths)         |      | 228   | 211   | 158   | 90.4  | 40    | 14.3  |

# Table 16: E+ scenario - IMPACTS - Jobs

| 2020 | 2025   | 2030                   | 2035                                    | 2040   | 2045   | 2050   |
|------|--------|------------------------|---|--|--|--|
|      | 112    | 304                    | 293                                     | 247  | 198  | 283  |
|      | 13,426 | 11,963                 | 16,967                                  | 24,459   | 25,943   | 26,720   |
|      | 4,933  | 8,934                  | 9,220                                   | 11,052   | 14,311   | 19,224   |
|      |        |                        |   |  |  |  |
|      | 1,719  | 1,228                  | 795                                     | 484  | 273  | 151  |
|      | 2020   | 112<br>13,426<br>4,933 | 112 304<br>13,426 11,963<br>4,933 8,934 | 112 304 293<br>13,426 11,963 16,967<br>4,933 8,934 9,220 | 112         304         293         247           13,426         11,963         16,967         24,459           4,933         8,934         9,220         11,052 | 112         304         293         247         198           13,426         11,963         16,967         24,459         25,943           4,933         8,934         9,220         11,052         14,311 |

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

| Table 16: E+ Scending - IMPAG13 - Jobs (Co    | Jiitiiiueuj |        |        |         |        |          |         |
|---|-------------|--------|--------|---------|--------|----------|---------|
| Item  | 2020        | 2025   | 2030   | 2035    | 2040   | 2045     | 2050    |
| By economic sector - Other (jobs)             |             | 2,212  | 1,664  | 2,324   | 3,509  | 4,214    | 5,723   |
| By economic sector - Pipeline (jobs)          |             | 423    | 387    | 281     | 208    | 135      | 113     |
| By economic sector - Professional (jobs)      |             | 5,017  | 5,504  | 8,234   | 12,721 | 14,433   | 16,236  |
| By economic sector - Trade (jobs)             |             | 3,698  | 3,519  | 4,916   | 7,459  | 8,665    | 10,294  |
| By economic sector - Utilities (jobs)         |             | 5,496  | 8,636  | 14,907  | 22,673 | 22,600   | 18,210  |
| By education level - All sectors -            |             | 11,757 | 13,447 | 18,695  | 26,901 | 29,456   | 31,307  |
| Associates degree or some college (jobs)      |             |        |        |         |        |          |         |
| By education level - All sectors -            |             | 7,188  | 8,334  | 11,372  | 16,322 | 18,044   | 19,500  |
| Bachelors degree (jobs)                       |             |        |        |         |        |          |         |
| By education level - All sectors - Doctoral   |             | 266    | 281    | 395     | 588    | 660      | 738     |
| degree (jobs)                                 |             |        |        |         |        |          |         |
| By education level - All sectors - High       |             | 16,095 | 18,089 | 24,679  | 34,909 | 38,093   | 40,553  |
| school diploma or less (jobs)                 |             |        |        |         |        |          |         |
| By education level - All sectors - Masters    |             | 1,732  | 1,987  | 2,797   | 4,092  | 4,518    | 4,857   |
| or professional degree (jobs)                 |             |        |        |         |        |          |         |
| By resource sector - Biomass (jobs)           |             | 482    | 839    | 834     | 744    | 722      | 1,210   |
| By resource sector - CO2 (jobs)               |             | 0      | 243    | 2.22    | 5.64   | 5.63     | 185     |
| By resource sector - Grid (jobs)              |             | 7,278  | 14,160 | 28,053  | 42,603 | 43,034   | 34,301  |
| By resource sector - Natural Gas (jobs)       |             | 4,338  | 3,538  | 2,624   | 3,481  | 2,501    | 1,473   |
| By resource sector - Nuclear (jobs)           |             | 0      | 0.012  | 0.027   | 0.03   | 0.058    | 0.074   |
| By resource sector - Oil (jobs)               |             | 3,930  | 3,107  | 2,204   | 1,475  | 957      | 589     |
| By resource sector - Solar (jobs)             |             | 20,140 | 14,280 | 13,698  | 18,680 | 24,790   | 34,338  |
| By resource sector - Wind (jobs)              |             | 870    | 5,971  | 10,522  | 15,823 | 18,760   | 24,859  |
| Median wages - Annual - All (\$2019 per       |             | 67,705 | 68,862 | 70,930  | 72,487 | 73,095   | 72,989  |
| job)  |             | 01,103 | 00,002 | 10,750  | 12,401 | 13,073   | 12,707  |
| On-Site or In-Plant Training - Total jobs - 1 |             | 6,120  | 6,920  | 9,628   | 13,822 | 15,048   | 15,833  |
| to 4 years (jobs)                             |             | 0,120  | 0,920  | 9,020   | 13,022 | 13,040   | 10,000  |
| On-Site or In-Plant Training - Total jobs - 4 |             | 2,637  | 2,822  | 4,051   | 5,910  | 6,327    | 6,464   |
| to 10 years (jobs)                            |             | 2,031  | 2,022  | 4,001   | 3,910  | 0,321    | 0,404   |
| On-Site or In-Plant Training - Total jobs -   |             | 6,096  | 6,877  | 9,350   | 13,353 | 14,750   | 16,036  |
| None (jobs)                                   |             | 0,070  | 0,011  | 9,330   | 13,333 | 14,130   | 10,030  |
| On-Site or In-Plant Training - Total jobs -   |             | 319    | 366    | 521     | 756    | 819      | 849     |
| Over 10 years (jobs)                          |             | 319    | 300    | 521     | 130    | 019      | 049     |
| On-Site or In-Plant Training - Total jobs -   |             | 21,864 | 25,155 | 34,388  | 48,971 | 53,826   | 57,773  |
| Up to 1 year (jobs)                           |             | 21,004 | 25,155 | 34,388  | 46,971 | 53,626   | 51,113  |
|   |             | 7,000  | 0.002  | 10 / 25 | 17000  | 10 / / E | 00 / 1E |
| On-the-Job Training - All sectors - 1 to 4    |             | 7,880  | 8,903  | 12,435  | 17,900 | 19,465   | 20,415  |
| years (jobs)                                  |             | 0.407  | 0.700  | / 007   | F 011  |          | ( ( 0 0 |
| On-the-Job Training - All sectors - 4 to 10   |             | 2,627  | 2,788  | 4,037   | 5,911  | 6,320    | 6,438   |
| years (jobs)                                  |             | 0.000  | 0.070  | 0.077   | / 001  | , 05,    | F 010   |
| On-the-Job Training - All sectors - None      |             | 2,083  | 2,268  | 3,077   | 4,391  | 4,854    | 5,313   |
| (jobs)  |             | 007    | / 01   | 5.0     | 700    | 071      | 0.0     |
| On-the-Job Training - All sectors - Over 10   |             | 394    | 431    | 560     | 782    | 871      | 969     |
| years (jobs)                                  |             |        |        | 27.000  |        |          |         |
| On-the-Job Training - All sectors - Up to 1   |             | 24,053 | 27,749 | 37,829  | 53,828 | 59,261   | 63,819  |
| year (jobs)                                   |             |        |        |         |        |          |         |
| Related work experience - All sectors - 1     |             | 13,171 | 15,037 | 20,733  | 29,684 | 32,503   | 34,617  |
| to 4 years (jobs)                             |             |        |        |         |        |          |         |
| Related work experience - All sectors - 4     |             | 8,555  | 9,755  | 13,502  | 19,403 | 21,222   | 22,501  |
| to 10 years (jobs)                            |             |        |        |         |        |          |         |
| Related work experience - All sectors -       |             | 5,371  | 6,087  | 8,415   | 12,040 | 13,142   | 13,964  |
| None (jobs)                                   |             |        |        |         |        |          |         |
| Related work experience - All sectors -       |             | 2,225  | 2,617  | 3,564   | 5,074  | 5,593    | 5,992   |
| Over 10 years (jobs)                          |             |        |        |         |        |          |         |
| Related work experience - All sectors - Up    |             | 7,714  | 8,643  | 11,725  | 16,611 | 18,310   | 19,879  |
| to 1 year (jobs)                              |             |        |        |         |        |          |         |
| Wage income - All (million \$2019)            |             | 2,508  | 2,902  | 4,110   | 6,004  | 6,636    | 7,078   |
|   |             |        |        |         |        |          |         |

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

| Item                                       | 2020 | 2025   | 2030   | 2035 | 2040 | 2045 | 2050  |
|--|------|--------|--------|------|------|------|-------|
| Commercial HVAC investment in 2020s -      | 0    | 13,315 | 14,553 | 0    | 0    | 0    | 0     |
| Cumulative 5-yr (million \$2018)           |      |        |        |      |      |      |       |
| Sales of cooking units - Electric          | 36.9 | 40.7   | 44.7   | 56.5 | 72.7 | 82.9 | 86.4  |
| Resistance (%)                             |      |        |        |      |      |      |       |
| Sales of cooking units - Gas (%)           | 63.1 | 59.3   | 55.3   | 43.5 | 27.3 | 17.1 | 13.6  |
| Sales of space heating units - Electric    | 4.31 | 7.58   | 10.8   | 20.7 | 40.6 | 61.6 | 72.9  |
| Heat Pump (%)                              |      |        |        |      |      |      |       |
| Sales of space heating units - Electric    | 2.07 | 2.47   | 3.76   | 7.71 | 14.2 | 19.1 | 21    |
| Resistance (%)                             |      |        |        |      |      |      |       |
| Sales of space heating units - Fossil (%)  | 23.7 | 34.5   | 32.4   | 24.4 | 11.9 | 3.8  | 0.998 |
| Sales of space heating units - Gas Furnace | 69.9 | 55.4   | 53.1   | 47.2 | 33.3 | 15.5 | 5.06  |
| (%)  |      |        |        |      |      |      |       |
| Sales of water heating units - Electric    | 2.04 | 2.9    | 4.29   | 8.99 | 20.1 | 34   | 42    |
| Heat Pump (%)                              |      |        |        |      |      |      |       |
| Sales of water heating units - Electric    | 10.2 | 11.8   | 12.9   | 17.6 | 28.1 | 41.1 | 48.8  |
| Resistance (%)                             |      |        |        |      |      |      |       |
| Sales of water heating units - Gas Furnace | 84.8 | 81.2   | 79     | 70.2 | 49.4 | 23.1 | 7.53  |
| (%)  |      |        |        |      |      |      |       |
| Sales of water heating units - Other (%)   | 2.99 | 4.09   | 3.78   | 3.24 | 2.41 | 1.82 | 1.65  |

Table 18: E- scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

| Item  | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|------|------|------|------|------|------|------|
| Electricity distribution capital invested - |      | 1.91 | 1.91 | 3.04 | 3.17 | 5.62 | 6.03 |
| Cumulative 5-yr (billion \$2018)            |      |      |      |      |      |      |      |

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

| Item                                   | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|--|------|------|------|------|------|------|------|
| Final energy use - Commercial (PJ)     | 253  | 241  | 235  | 230  | 223  | 216  | 207  |
| Final energy use - Industry (PJ)       | 81.4 | 79.4 | 79.8 | 80.8 | 82.8 | 83.9 | 85.2 |
| Final energy use - Residential (PJ)    | 286  | 270  | 259  | 248  | 231  | 207  | 181  |
| Final energy use - Transportation (PJ) | 501  | 471  | 433  | 400  | 373  | 341  | 304  |

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

| Item                                       | 2020 | 2025  | 2030 | 2035 | 2040 | 2045  | 2050  |
|--|------|-------|------|------|------|-------|-------|
| Residential HVAC investment in 2020s vs.   | 0    | 5.63  | 6.47 | 0    | 0    | 0     | 0     |
| REF - Cumulative 5-yr (billion \$2018)     |      |       |      |      |      |       |       |
| Sales of cooking units - Electric          | 64   | 64.9  | 68.2 | 76.9 | 89   | 96.4  | 99    |
| Resistance (%)                             |      |       |      |      |      |       |       |
| Sales of cooking units - Gas (%)           | 36   | 35.1  | 31.8 | 23.1 | 11   | 3.56  | 0.957 |
| Sales of space heating units - Electric    | 6.91 | 7.36  | 12   | 26   | 51.8 | 76    | 88    |
| Heat Pump (%)                              |      |       |      |      |      |       |       |
| Sales of space heating units - Electric    | 6.17 | 9.22  | 8.85 | 8.12 | 6.41 | 4.13  | 2.94  |
| Resistance (%)                             |      |       |      |      |      |       |       |
| Sales of space heating units - Fossil (%)  | 32.4 | 46.7  | 43.8 | 34.6 | 19.9 | 9.61  | 5.55  |
| Sales of space heating units - Gas (%)     | 54.5 | 36.7  | 35.3 | 31.3 | 21.9 | 10.3  | 3.54  |
| Sales of water heating units - Electric    | 0    | 0.459 | 1.73 | 5.83 | 15.1 | 26.1  | 32.4  |
| Heat Pump (%)                              |      |       |      |      |      |       |       |
| Sales of water heating units - Electric    | 30.5 | 48.3  | 49   | 51.2 | 55.6 | 60.5  | 63.2  |
| Resistance (%)                             |      |       |      |      |      |       |       |
| Sales of water heating units - Gas Furnace | 60   | 44.6  | 43.2 | 38.4 | 27   | 12.6  | 4.1   |
| (%)  |      |       |      |      |      |       |       |
| Sales of water heating units - Other (%)   | 9.47 | 6.6   | 6.08 | 4.62 | 2.32 | 0.811 | 0.288 |

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

| Item                                       | 2020  | 2025  | 2030  | 2035  | 2040  | 2045  | 2050  |
|--|-------|-------|-------|-------|-------|-------|-------|
| Light-duty vehicle capital costs -         | 0     | 0     | 161   | 327   | 1,113 | 3,470 | 5,067 |
| Cumulative 5-yr (million \$2018)           |       |       |       |       |       |       |       |
| Public EV charging plugs - DC Fast (1000   | 0.317 | 0     | 0.499 | 0     | 2.34  | 0     | 6.43  |
| units)                                     |       |       |       |       |       |       |       |
| Public EV charging plugs - L2 (1000 units) | 2.26  | 0     | 12    | 0     | 56.3  | 0     | 154   |
| 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 (%)    | 1.41  | 1.85  | 2.03  | 1.61  | 1.02  | 0.519 | 0.223 |
| Vehicle sales - Light-duty - EV (%)        | 2.06  | 5.07  | 12.6  | 27.1  | 49.7  | 72.9  | 87.9  |
| Vehicle sales - Light-duty - gasoline (%)  | 91.2  | 86.7  | 78.4  | 65.1  | 44.7  | 23.9  | 10.6  |
| Vehicle sales - Light-duty - hybrid (%)    | 5.1   | 5.88  | 6.54  | 5.88  | 4.34  | 2.52  | 1.21  |
| Vehicle sales - Light-duty - hydrogen FC   | 0.112 | 0.376 | 0.317 | 0.239 | 0.168 | 0.092 | 0.043 |
| (%)  |       |       |       |       |       |       |       |
| Vehicle sales - Light-duty - other (%)     | 0.097 | 0.1   | 0.09  | 0.078 | 0.056 | 0.03  | 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     | 0.166 | 0.485 | 1.37  | 3.58  | 7.86  | 13.2  | 17    |
| FC (%)                                     |       |       |       |       |       |       |       |
| 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      |      |      |      |      |      |      | 0     |
| deployment - Corn-ethanol to energy     |      |      |      |      |      |      |       |
| grasses (1000 tCO2e/y)                  |      |      |      |      |      |      |       |
| Carbon sink potential - Aggressive      |      |      |      |      |      |      | -105  |
| deployment - Cropland measures (1000    |      |      |      |      |      |      |       |
| tCO2e/y)                                |      |      |      |      |      |      |       |
| Carbon sink potential - Aggressive      |      |      |      |      |      |      | -3.29 |
| deployment - Permanent conservation     |      |      |      |      |      |      |       |
| cover (1000 tCO2e/y)                    |      |      |      |      |      |      |       |
| Carbon sink potential - Aggressive      |      |      |      |      |      |      | -109  |
| deployment - Total (1000 tCO2e/y)       |      |      |      |      |      |      |       |
| Carbon sink potential - Moderate        |      |      |      |      |      |      | 0     |
| deployment - Corn-ethanol to energy     |      |      |      |      |      |      |       |
| grasses (1000 tC02e/y)                  |      |      |      |      |      |      |       |
| Carbon sink potential - Moderate        |      |      |      |      |      |      | -55   |
| deployment - Cropland measures (1000    |      |      |      |      |      |      |       |
| tCO2e/y)                                |      |      |      |      |      |      |       |
| Carbon sink potential - Moderate        |      |      |      |      |      |      | -1.64 |
| deployment - Permanent conservation     |      |      |      |      |      |      |       |
| cover (1000 tCO2e/y)                    |      |      |      |      |      |      |       |
| Carbon sink potential - Moderate        |      |      |      |      |      |      | -56.7 |
| deployment - Total (1000 tCO2e/y)       |      |      |      |      |      |      |       |
| Land impacted for carbon sink -         |      |      |      |      |      |      | 0     |
| Aggressive deployment - Corn-ethanol to |      |      |      |      |      |      |       |
| energy grasses (1000 hectares)          |      |      |      |      |      |      |       |
| Land impacted for carbon sink -         |      |      |      |      |      |      | 63.5  |
| Aggressive deployment - Cropland        |      |      |      |      |      |      |       |
| measures (1000 hectares)                |      |      |      |      |      |      |       |
| Land impacted for carbon sink -         |      |      |      |      |      |      | 5.98  |
| Aggressive deployment - Permanent       |      |      |      |      |      |      |       |
| conservation cover (1000 hectares)      |      |      |      |      |      |      |       |

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

| Item                                     | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|--|------|------|------|------|------|------|------|
| Land impacted for carbon sink -          |      |      |      |      |      |      | 69.5 |
| Aggressive deployment - Total (1000      |      |      |      |      |      |      |      |
| hectares)                                |      |      |      |      |      |      |      |
| Land impacted for carbon sink - Moderate |      |      |      |      |      |      | 0    |
| deployment - Corn-ethanol to energy      |      |      |      |      |      |      |      |
| grasses (1000 hectares)                  |      |      |      |      |      |      |      |
| Land impacted for carbon sink - Moderate |      |      |      |      |      |      | 33.2 |
| deployment - Cropland measures (1000     |      |      |      |      |      |      |      |
| hectares)                                |      |      |      |      |      |      |      |
| Land impacted for carbon sink - Moderate |      |      |      |      |      |      | 2.99 |
| deployment - Permanent conservation      |      |      |      |      |      |      |      |
| cover (1000 hectares)                    |      |      |      |      |      |      |      |
| Land impacted for carbon sink - Moderate |      |      |      |      |      |      | 36.2 |
| deployment - Total (1000 hectares)       |      |      |      |      |      |      |      |

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

| Item                                      | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050   |
|---|------|------|------|------|------|------|--------|
| Carbon sink potential - High - Accelerate |      |      |      |      |      |      | -36.4  |
| regeneration (1000 tCO2e/y)               |      |      |      |      |      |      |        |
| Carbon sink potential - High - All (not   |      |      |      |      |      |      | -4,728 |
| counting overlap) (1000 tCO2e/y)          |      |      |      |      |      |      |        |
| Carbon sink potential - High - Avoid      |      |      |      |      |      |      | -1,146 |
| deforestation (1000 tCO2e/y)              |      |      |      |      |      |      |        |
| Carbon sink potential - High - Extend     |      |      |      |      |      |      | -1,955 |
| rotation length (1000 tCO2e/y)            |      |      |      |      |      |      |        |
| Carbon sink potential - High - Improve    |      |      |      |      |      |      | 0      |
| plantations (1000 tCO2e/y)                |      |      |      |      |      |      |        |
| Carbon sink potential - High - Increase   |      |      |      |      |      |      | -518   |
| retention of HWP (1000 tCO2e/y)           |      |      |      |      |      |      |        |
| Carbon sink potential - High - Increase   |      |      |      |      |      |      | -210   |
| trees outside forests (1000 tCO2e/y)      |      |      |      |      |      |      |        |
| Carbon sink potential - High - Reforest   |      |      |      |      |      |      | 0      |
| cropland (1000 tCO2e/y)                   |      |      |      |      |      |      |        |
| Carbon sink potential - High - Reforest   |      |      |      |      |      |      | -307   |
| pasture (1000 tCO2e/y)                    |      |      |      |      |      |      |        |
| Carbon sink potential - High - Restore    |      |      |      |      |      |      | -555   |
| productivity (1000 tCO2e/y)               |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Accelerate  |      |      |      |      |      |      | -18.3  |
| regeneration (1000 tCO2e/y)               |      |      |      |      |      |      |        |
| Carbon sink potential - Low - All (not    |      |      |      |      |      |      | -1,417 |
| counting overlap) (1000 tCO2e/y)          |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Avoid       |      |      |      |      |      |      | -191   |
| deforestation (1000 tCO2e/y)              |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Extend      |      |      |      |      |      |      | -751   |
| rotation length (1000 tCO2e/y)            |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Improve     |      |      |      |      |      |      | 0      |
| plantations (1000 tCO2e/y)                |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Increase    |      |      |      |      |      |      | -173   |
| retention of HWP (1000 tCO2e/y)           |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Increase    |      |      |      |      |      |      | -73.7  |
| trees outside forests (1000 tCO2e/y)      |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Reforest    |      |      |      |      |      |      | 0      |
| cropland (1000 tCO2e/y)                   |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Reforest    |      |      |      |      |      |      | -23.3  |
| pasture (1000 tCO2e/y)                    |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Restore     |      |      |      |      |      |      | -187   |
| productivity (1000 tCO2e/y)               |      |      |      |      |      |      |        |
| Carbon sink potential - Mid - Accelerate  |      |      |      |      |      |      | -27.4  |
| regeneration (1000 tCO2e/y)               |      |      |      |      |      |      |        |

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

| Item Carbon sink potential - Mid - All (not | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 205<br>-3,07 |
|---|------|------|------|------|------|------|--------------|
|   |      |      |      |      |      |      | -3,07        |
| counting overlap) (1000 tC02e/y)            |      |      |      |      |      |      |              |
| Carbon sink potential - Mid - Avoid         |      |      |      |      |      |      | -66          |
| deforestation (1000 tC02e/y)                |      |      |      |      |      |      | 4.05         |
| Carbon sink potential - Mid - Extend        |      |      |      |      |      |      | -1,35        |
| rotation length (1000 tCO2e/y)              |      |      |      |      |      |      |              |
| Carbon sink potential - Mid - Improve       |      |      |      |      |      |      | (            |
| plantations (1000 tCO2e/y)                  |      |      |      |      |      |      |              |
| Carbon sink potential - Mid - Increase      |      |      |      |      |      |      | -34          |
| retention of HWP (1000 tCO2e/y)             |      |      |      |      |      |      |              |
| Carbon sink potential - Mid - Increase      |      |      |      |      |      |      | -14          |
| trees outside forests (1000 tCO2e/y)        |      |      |      |      |      |      |              |
| Carbon sink potential - Mid - Reforest      |      |      |      |      |      |      |              |
| cropland (1000 tCO2e/y)                     |      |      |      |      |      |      |              |
| Carbon sink potential - Mid - Reforest      |      |      |      |      |      |      | -16          |
| pasture (1000 tC02e/y)                      |      |      |      |      |      |      | 10           |
| Carbon sink potential - Mid - Restore       |      |      |      |      |      | +    | -37          |
| ·   |      |      |      |      |      |      | -31          |
| productivity (1000 tCO2e/y)                 |      |      |      |      |      |      |              |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 5.9          |
| High - Accelerate regeneration (1000        |      |      |      |      |      |      |              |
| hectares)                                   |      |      |      |      |      |      |              |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 15           |
| High - Avoid deforestation (over 30 years)  |      |      |      |      |      |      |              |
| (1000 hectares)                             |      |      |      |      |      |      |              |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 99           |
| High - Extend rotation length (1000         |      |      |      |      |      |      |              |
| hectares)                                   |      |      |      |      |      |      |              |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      |              |
| High - Improve plantations (1000            |      |      |      |      |      |      |              |
| hectares)                                   |      |      |      |      |      |      |              |
| -   |      |      |      |      |      |      |              |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      |              |
| High - Increase retention of HWP (1000      |      |      |      |      |      |      |              |
| hectares)                                   |      |      |      |      |      |      |              |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 2            |
| High - Increase trees outside forests       |      |      |      |      |      |      |              |
| (1000 hectares)                             |      |      |      |      |      |      |              |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      |              |
| High - Reforest cropland (1000 hectares)    |      |      |      |      |      |      |              |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 8.7          |
| High - Reforest pasture (1000 hectares)     |      |      |      |      |      |      |              |
| Land impacted for carbon sink potential -   |      |      |      |      |      | +    | 18           |
| High - Restore productivity (1000           |      |      |      |      |      |      | .0           |
| hectares)                                   |      |      |      |      |      |      |              |
|   |      |      |      |      |      |      | 1.0-         |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 1,37         |
| High - Total impacted (over 30 years)       |      |      |      |      |      |      |              |
| (1000 hectares)                             |      |      |      |      |      |      |              |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 2.9          |
| Low - Accelerate regeneration (1000         |      |      |      |      |      |      |              |
| hectares)                                   |      |      |      |      |      |      |              |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 14           |
| Low - Avoid deforestation (over 30 years)   |      |      |      |      |      |      |              |
| (1000 hectares)                             |      |      |      |      |      |      |              |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 38           |
| Low - Extend rotation length (1000          |      |      |      |      |      |      | 00           |
| nectares)                                   |      |      |      |      |      |      |              |
|   |      |      |      |      |      |      |              |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      |              |
| Low - Improve plantations (1000             |      |      |      |      |      |      |              |
| hectares)                                   |      |      |      |      |      |      |              |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      |              |
| Low - Increase retention of HWP (1000       |      |      |      |      |      |      |              |
| hectares)                                   |      |      |      |      |      |      |              |

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

| Item                                       | 2020 | 2025 | 2030 | 2035 | 2040   | 2045 | 2050  |
|--|------|------|------|------|--------|------|-------|
| Land impacted for carbon sink potential -  |      |      |      |      |        |      | 10.5  |
| Low - Increase trees outside forests       |      |      |      |      |        |      |       |
| (1000 hectares)                            |      |      |      |      |        |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |        |      | 0     |
| Low - Reforest cropland (1000 hectares)    |      |      |      |      |        |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |        |      | 1.51  |
| Low - Reforest pasture (1000 hectares)     |      |      |      |      |        |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |        |      | 111   |
| Low - Restore productivity (1000           |      |      |      |      |        |      |       |
| hectares)                                  |      |      |      |      |        |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |        |      | 654   |
| Low - Total impacted (over 30 years)       |      |      |      |      |        |      |       |
| (1000 hectares)                            |      |      |      |      |        |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |        |      | 4.47  |
| Mid - Accelerate regeneration (1000        |      |      |      |      |        |      |       |
| hectares)                                  |      |      |      |      |        |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |        |      | 150   |
| Mid - Avoid deforestation (over 30 years)  |      |      |      |      |        |      |       |
| (1000 hectares)                            |      |      |      |      |        |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |        |      | 689   |
| Mid - Extend rotation length (1000         |      |      |      |      |        |      |       |
| hectares)                                  |      |      |      |      |        |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |        |      | 0     |
| Mid - Improve plantations (1000 hectares)  |      |      |      |      |        |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |        |      | 0     |
| Mid - Increase retention of HWP (1000      |      |      |      |      |        |      |       |
| hectares)                                  |      |      |      |      |        |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |        |      | 15.3  |
| Mid - Increase trees outside forests (1000 |      |      |      |      |        |      |       |
| hectares)                                  |      |      |      |      |        |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |        |      | 0     |
| Mid - Reforest cropland (1000 hectares)    |      |      |      |      |        |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |        |      | 10.9  |
| Mid - Reforest pasture (1000 hectares)     |      |      |      |      |        |      |       |
| Land impacted for carbon sink potential -  |      | T    |      |      |        |      | 224   |
| Mid - Restore productivity (1000           |      |      |      |      |        |      |       |
| hectares)                                  |      |      |      |      |        |      |       |
| Land impacted for carbon sink potential -  |      | T    |      |      | $\Box$ |      | 1,095 |
| Mid - Total impacted (over 30 years) (1000 |      |      |      |      |        |      |       |
| hectares)                                  |      |      |      |      |        |      |       |

Table 24: E- scenario - IMPACTS - Health

| 2020 | 2025  | 2030                        | 2035   | 2040   | 2045   | 2050  |
|------|-------|-----------------------------|--|--|--|---|
|      | 557   | 0.598                       | 0.597  | 0.568  | 0.345  | 0.018   |
|      |       |                             |  |  |  |   |
|      | 284   | 123                         | 47.3   | 19.9   | 5.97   | 9.82  |
|      |       |                             |  |  |  |   |
|      | 2,064 | 2,069                       | 1,991  | 1,771  | 1,392  | 941   |
|      |       |                             |  |  |  |   |
|      | 62.9  | 0.068                       | 0.067  | 0.064  | 0.039  | 0.002   |
|      |       |                             |  |  |  |   |
|      | 32    | 13.9                        | 5.34   | 2.25   | 0.674  | 1.11  |
|      |       |                             |  |  |  |   |
|      | 232   | 233                         | 224  | 199  | 157  | 106   |
|      |       |                             |  |  |  |   |
|      | 2020  | 557<br>284<br>2,064<br>62.9 | 557 0.598<br>284 123<br>2,064 2,069<br>62.9 0.068<br>32 13.9 | 557 0.598 0.597<br>284 123 47.3<br>2,064 2,069 1,991<br>62.9 0.068 0.067<br>32 13.9 5.34 | 557         0.598         0.597         0.568           284         123         47.3         19.9           2,064         2,069         1,991         1,771           62.9         0.068         0.067         0.064           32         13.9         5.34         2.25 | 557         0.598         0.597         0.568         0.345           284         123         47.3         19.9         5.97           2,064         2,069         1,991         1,771         1,392           62.9         0.068         0.067         0.064         0.039           32         13.9         5.34         2.25         0.674 |

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

| Item  | 2020 | 2025   | 2030   | 2035  | 2040  | 2045 | 2050 |
|---|------|--------|--------|-------|-------|------|------|
| Commercial HVAC investment in 2020s -<br>Cumulative 5-yr (million \$2018) | 0    | 13,317 | 14,546 | 0     | 0     | 0    | 0    |
| Sales of cooking units - Electric<br>Resistance (%)                       | 36.9 | 49.9   | 81.2   | 87.4  | 87.7  | 87.7 | 87.7 |
| Sales of cooking units - Gas (%)  | 63.1 | 50.1   | 18.8   | 12.6  | 12.3  | 12.3 | 12.3 |
| Sales of space heating units - Electric<br>Heat Pump (%)                  | 4.31 | 10.7   | 38.6   | 72.2  | 77.8  | 78.1 | 78.1 |
| Sales of space heating units - Electric<br>Resistance (%)                 | 2.07 | 4.58   | 16.4   | 21.3  | 21.9  | 21.9 | 21.9 |
| Sales of space heating units - Fossil (%)                                 | 23.7 | 29.9   | 5.74   | 0.244 | 0     | 0    | 0    |
| Sales of space heating units - Gas Furnace (%)                            | 69.9 | 54.9   | 39.2   | 6.26  | 0.372 | 0    | 0    |
| Sales of water heating units - Electric<br>Heat Pump (%)                  | 2.04 | 3.48   | 15.8   | 41.1  | 45.6  | 46   | 45.9 |
| Sales of water heating units - Electric<br>Resistance (%)                 | 10.2 | 12.4   | 23.9   | 48    | 52.3  | 52.5 | 52.5 |
| Sales of water heating units - Gas Furnace (%)                            | 84.8 | 80.4   | 58.4   | 9.31  | 0.551 | 0    | 0    |
| Sales of water heating units - Other (%)                                  | 2.99 | 3.76   | 1.89   | 1.58  | 1.56  | 1.56 | 1.58 |

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

| Item  | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|------|------|------|------|------|------|------|
| Electricity distribution capital invested - |      | 2.59 | 2.67 | 6.63 | 7.17 | 6.63 | 7.04 |
| Cumulative 5-yr (billion \$2018)            |      |      |      |      |      |      |      |

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

| Item                                   | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|--|------|------|------|------|------|------|------|
| Final energy use - Commercial (PJ)     | 253  | 241  | 230  | 215  | 199  | 188  | 181  |
| Final energy use - Industry (PJ)       | 81.4 | 79.3 | 79.4 | 79.4 | 80.6 | 81.8 | 83.4 |
| Final energy use - Residential (PJ)    | 286  | 269  | 250  | 218  | 185  | 159  | 144  |
| Final energy use - Transportation (PJ) | 500  | 466  | 414  | 349  | 289  | 250  | 231  |

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

| Item                                       | 2020 | 2025 | 2030 | 2035  | 2040  | 2045  | 2050  |
|--|------|------|------|-------|-------|-------|-------|
| Residential HVAC investment in 2020s vs.   | 0    | 5.62 | 6.19 | 0     | 0     | 0     | 0     |
| REF - Cumulative 5-yr (billion \$2018)     |      |      |      |       |       |       |       |
| Sales of cooking units - Electric          | 64.1 | 71.7 | 95.2 | 99.8  | 100   | 100   | 100   |
| Resistance (%)                             |      |      |      |       |       |       |       |
| Sales of cooking units - Gas (%)           | 35.9 | 28.3 | 4.84 | 0.243 | 0     | 0     | 0     |
| Sales of space heating units - Electric    | 6.91 | 13.1 | 53.5 | 87.8  | 93.1  | 93.4  | 93.4  |
| Heat Pump (%)                              |      |      |      |       |       |       |       |
| Sales of space heating units - Electric    | 6.17 | 9.15 | 7.14 | 3.07  | 2.34  | 2.27  | 2.46  |
| Resistance (%)                             |      |      |      |       |       |       |       |
| Sales of space heating units - Fossil (%)  | 32.4 | 41.6 | 13.8 | 4.85  | 4.07  | 4.05  | 3.91  |
| Sales of space heating units - Gas (%)     | 54.5 | 36.2 | 25.6 | 4.29  | 0.5   | 0.264 | 0.249 |
| Sales of water heating units - Electric    | 0    | 1.22 | 12.2 | 31.8  | 35.2  | 35.4  | 35.4  |
| Heat Pump (%)                              |      |      |      |       |       |       |       |
| Sales of water heating units - Electric    | 30.5 | 48.9 | 54.7 | 62.9  | 64.4  | 64.5  | 64.5  |
| Resistance (%)                             |      |      |      |       |       |       |       |
| Sales of water heating units - Gas Furnace | 60   | 44.2 | 31.9 | 5.09  | 0.3   | 0     | 0     |
| (%)  |      |      |      |       |       |       |       |
| Sales of water heating units - Other (%)   | 9.47 | 5.72 | 1.16 | 0.145 | 0.102 | 0.103 | 0.103 |

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

| Item                                       | 2020  | 2025  | 2030  | 2035  | 2040  | 2045  | 2050  |
|--|-------|-------|-------|-------|-------|-------|-------|
| Light-duty vehicle capital costs -         | 0     | 962   | 2,495 | 3,997 | 6,074 | 6,591 | 6,294 |
| Cumulative 5-yr (million \$2018)           |       |       |       |       |       |       |       |
| Public EV charging plugs - DC Fast (1000   | 0.317 | 0     | 1.49  | 0     | 6.24  | 0     | 10    |
| units)                                     |       |       |       |       |       |       |       |
| Public EV charging plugs - L2 (1000 units) | 2.26  | 0     | 35.7  | 0     | 150   | 0     | 241   |
| 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 (%)    | 1.4   | 1.68  | 1.2   | 0.382 | 0.072 | 0.013 | 0     |
| Vehicle sales - Light-duty - EV (%)        | 4.41  | 16.7  | 48.7  | 82.7  | 96.4  | 99.3  | 100   |
| Vehicle sales - Light-duty - gasoline (%)  | 89.1  | 76.3  | 46.4  | 15.6  | 3.17  | 0.586 | 0     |
| Vehicle sales - Light-duty - hybrid (%)    | 4.9   | 4.89  | 3.38  | 1.24  | 0.304 | 0.067 | 0     |
| Vehicle sales - Light-duty - hydrogen FC   | 0.11  | 0.331 | 0.191 | 0.059 | 0.012 | 0.002 | 0     |
| (%)  |       |       |       |       |       |       |       |
| Vehicle sales - Light-duty - other (%)     | 0.095 | 0.091 | 0.058 | 0.02  | 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     | 0.196 | 1.27  | 6.33  | 15.2  | 19.1  | 19.9  | 20    |
| FC (%)                                     |       |       |       |       |       |       |       |
| Vehicle sales - Medium-duty - other (%)    | 0.253 | 0.255 | 0.205 | 0.083 | 0.019 | 0.004 | 0     |

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

| Item  | 2020 | 2025  | 2030  | 2035   | 2040   | 2045   | 2050   |
|---|------|-------|-------|--------|--------|--------|--------|
| Capital invested - Offshore Wind - Base     | 0    | 1.72  | 8.25  | 26     | 18.5   | 2.74   | 0      |
| (billion \$2018)                            |      |       |       |        |        |        |        |
| Capital invested - Solar PV - Base (billion | 0    | 0     | 2.48  | 4.94   | 8.24   | 2.04   | 0      |
| \$2018)                                     |      |       |       |        |        |        |        |
| Capital invested - Wind - Base (billion     | 0    | 0.105 | 1.71  | 0.488  | 0.32   | 0      | 0.218  |
| \$2018)                                     |      |       |       |        |        |        |        |
| Installed (cumulative) - OffshoreWind -     | 70.3 | 678   | 3,840 | 15,289 | 24,408 | 26,167 | 26,167 |
| Base land use assumptions (MW)              |      |       |       |        |        |        |        |
| Installed (cumulative) - Solar - Base land  | 672  | 672   | 2,747 | 7,224  | 15,150 | 17,225 | 17,225 |
| use assumptions (MW)                        |      |       |       |        |        |        |        |
| Installed (cumulative) - Wind - Base land   | 125  | 165   | 878   | 1,096  | 1,247  | 1,247  | 1,361  |
| use assumptions (MW)                        |      |       |       |        |        |        |        |

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

| Item                                     | 2020 | 2025  | 2030   | 2035   | 2040   | 2045  | 2050   |
|--|------|-------|--------|--------|--------|-------|--------|
| OffshoreWind - Base land use             | 282  | 2,446 | 12,876 | 48,252 | 39,559 | 8,011 | 0      |
| assumptions (GWh)                        |      |       |        |        |        |       |        |
| OffshoreWind - Constrained land use      | 0    | 0     | 13,165 | 51,357 | 9,619  | 0     | 15,928 |
| assumptions (GWh)                        |      |       |        |        |        |       |        |
| Solar - Base land use assumptions (GWh)  | 744  | 0     | 3,665  | 7,767  | 13,819 | 3,589 | 0      |
| Solar - Constrained land use assumptions | 744  | 0     | 3,484  | 4,682  | 7,810  | 3,047 | 0      |
| (GWh)                                    |      |       |        |        |        |       |        |
| Wind - Base land use assumptions (GWh)   | 502  | 153   | 2,604  | 775    | 538    | 0     | 405    |
| Wind - Constrained land use assumptions  | 502  | 153   | 2,904  | 423    | 307    | 298   | 890    |
| (GWh)                                    |      |       |        |        |        |       |        |

Table 32: E+RE+ scenario - PILLAR 6: Land sinks - Agriculture

| Item                                     | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050  |
|--|------|------|------|------|------|------|-------|
| Carbon sink potential - Aggressive       |      |      |      |      |      |      | 0     |
| deployment - Corn-ethanol to energy      |      |      |      |      |      |      |       |
| grasses (1000 tC02e/y)                   |      |      |      |      |      |      |       |
| Carbon sink potential - Aggressive       |      |      |      |      |      |      | -105  |
| deployment - Cropland measures (1000     |      |      |      |      |      |      |       |
| tCO2e/y)                                 |      |      |      |      |      |      |       |
| Carbon sink potential - Aggressive       |      |      |      |      |      |      | -3.29 |
| deployment - Permanent conservation      |      |      |      |      |      |      |       |
| cover (1000 tCO2e/y)                     |      |      |      |      |      |      |       |
| Carbon sink potential - Aggressive       |      |      |      |      |      |      | -109  |
| deployment - Total (1000 tCO2e/y)        |      |      |      |      |      |      |       |
| Carbon sink potential - Moderate         |      |      |      |      |      |      | 0     |
| deployment - Corn-ethanol to energy      |      |      |      |      |      |      |       |
| grasses (1000 tCO2e/y)                   |      |      |      |      |      |      |       |
| Carbon sink potential - Moderate         |      |      |      |      |      |      | -55   |
| deployment - Cropland measures (1000     |      |      |      |      |      |      |       |
| tCO2e/y)                                 |      |      |      |      |      |      |       |
| Carbon sink potential - Moderate         |      |      |      |      |      |      | -1.64 |
| deployment - Permanent conservation      |      |      |      |      |      |      |       |
| cover (1000 tCO2e/y)                     |      |      |      |      |      |      |       |
| Carbon sink potential - Moderate         |      |      |      |      |      |      | -56.7 |
| deployment - Total (1000 tCO2e/y)        |      |      |      |      |      |      |       |
| Land impacted for carbon sink -          |      |      |      |      |      |      | 0     |
| Aggressive deployment - Corn-ethanol to  |      |      |      |      |      |      | _     |
| energy grasses (1000 hectares)           |      |      |      |      |      |      |       |
| Land impacted for carbon sink -          |      |      |      |      |      |      | 63.5  |
| Aggressive deployment - Cropland         |      |      |      |      |      |      |       |
| measures (1000 hectares)                 |      |      |      |      |      |      |       |
| Land impacted for carbon sink -          |      |      |      |      |      |      | 5.98  |
| Aggressive deployment - Permanent        |      |      |      |      |      |      | 0.70  |
| conservation cover (1000 hectares)       |      |      |      |      |      |      |       |
| Land impacted for carbon sink -          |      |      |      |      |      |      | 69.5  |
| Aggressive deployment - Total (1000      |      |      |      |      |      |      | 07.0  |
| hectares)                                |      |      |      |      |      |      |       |
| Land impacted for carbon sink - Moderate |      |      |      |      |      |      | 0     |
| deployment - Corn-ethanol to energy      |      |      |      |      |      |      | U     |
| grasses (1000 hectares)                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink - Moderate |      |      |      |      |      |      | 33.2  |
| deployment - Cropland measures (1000     |      |      |      |      |      |      | 33.2  |
| hectares)                                |      |      |      |      |      |      |       |
| Land impacted for carbon sink - Moderate |      |      |      |      |      |      | 2.99  |
| deployment - Permanent conservation      |      |      |      |      |      |      | 2.77  |
| cover (1000 hectares)                    |      |      |      |      |      |      |       |
| Land impacted for carbon sink - Moderate |      |      |      |      |      |      | 36.2  |
|  |      |      |      |      |      |      | 36.2  |
| deployment - Total (1000 hectares)       |      |      |      |      |      |      |       |

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

| Item                                      | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050   |
|---|------|------|------|------|------|------|--------|
| Carbon sink potential - High - Accelerate |      |      |      |      |      |      | -36.4  |
| regeneration (1000 tCO2e/y)               |      |      |      |      |      |      |        |
| Carbon sink potential - High - All (not   |      |      |      |      |      |      | -4,728 |
| counting overlap) (1000 tCO2e/y)          |      |      |      |      |      |      |        |
| Carbon sink potential - High - Avoid      |      |      |      |      |      |      | -1,146 |
| deforestation (1000 tCO2e/y)              |      |      |      |      |      |      |        |
| Carbon sink potential - High - Extend     |      |      |      |      |      |      | -1,955 |
| rotation length (1000 tCO2e/y)            |      |      |      |      |      |      |        |
| Carbon sink potential - High - Improve    |      |      |      |      |      |      | 0      |
| plantations (1000 tCO2e/y)                |      |      |      |      |      |      |        |
| Carbon sink potential - High - Increase   |      |      |      |      |      |      | -518   |
| retention of HWP (1000 tCO2e/y)           |      |      |      |      |      |      |        |

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

| Item   | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050   |
|--|------|------|------|------|------|------|--------|
| Carbon sink potential - High - Increase  |      |      |      |      |      |      | -210   |
| trees outside forests (1000 tC02e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - High - Reforest cropland (1000 tCO2e/y)                                      |      |      |      |      |      |      | C      |
| Carbon sink potential - High - Reforest pasture (1000 tC02e/y)                                       |      |      |      |      |      |      | -307   |
| Carbon sink potential - High - Restore productivity (1000 tCO2e/y)                                   |      |      |      |      |      |      | -555   |
| Carbon sink potential - Low - Accelerate regeneration (1000 tC02e/y)                                 |      |      |      |      |      |      | -18.3  |
| Carbon sink potential - Low - All (not counting overlap) (1000 tC02e/y)                              |      |      |      |      |      |      | -1,417 |
| Carbon sink potential - Low - Avoid deforestation (1000 tC02e/y)                                     |      |      |      |      |      |      | -191   |
| Carbon sink potential - Low - Extend rotation length (1000 tCO2e/y)                                  |      |      |      |      |      |      | -751   |
| Carbon sink potential - Low - Improve plantations (1000 tCO2e/y)                                     |      |      |      |      |      |      | C      |
| Carbon sink potential - Low - Increase retention of HWP (1000 tC02e/y)                               |      |      |      |      |      |      | -173   |
| Carbon sink potential - Low - Increase trees outside forests (1000 tC02e/y)                          |      |      |      |      |      |      | -73.7  |
| Carbon sink potential - Low - Reforest cropland (1000 tC02e/y)                                       |      |      |      |      |      |      | C      |
| Carbon sink potential - Low - Reforest pasture (1000 tC02e/y)  |      |      |      |      |      |      | -23.3  |
| Carbon sink potential - Low - Restore productivity (1000 tCO2e/y)                                    |      |      |      |      |      |      | -18    |
| Carbon sink potential - Mid - Accelerate regeneration (1000 tCO2e/y)                                 |      |      |      |      |      |      | -27.4  |
| Carbon sink potential - Mid - All (not counting overlap) (1000 tC02e/y)                              |      |      |      |      |      |      | -3,072 |
| Carbon sink potential - Mid - Avoid deforestation (1000 tC02e/y)                                     |      |      |      |      |      |      | -669   |
| Carbon sink potential - Mid - Extend rotation length (1000 tCO2e/y)                                  |      |      |      |      |      |      | -1,353 |
| Carbon sink potential - Mid - Improve plantations (1000 tC02e/y)                                     |      |      |      |      |      |      | (      |
| Carbon sink potential - Mid - Increase retention of HWP (1000 tC02e/y)                               |      |      |      |      |      |      | -34    |
| Carbon sink potential - Mid - Increase<br>trees outside forests (1000 tCO2e/y)                       |      |      |      |      |      |      | -14:   |
| Carbon sink potential - Mid - Reforest cropland (1000 tCO2e/y)                                       |      |      |      |      |      |      | (      |
| Carbon sink potential - Mid - Reforest pasture (1000 tCO2e/y)  |      |      |      |      |      |      | -16    |
| Carbon sink potential - Mid - Restore productivity (1000 tCO2e/y)                                    |      |      |      |      |      |      | -37    |
| Land impacted for carbon sink potential -<br>High - Accelerate regeneration (1000                    |      |      |      |      |      |      | 5.96   |
| hectares) Land impacted for carbon sink potential -  |      |      |      |      |      |      | 15     |
| High - Avoid deforestation (over 30 years) (1000 hectares) Land impacted for carbon sink potential - |      |      |      |      |      |      | 99     |
| High - Extend rotation length (1000 hectares)  |      |      |      |      |      |      |        |
| Land impacted for carbon sink potential -<br>High - Improve plantations (1000<br>hectares)           |      |      |      |      |      |      | (      |

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 -<br>High - Increase retention of HWP (1000     |      |      |      |      |      |      | 0     |
| hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 20    |
| High - Increase trees outside forests   |      |      |      |      |      |      |       |
| (1000 hectares)  Land impacted for carbon sink potential -                              |      |      |      |      |      |      | 0     |
| High - Reforest cropland (1000 hectares)  |      |      |      |      |      |      | U     |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 8.73  |
| High - Reforest pasture (1000 hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 184   |
| High - Restore productivity (1000   |      |      |      |      |      |      |       |
| hectares)   |      |      |      |      |      |      | 1.071 |
| Land impacted for carbon sink potential -<br>High - Total impacted (over 30 years)      |      |      |      |      |      |      | 1,371 |
| (1000 hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 2.98  |
| Low - Accelerate regeneration (1000   |      |      |      |      |      |      |       |
| hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 146   |
| Low - Avoid deforestation (over 30 years)<br>(1000 hectares)                            |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 382   |
| Low - Extend rotation length (1000  |      |      |      |      |      |      | 302   |
| hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 0     |
| Low - Improve plantations (1000   |      |      |      |      |      |      |       |
| hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -<br>Low - Increase retention of HWP (1000      |      |      |      |      |      |      | 0     |
| hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 10.5  |
| Low - Increase trees outside forests  |      |      |      |      |      |      |       |
| (1000 hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 0     |
| Low - Reforest cropland (1000 hectares)  Land impacted for carbon sink potential -      |      |      |      |      |      |      | 1.51  |
| Low - Reforest pasture (1000 hectares)  |      |      |      |      |      |      | 1.51  |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 111   |
| Low - Restore productivity (1000  |      |      |      |      |      |      |       |
| hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 654   |
| Low - Total impacted (over 30 years)  |      |      |      |      |      |      |       |
| (1000 hectares)  Land impacted for carbon sink potential -                              |      |      |      |      |      |      | 4.47  |
| Mid - Accelerate regeneration (1000   |      |      |      |      |      |      | 4.41  |
| hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 150   |
| Mid - Avoid deforestation (over 30 years)   |      |      |      |      |      |      |       |
| (1000 hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 689   |
| Mid - Extend rotation length (1000 hectares)  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -   |      |      |      |      |      | +    | 0     |
| Mid - Improve plantations (1000 hectares)   |      |      |      |      |      |      | -     |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 0     |
| Mid - Increase retention of HWP (1000   |      |      |      |      |      |      |       |
| hectares)   |      |      |      |      |      |      | 45.0  |
| Land impacted for carbon sink potential -<br>Mid - Increase trees outside forests (1000 |      |      |      |      |      |      | 15.3  |
| hectares)   |      |      |      |      |      |      |       |

| Table 33: E+RE+ | . cronaria - | DTII AD A. | I and cinke - | Forests | (continued) |
|-----------------|--------------|------------|---------------|---------|-------------|
| 14018 33. E+KE+ | · SCEHUITO - | PILLAR O.  | LUHU SHIKS -  | FULESTS | COMUNICEUR  |

| Item                                       | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050  |
|--|------|------|------|------|------|------|-------|
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 0     |
| Mid - Reforest cropland (1000 hectares)    |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 10.9  |
| Mid - Reforest pasture (1000 hectares)     |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 224   |
| Mid - Restore productivity (1000           |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 1,095 |
| Mid - Total impacted (over 30 years) (1000 |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |

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

| Item                                  | 2020 | 2025  | 2030  | 2035  | 2040  | 2045  | 2050  |
|---------------------------------------|------|-------|-------|-------|-------|-------|-------|
| Monetary damages from air pollution - |      | 557   | 0.598 | 0.597 | 0.568 | 0.345 | 0.018 |
| Coal (million 2019\$)                 |      |       |       |       |       |       |       |
| Monetary damages from air pollution - |      | 273   | 137   | 76.8  | 69.5  | 24    | 12.3  |
| Natural Gas (million 2019\$)          |      |       |       |       |       |       |       |
| Monetary damages from air pollution - |      | 2,027 | 1,872 | 1,408 | 804   | 356   | 128   |
| Transportation (million 2019\$)       |      |       |       |       |       |       |       |
| Premature deaths from air pollution - |      | 62.9  | 0.068 | 0.067 | 0.064 | 0.039 | 0.002 |
| Coal (deaths)                         |      |       |       |       |       |       |       |
| Premature deaths from air pollution - |      | 30.8  | 15.5  | 8.67  | 7.84  | 2.71  | 1.39  |
| Natural Gas (deaths)                  |      |       |       |       |       |       |       |
| Premature deaths from air pollution - |      | 228   | 211   | 158   | 90.4  | 40    | 14.3  |
| Transportation (deaths)               |      |       |       |       |       |       |       |

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

| Item                                       | 2020 | 2025   | 2030   | 2035  | 2040  | 2045 | 2050 |
|--|------|--------|--------|-------|-------|------|------|
| Commercial HVAC investment in 2020s -      | 0    | 13,317 | 14,546 | 0     | 0     | 0    | 0    |
| Cumulative 5-yr (million \$2018)           |      |        |        |       |       |      |      |
| Sales of cooking units - Electric          | 36.9 | 49.9   | 81.2   | 87.4  | 87.7  | 87.7 | 87.7 |
| Resistance (%)                             |      |        |        |       |       |      |      |
| Sales of cooking units - Gas (%)           | 63.1 | 50.1   | 18.8   | 12.6  | 12.3  | 12.3 | 12.3 |
| Sales of space heating units - Electric    | 4.31 | 10.7   | 38.6   | 72.2  | 77.8  | 78.1 | 78.1 |
| Heat Pump (%)                              |      |        |        |       |       |      |      |
| Sales of space heating units - Electric    | 2.07 | 4.58   | 16.4   | 21.3  | 21.9  | 21.9 | 21.9 |
| Resistance (%)                             |      |        |        |       |       |      |      |
| Sales of space heating units - Fossil (%)  | 23.7 | 29.9   | 5.74   | 0.244 | 0     | 0    | 0    |
| Sales of space heating units - Gas Furnace | 69.9 | 54.9   | 39.2   | 6.26  | 0.372 | 0    | 0    |
| (%)  |      |        |        |       |       |      |      |
| Sales of water heating units - Electric    | 2.04 | 3.48   | 15.8   | 41.1  | 45.6  | 46   | 45.9 |
| Heat Pump (%)                              |      |        |        |       |       |      |      |
| Sales of water heating units - Electric    | 10.2 | 12.4   | 23.9   | 48    | 52.3  | 52.5 | 52.5 |
| Resistance (%)                             |      |        |        |       |       |      |      |
| Sales of water heating units - Gas Furnace | 84.8 | 80.4   | 58.4   | 9.31  | 0.551 | 0    | 0    |
| (%)  |      |        |        |       |       |      |      |
| Sales of water heating units - Other (%)   | 2.99 | 3.76   | 1.89   | 1.58  | 1.56  | 1.56 | 1.58 |

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

| Item  | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|------|------|------|------|------|------|------|
| Electricity distribution capital invested - |      | 2.59 | 2.67 | 6.63 | 7.17 | 6.63 | 7.04 |
| Cumulative 5-yr (billion \$2018)            |      |      |      |      |      |      |      |

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

| Item                               | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|------------------------------------|------|------|------|------|------|------|------|
| Final energy use - Commercial (PJ) | 253  | 241  | 230  | 215  | 199  | 188  | 181  |

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

| The state of the s | -    | -    |      | -    |      |      |      |
|--|------|------|------|------|------|------|------|
| Item   | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
| Final energy use - Industry (PJ)   | 81.4 | 79.3 | 79.4 | 79.4 | 80.6 | 81.8 | 83.4 |
| Final energy use - Residential (PJ)  | 286  | 269  | 250  | 218  | 185  | 159  | 144  |
| Final energy use - Transportation (PJ)   | 500  | 466  | 414  | 349  | 289  | 250  | 231  |

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

| Item                                       | 2020 | 2025 | 2030 | 2035  | 2040  | 2045  | 2050  |
|--|------|------|------|-------|-------|-------|-------|
| Residential HVAC investment in 2020s vs.   | 0    | 5.62 | 6.19 | 0     | 0     | 0     | 0     |
| REF - Cumulative 5-yr (billion \$2018)     |      |      |      |       |       |       |       |
| Sales of cooking units - Electric          | 64.1 | 71.7 | 95.2 | 99.8  | 100   | 100   | 100   |
| Resistance (%)                             |      |      |      |       |       |       |       |
| Sales of cooking units - Gas (%)           | 35.9 | 28.3 | 4.84 | 0.243 | 0     | 0     | 0     |
| Sales of space heating units - Electric    | 6.91 | 13.1 | 53.5 | 87.8  | 93.1  | 93.4  | 93.4  |
| Heat Pump (%)                              |      |      |      |       |       |       |       |
| Sales of space heating units - Electric    | 6.17 | 9.15 | 7.14 | 3.07  | 2.34  | 2.27  | 2.46  |
| Resistance (%)                             |      |      |      |       |       |       |       |
| Sales of space heating units - Fossil (%)  | 32.4 | 41.6 | 13.8 | 4.85  | 4.07  | 4.05  | 3.91  |
| Sales of space heating units - Gas (%)     | 54.5 | 36.2 | 25.6 | 4.29  | 0.5   | 0.264 | 0.249 |
| Sales of water heating units - Electric    | 0    | 1.22 | 12.2 | 31.8  | 35.2  | 35.4  | 35.4  |
| Heat Pump (%)                              |      |      |      |       |       |       |       |
| Sales of water heating units - Electric    | 30.5 | 48.9 | 54.7 | 62.9  | 64.4  | 64.5  | 64.5  |
| Resistance (%)                             |      |      |      |       |       |       |       |
| Sales of water heating units - Gas Furnace | 60   | 44.2 | 31.9 | 5.09  | 0.3   | 0     | 0     |
| (%)  |      |      |      |       |       |       |       |
| Sales of water heating units - Other (%)   | 9.47 | 5.72 | 1.16 | 0.145 | 0.102 | 0.103 | 0.103 |

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

| Item                                       | 2020  | 2025  | 2030  | 2035  | 2040  | 2045  | 2050  |
|--|-------|-------|-------|-------|-------|-------|-------|
| Light-duty vehicle capital costs -         | 0     | 962   | 2,495 | 3,997 | 6,074 | 6,591 | 6,294 |
| Cumulative 5-yr (million \$2018)           |       |       |       |       |       |       |       |
| Public EV charging plugs - DC Fast (1000   | 0.317 | 0     | 1.49  | 0     | 6.24  | 0     | 10    |
| units)                                     |       |       |       |       |       |       |       |
| Public EV charging plugs - L2 (1000 units) | 2.26  | 0     | 35.7  | 0     | 150   | 0     | 241   |
| 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 (%)    | 1.4   | 1.68  | 1.2   | 0.382 | 0.072 | 0.013 | 0     |
| Vehicle sales - Light-duty - EV (%)        | 4.41  | 16.7  | 48.7  | 82.7  | 96.4  | 99.3  | 100   |
| Vehicle sales - Light-duty - gasoline (%)  | 89.1  | 76.3  | 46.4  | 15.6  | 3.17  | 0.586 | 0     |
| Vehicle sales - Light-duty - hybrid (%)    | 4.9   | 4.89  | 3.38  | 1.24  | 0.304 | 0.067 | 0     |
| Vehicle sales - Light-duty - hydrogen FC   | 0.11  | 0.331 | 0.191 | 0.059 | 0.012 | 0.002 | 0     |
| (%)  |       |       |       |       |       |       |       |
| Vehicle sales - Light-duty - other (%)     | 0.095 | 0.091 | 0.058 | 0.02  | 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     | 0.196 | 1.27  | 6.33  | 15.2  | 19.1  | 19.9  | 20    |
| FC (%)                                     |       |       |       |       |       |       |       |
| Vehicle sales - Medium-duty - other (%)    | 0.253 | 0.255 | 0.205 | 0.083 | 0.019 | 0.004 | 0     |

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

| Item   | 2020 | 2025  | 2030  | 2035  | 2040  | 2045  | 2050  |
|--|------|-------|-------|-------|-------|-------|-------|
| Capital invested - Offshore Wind - Base (billion \$2018)           |      | 6.33  | 5.44  | 6.44  | 2.81  | 1.2   | 1.44  |
| Capital invested - Offshore Wind -<br>Constrained (billion \$2018) |      | 3.86  | 6.35  | 7.03  | 2.97  | 1.19  | 1.97  |
| Capital invested - Solar PV - Base (billion \$2018)                |      | 0.489 | 1.5   | 0.551 | 0.859 | 0.368 | 1.16  |
| Capital invested - Solar PV - Constrained (billion \$2018)         |      | 0     | 0     | 0     | 0     | 1.24  | 1.34  |
| Capital invested - Wind - Base (billion<br>\$2018)                 |      | 0.105 | 0.866 | 0     | 0     | 0     | 0.67  |
| Capital invested - Wind - Constrained (billion \$2018)             |      | 0.105 | 0.871 | 0     | 0     | 0.229 | 0.615 |

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

| Item                                     | 2020  | 2025  | 2030  | 2035   | 2040  | 2045  | 2050  |
|--|-------|-------|-------|--------|-------|-------|-------|
| OffshoreWind - Base land use             | 282   | 9,053 | 8,495 | 11,802 | 6,088 | 3,355 | 4,787 |
| assumptions (GWh)                        |       |       |       |        |       |       |       |
| OffshoreWind - Constrained land use      | 0     | 5,479 | 9,974 | 12,718 | 6,101 | 3,213 | 6,664 |
| assumptions (GWh)                        |       |       |       |        |       |       |       |
| Solar - Base land use assumptions (GWh)  | 744   | 646   | 2,193 | 878    | 1,444 | 659   | 2,197 |
| Solar - Constrained land use assumptions | 2,577 | 0     | 0     | 0      | 0     | 2,187 | 2,508 |
| (GWh)                                    |       |       |       |        |       |       |       |
| Wind - Base land use assumptions (GWh)   | 502   | 153   | 1,336 | 0      | 0     | 0     | 1,268 |
| Wind - Constrained land use assumptions  | 502   | 153   | 1,345 | 0      | 0     | 407   | 1,152 |
| (GWh)                                    |       |       |       |        |       |       |       |

Table 42: E+RE- scenario - PILLAR 6: Land sinks - Agriculture

| Item                                    | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050  |
|---|------|------|------|------|------|------|-------|
| Carbon sink potential - Aggressive      |      |      |      |      |      |      | 0     |
| deployment - Corn-ethanol to energy     |      |      |      |      |      |      |       |
| grasses (1000 tCO2e/y)                  |      |      |      |      |      |      |       |
| Carbon sink potential - Aggressive      |      |      |      |      |      |      | -105  |
| deployment - Cropland measures (1000    |      |      |      |      |      |      |       |
| tCO2e/y)                                |      |      |      |      |      |      |       |
| Carbon sink potential - Aggressive      |      |      |      |      |      |      | -3.29 |
| deployment - Permanent conservation     |      |      |      |      |      |      |       |
| cover (1000 tCO2e/y)                    |      |      |      |      |      |      |       |
| Carbon sink potential - Aggressive      |      |      |      |      |      |      | -109  |
| deployment - Total (1000 tCO2e/y)       |      |      |      |      |      |      |       |
| Carbon sink potential - Moderate        |      |      |      |      |      |      | 0     |
| deployment - Corn-ethanol to energy     |      |      |      |      |      |      |       |
| grasses (1000 tCO2e/y)                  |      |      |      |      |      |      |       |
| Carbon sink potential - Moderate        |      |      |      |      |      |      | -55   |
| deployment - Cropland measures (1000    |      |      |      |      |      |      |       |
| tCO2e/y)                                |      |      |      |      |      |      |       |
| Carbon sink potential - Moderate        |      |      |      |      |      |      | -1.64 |
| deployment - Permanent conservation     |      |      |      |      |      |      |       |
| cover (1000 tCO2e/y)                    |      |      |      |      |      |      |       |
| Carbon sink potential - Moderate        |      |      |      |      |      |      | -56.7 |
| deployment - Total (1000 tCO2e/y)       |      |      |      |      |      |      |       |
| Land impacted for carbon sink -         |      |      |      |      |      |      | 0     |
| Aggressive deployment - Corn-ethanol to |      |      |      |      |      |      |       |
| energy grasses (1000 hectares)          |      |      |      |      |      |      |       |
| Land impacted for carbon sink -         |      |      |      |      |      |      | 63.5  |
| Aggressive deployment - Cropland        |      |      |      |      |      |      |       |
| measures (1000 hectares)                |      |      |      |      |      |      |       |
| Land impacted for carbon sink -         |      |      |      |      |      |      | 5.98  |
| Aggressive deployment - Permanent       |      |      |      |      |      |      |       |
| conservation cover (1000 hectares)      |      |      |      |      |      |      |       |

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

| Item                                     | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|--|------|------|------|------|------|------|------|
| Land impacted for carbon sink -          |      |      |      |      |      |      | 69.5 |
| Aggressive deployment - Total (1000      |      |      |      |      |      |      |      |
| hectares)                                |      |      |      |      |      |      |      |
| Land impacted for carbon sink - Moderate |      |      |      |      |      |      | 0    |
| deployment - Corn-ethanol to energy      |      |      |      |      |      |      |      |
| grasses (1000 hectares)                  |      |      |      |      |      |      |      |
| Land impacted for carbon sink - Moderate |      |      |      |      |      |      | 33.2 |
| deployment - Cropland measures (1000     |      |      |      |      |      |      |      |
| hectares)                                |      |      |      |      |      |      |      |
| Land impacted for carbon sink - Moderate |      |      |      |      |      |      | 2.99 |
| deployment - Permanent conservation      |      |      |      |      |      |      |      |
| cover (1000 hectares)                    |      |      |      |      |      |      |      |
| Land impacted for carbon sink - Moderate |      |      |      |      |      |      | 36.2 |
| deployment - Total (1000 hectares)       |      |      |      |      |      |      |      |

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

| Item                                      | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050   |
|---|------|------|------|------|------|------|--------|
| Carbon sink potential - High - Accelerate |      |      |      |      |      |      | -36.4  |
| regeneration (1000 tCO2e/y)               |      |      |      |      |      |      |        |
| Carbon sink potential - High - All (not   |      |      |      |      |      |      | -4,728 |
| counting overlap) (1000 tCO2e/y)          |      |      |      |      |      |      |        |
| Carbon sink potential - High - Avoid      |      |      |      |      |      |      | -1,146 |
| deforestation (1000 tCO2e/y)              |      |      |      |      |      |      |        |
| Carbon sink potential - High - Extend     |      |      |      |      |      |      | -1,955 |
| rotation length (1000 tCO2e/y)            |      |      |      |      |      |      |        |
| Carbon sink potential - High - Improve    |      |      |      |      |      |      | 0      |
| plantations (1000 tCO2e/y)                |      |      |      |      |      |      |        |
| Carbon sink potential - High - Increase   |      |      |      |      |      |      | -518   |
| retention of HWP (1000 tCO2e/y)           |      |      |      |      |      |      |        |
| Carbon sink potential - High - Increase   |      |      |      |      |      |      | -210   |
| trees outside forests (1000 tCO2e/y)      |      |      |      |      |      |      |        |
| Carbon sink potential - High - Reforest   |      |      |      |      |      |      | 0      |
| cropland (1000 tCO2e/y)                   |      |      |      |      |      |      |        |
| Carbon sink potential - High - Reforest   |      |      |      |      |      |      | -307   |
| pasture (1000 tCO2e/y)                    |      |      |      |      |      |      |        |
| Carbon sink potential - High - Restore    |      |      |      |      |      |      | -555   |
| productivity (1000 tCO2e/y)               |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Accelerate  |      |      |      |      |      |      | -18.3  |
| regeneration (1000 tCO2e/y)               |      |      |      |      |      |      |        |
| Carbon sink potential - Low - All (not    |      |      |      |      |      |      | -1,417 |
| counting overlap) (1000 tCO2e/y)          |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Avoid       |      |      |      |      |      |      | -191   |
| deforestation (1000 tCO2e/y)              |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Extend      |      |      |      |      |      |      | -751   |
| rotation length (1000 tCO2e/y)            |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Improve     |      |      |      |      |      |      | 0      |
| plantations (1000 tCO2e/y)                |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Increase    |      |      |      |      |      |      | -173   |
| retention of HWP (1000 tCO2e/y)           |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Increase    |      |      |      |      |      |      | -73.7  |
| trees outside forests (1000 tCO2e/y)      |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Reforest    |      |      |      |      |      |      | 0      |
| cropland (1000 tCO2e/y)                   |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Reforest    |      |      |      |      |      |      | -23.3  |
| pasture (1000 tCO2e/y)                    |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Restore     |      |      |      |      |      |      | -187   |
| productivity (1000 tCO2e/y)               |      |      |      |      |      |      |        |
| Carbon sink potential - Mid - Accelerate  |      |      |      |      |      |      | -27.4  |
| regeneration (1000 tCO2e/y)               |      |      |      |      |      |      |        |

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

| Item Carbon sink potential - Mid - All (not | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050<br>-3,072 |
|---|------|------|------|------|------|------|----------------|
| counting overlap) (1000 tCO2e/y)            |      |      |      |      |      |      | -3,072         |
| = : - : - : - : - : - : - : - : - : - :     |      |      |      |      |      |      | ///            |
| Carbon sink potential - Mid - Avoid         |      |      |      |      |      |      | -669           |
| deforestation (1000 tC02e/y)                |      |      |      |      |      |      | 1.05           |
| Carbon sink potential - Mid - Extend        |      |      |      |      |      |      | -1,353         |
| rotation length (1000 tCO2e/y)              |      |      |      |      |      |      |                |
| Carbon sink potential - Mid - Improve       |      |      |      |      |      |      | (              |
| plantations (1000 tCO2e/y)                  |      |      |      |      |      |      |                |
| Carbon sink potential - Mid - Increase      |      |      |      |      |      |      | -345           |
| retention of HWP (1000 tCO2e/y)             |      |      |      |      |      |      |                |
| Carbon sink potential - Mid - Increase      |      |      |      |      |      |      | -142           |
| trees outside forests (1000 tC02e/y)        |      |      |      |      |      |      |                |
| Carbon sink potential - Mid - Reforest      |      |      |      |      |      |      | (              |
| cropland (1000 tCO2e/y)                     |      |      |      |      |      |      | `              |
| Carbon sink potential - Mid - Reforest      |      |      |      |      |      |      | -165           |
|   |      |      |      |      |      |      | -103           |
| pasture (1000 tC02e/y)                      |      |      |      |      |      |      |                |
| Carbon sink potential - Mid - Restore       |      |      |      |      |      |      | -37            |
| productivity (1000 tCO2e/y)                 |      |      |      |      |      |      |                |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 5.90           |
| High - Accelerate regeneration (1000        |      |      |      |      |      |      |                |
| hectares)                                   |      |      |      |      |      |      |                |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 155            |
| High - Avoid deforestation (over 30 years)  |      |      |      |      |      |      |                |
| (1000 hectares)                             |      |      |      |      |      |      |                |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 99             |
| High - Extend rotation length (1000         |      |      |      |      |      |      | 77             |
| · ·   |      |      |      |      |      |      |                |
| hectares)                                   |      |      |      |      |      |      |                |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | (              |
| High - Improve plantations (1000            |      |      |      |      |      |      |                |
| hectares)                                   |      |      |      |      |      |      |                |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | (              |
| High - Increase retention of HWP (1000      |      |      |      |      |      |      |                |
| hectares)                                   |      |      |      |      |      |      |                |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 20             |
| High - Increase trees outside forests       |      |      |      |      |      |      |                |
| (1000 hectares)                             |      |      |      |      |      |      |                |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | (              |
| High - Reforest cropland (1000 hectares)    |      |      |      |      |      |      | ,              |
|   |      |      |      |      |      |      | 0.7            |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 8.73           |
| High - Reforest pasture (1000 hectares)     |      |      |      |      |      |      |                |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 18             |
| High - Restore productivity (1000           |      |      |      |      |      |      |                |
| hectares)                                   |      |      |      |      |      |      |                |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 1,37           |
| High - Total impacted (over 30 years)       |      |      |      |      |      |      | •              |
| (1000 hectares)                             |      |      |      |      |      |      |                |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 2.9            |
|   |      |      |      |      |      |      | 2.70           |
| Low - Accelerate regeneration (1000         |      |      |      |      |      |      |                |
| hectares)                                   |      |      |      |      |      |      |                |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 14             |
| Low - Avoid deforestation (over 30 years)   |      |      |      |      |      |      |                |
| (1000 hectares)                             |      |      |      |      |      |      |                |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      | 38             |
| Low - Extend rotation length (1000          |      |      |      |      |      |      |                |
| hectares)                                   |      |      |      |      |      |      |                |
| Land impacted for carbon sink potential -   |      | -    |      |      |      |      |                |
|   |      |      |      |      |      |      |                |
| Low - Improve plantations (1000             |      |      |      |      |      |      |                |
| hectares)                                   |      |      |      |      |      |      |                |
| Land impacted for carbon sink potential -   |      |      |      |      |      |      |                |
| Low - Increase retention of HWP (1000       |      |      |      |      |      |      |                |
| hectares)                                   |      |      |      |      |      |      |                |

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

| 2020 | 2025 | 2030      | 2035           | 2040 | 2045                     | 2050                          |
|------|------|-----------|----------------|------|--------------------------|-------------------------------|
|      |      |           |                |      |                          | 10.5                          |
|      |      |           |                |      |                          |                               |
|      |      |           |                |      |                          |                               |
|      |      |           |                |      |                          | C                             |
|      |      |           |                |      |                          |                               |
|      |      |           |                |      |                          | 1.5                           |
|      |      |           |                |      |                          |                               |
|      |      |           |                |      |                          | 11                            |
|      |      |           |                |      |                          |                               |
|      |      |           |                |      |                          |                               |
|      |      |           |                |      |                          | 654                           |
|      |      |           |                |      |                          |                               |
|      |      |           |                |      |                          |                               |
|      |      |           |                |      |                          | 4.4                           |
|      |      |           |                |      |                          |                               |
|      |      |           |                |      |                          |                               |
|      |      |           |                |      |                          | 150                           |
|      |      |           |                |      |                          |                               |
|      |      |           |                |      |                          |                               |
|      |      |           |                |      |                          | 689                           |
|      |      |           |                |      |                          |                               |
|      |      |           |                |      |                          |                               |
|      |      |           |                |      |                          | (                             |
|      |      |           |                |      |                          |                               |
|      |      |           |                |      |                          | (                             |
|      |      |           |                |      |                          |                               |
|      |      |           |                |      |                          |                               |
|      |      |           |                |      |                          | 15.3                          |
|      |      |           |                |      |                          |                               |
|      |      |           |                |      |                          |                               |
|      |      |           |                |      |                          | (                             |
|      |      |           |                |      |                          | `                             |
|      |      |           |                |      |                          | 10.9                          |
|      |      |           |                |      |                          | 101.                          |
|      |      |           |                |      | <del></del>              | 224                           |
|      |      |           |                |      |                          | 22-                           |
|      |      |           |                |      |                          |                               |
|      |      | -         |                |      |                          | 1,09                          |
|      |      |           |                |      |                          | 1,070                         |
|      |      |           |                |      |                          |                               |
|      | 2020 | 2020 2025 | 2020 2025 2030 |      | 2020 2025 2030 2035 2040 | 2020 2025 2030 2035 2040 2045 |

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

| Item   | 2020 | 2025  | 2030  | 2035  | 2040  | 2045  | 2050  |
|--|------|-------|-------|-------|-------|-------|-------|
| Monetary damages from air pollution -<br>Coal (million 2019\$)           | 2020 | 557   | 0.598 | 0.597 | 0.568 | 0.345 | 0.018 |
| Monetary damages from air pollution -<br>Natural Gas (million 2019\$)    |      | 286   | 161   | 172   | 129   | 66.5  | 15.4  |
| Monetary damages from air pollution -<br>Transportation (million 2019\$) |      | 2,027 | 1,872 | 1,408 | 804   | 356   | 128   |
| Premature deaths from air pollution -<br>Coal (deaths)                   |      | 62.9  | 0.068 | 0.067 | 0.064 | 0.039 | 0.002 |
| Premature deaths from air pollution -<br>Natural Gas (deaths)            |      | 32.3  | 18.1  | 19.4  | 14.5  | 7.5   | 1.74  |
| Premature deaths from air pollution -<br>Transportation (deaths)         |      | 228   | 211   | 158   | 90.4  | 40    | 14.3  |

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

| Item  | 2020 | 2025   | 2030   | 2035 | 2040 | 2045 | 2050  |
|---|------|--------|--------|------|------|------|-------|
| Commercial HVAC investment in 2020s -<br>Cumulative 5-yr (million \$2018) | 0    | 13,315 | 14,553 | 0    | 0    | 0    | 0     |
| Sales of cooking units - Electric<br>Resistance (%)                       | 36.9 | 40.7   | 44.7   | 56.5 | 72.7 | 82.9 | 86.4  |
| Sales of cooking units - Gas (%)  | 63.1 | 59.3   | 55.3   | 43.5 | 27.3 | 17.1 | 13.6  |
| Sales of space heating units - Electric<br>Heat Pump (%)                  | 4.31 | 7.58   | 10.8   | 20.7 | 40.6 | 61.6 | 72.9  |
| Sales of space heating units - Electric<br>Resistance (%)                 | 2.07 | 2.47   | 3.76   | 7.71 | 14.2 | 19.1 | 21    |
| Sales of space heating units - Fossil (%)                                 | 23.7 | 34.5   | 32.4   | 24.4 | 11.9 | 3.8  | 0.998 |
| Sales of space heating units - Gas Furnace (%)                            | 69.9 | 55.4   | 53.1   | 47.2 | 33.3 | 15.5 | 5.06  |
| Sales of water heating units - Electric<br>Heat Pump (%)                  | 2.04 | 2.9    | 4.29   | 8.99 | 20.1 | 34   | 42    |
| Sales of water heating units - Electric<br>Resistance (%)                 | 10.2 | 11.8   | 12.9   | 17.6 | 28.1 | 41.1 | 48.8  |
| Sales of water heating units - Gas Furnace (%)                            | 84.8 | 81.2   | 79     | 70.2 | 49.4 | 23.1 | 7.53  |
| Sales of water heating units - Other (%)                                  | 2.99 | 4.09   | 3.78   | 3.24 | 2.41 | 1.82 | 1.65  |

Table 46: E-B+ scenario - PILLAR 1: Efficiency/Electrification - Electricity demand

| Item  | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|------|------|------|------|------|------|------|
| Electricity distribution capital invested - |      | 1.91 | 1.91 | 3.04 | 3.17 | 5.62 | 6.03 |
| Cumulative 5-yr (billion \$2018)            |      |      |      |      |      |      |      |

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

|  | ,,   |      |      |      |      |      |      |
|--|------|------|------|------|------|------|------|
| Item                                   | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
| Final energy use - Commercial (PJ)     | 253  | 241  | 235  | 230  | 223  | 216  | 207  |
| Final energy use - Industry (PJ)       | 81.4 | 79.4 | 79.8 | 80.8 | 82.8 | 83.9 | 85.2 |
| Final energy use - Residential (PJ)    | 286  | 270  | 259  | 248  | 231  | 207  | 181  |
| Final energy use - Transportation (PJ) | 501  | 471  | 433  | 400  | 373  | 341  | 304  |

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

| Item                                       | 2020 | 2025  | 2030 | 2035 | 2040 | 2045  | 2050  |
|--|------|-------|------|------|------|-------|-------|
| Residential HVAC investment in 2020s vs.   | 0    | 5.63  | 6.47 | 0    | 0    | 0     | 0     |
| REF - Cumulative 5-yr (billion \$2018)     |      |       |      |      |      |       |       |
| Sales of cooking units - Electric          | 64   | 64.9  | 68.2 | 76.9 | 89   | 96.4  | 99    |
| Resistance (%)                             |      |       |      |      |      |       |       |
| Sales of cooking units - Gas (%)           | 36   | 35.1  | 31.8 | 23.1 | 11   | 3.56  | 0.957 |
| Sales of space heating units - Electric    | 6.91 | 7.36  | 12   | 26   | 51.8 | 76    | 88    |
| Heat Pump (%)                              |      |       |      |      |      |       |       |
| Sales of space heating units - Electric    | 6.17 | 9.22  | 8.85 | 8.12 | 6.41 | 4.13  | 2.94  |
| Resistance (%)                             |      |       |      |      |      |       |       |
| Sales of space heating units - Fossil (%)  | 32.4 | 46.7  | 43.8 | 34.6 | 19.9 | 9.61  | 5.55  |
| Sales of space heating units - Gas (%)     | 54.5 | 36.7  | 35.3 | 31.3 | 21.9 | 10.3  | 3.54  |
| Sales of water heating units - Electric    | 0    | 0.459 | 1.73 | 5.83 | 15.1 | 26.1  | 32.4  |
| Heat Pump (%)                              |      |       |      |      |      |       |       |
| Sales of water heating units - Electric    | 30.5 | 48.3  | 49   | 51.2 | 55.6 | 60.5  | 63.2  |
| Resistance (%)                             |      |       |      |      |      |       |       |
| Sales of water heating units - Gas Furnace | 60   | 44.6  | 43.2 | 38.4 | 27   | 12.6  | 4.1   |
| (%)  |      |       |      |      |      |       |       |
| Sales of water heating units - Other (%)   | 9.47 | 6.6   | 6.08 | 4.62 | 2.32 | 0.811 | 0.288 |

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

| Item                                       | 2020  | 2025  | 2030  | 2035  | 2040  | 2045  | 2050  |
|--|-------|-------|-------|-------|-------|-------|-------|
| Light-duty vehicle capital costs -         | 0     | 0     | 161   | 327   | 1,113 | 3,470 | 5,067 |
| Cumulative 5-yr (million \$2018)           |       |       |       |       |       |       |       |
| Public EV charging plugs - DC Fast (1000   | 0.317 | 0     | 0.499 | 0     | 2.34  | 0     | 6.43  |
| units)                                     |       |       |       |       |       |       |       |
| Public EV charging plugs - L2 (1000 units) | 2.26  | 0     | 12    | 0     | 56.3  | 0     | 154   |
| 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 (%)    | 1.41  | 1.85  | 2.03  | 1.61  | 1.02  | 0.519 | 0.223 |
| Vehicle sales - Light-duty - EV (%)        | 2.06  | 5.07  | 12.6  | 27.1  | 49.7  | 72.9  | 87.9  |
| Vehicle sales - Light-duty - gasoline (%)  | 91.2  | 86.7  | 78.4  | 65.1  | 44.7  | 23.9  | 10.6  |
| Vehicle sales - Light-duty - hybrid (%)    | 5.1   | 5.88  | 6.54  | 5.88  | 4.34  | 2.52  | 1.21  |
| Vehicle sales - Light-duty - hydrogen FC   | 0.112 | 0.376 | 0.317 | 0.239 | 0.168 | 0.092 | 0.043 |
| (%)  |       |       |       |       |       |       |       |
| Vehicle sales - Light-duty - other (%)     | 0.097 | 0.1   | 0.09  | 0.078 | 0.056 | 0.03  | 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     | 0.166 | 0.485 | 1.37  | 3.58  | 7.86  | 13.2  | 17    |
| FC (%)                                     |       |       |       |       |       |       |       |
| 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    | 0.403 | 0     | 0    | 0    | 0    |
| Capital invested - Biomass w/ccu allam power plant (billion \$2018) | 0    | 0    | 0     | 0.006 | 0    | 0    | 0    |
| Capital invested - Biomass w/ccu power plant (billion \$2018)       | 0    | 0    | 0.006 | 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    | 792  | 792  | 792  | 792  | 792  |
| Biomass w/ccu allam power plant (GWh) | 0    | 0    | 0    | 5.53 | 5.81 | 6.24 | 6.24 |
| Biomass w/ccu power plant (GWh)       | 0    | 0    | 7.09 | 7.09 | 7.22 | 7.57 | 7.57 |

#### 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    | 48.1 | 52   | 54.9 | 56.1 | 376   |
| Conversion capital investment -              | 0    | 0    | 456  | 66.9 | 44.2 | 19.3 | 4,630 |
| Cumulative 5-yr (million \$2018)             |      |      |      |      |      |      |       |
| Number of facilities - Allam power w ccu     | 0    | 0    | 0    | 1    | 1    | 1    | 1     |
| (quantity)                                   |      |      |      |      |      |      |       |
| Number of facilities - Beccs hydrogen        | 0    | 0    | 0    | 1    | 1    | 1    | 2     |
| (quantity)                                   |      |      |      |      |      |      |       |
| Number of facilities - Diesel (quantity)     | 0    | 0    | 0    | 1    | 1    | 1    | 1     |
| Number of facilities - Diesel ccu (quantity) | 0    | 0    | 0    | 1    | 1    | 1    | 1     |
| Number of facilities - Power (quantity)      | 0    | 0    | 1    | 1    | 1    | 1    | 1     |
| Number of facilities - Power ccu             | 0    | 0    | 1    | 1    | 1    | 1    | 1     |
| (quantity)                                   |      |      |      |      |      |      |       |
| Number of facilities - Pyrolysis (quantity)  | 0    | 0    | 0    | 1    | 1    | 1    | 3     |

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

| Item                                      | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|------|------|------|------|------|------|------|
| Number of facilities - Pyrolysis ccu      | 0    | 0    | 0    | 1    | 1    | 1    | 1    |
| (quantity)                                |      |      |      |      |      |      |      |
| Number of facilities - Sng (quantity)     | 0    | 0    | 1    | 1    | 1    | 1    | 1    |
| Number of facilities - Sng ccu (quantity) | 0    | 0    | 1    | 1    | 1    | 1    | 1    |

#### Table 53: E-B+ scenario - PILLAR 4: CCUS - CO2 capture

| Item                               | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|------------------------------------|------|------|------|------|------|------|------|
| Annual - All (MMT)                 |      | 0    | 0.01 | 0.02 | 0.03 | 0.03 | 2.76 |
| Annual - BECCS (MMT)               |      | 0    | 0.01 | 0.02 | 0.02 | 0.02 | 2.75 |
| Annual - Cement and lime (MMT)     |      | 0    | 0    | 0    | 0    | 0    | 0    |
| Annual - NGCC (MMT)                |      | 0    | 0    | 0    | 0    | 0    | 0.01 |
| Cumulative - All (MMT)             |      | 0    | 0.01 | 0.03 | 0.06 | 0.09 | 2.85 |
| Cumulative - BECCS (MMT)           |      | 0    | 0.01 | 0.03 | 0.05 | 0.07 | 2.82 |
| Cumulative - Cement and lime (MMT) |      | 0    | 0    | 0    | 0    | 0    | 0    |
| Cumulative - NGCC (MMT)            |      | 0    | 0    | 0    | 0    | 0    | 0.01 |

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

| Item   | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|--|------|------|------|------|------|------|------|
| All (km)                                       |      | 0    | 171  | 314  | 314  | 314  | 393  |
| Cumulative investment - All (million \$2018)   |      | 0    | 264  | 339  | 339  | 339  | 407  |
| Cumulative investment - Spur (million \$2018)  |      | 0    | 19.1 | 94.2 | 94.2 | 94.2 | 162  |
| Cumulative investment - Trunk (million \$2018) |      | 0    | 245  | 245  | 245  | 245  | 245  |
| Spur (km)                                      |      | 0    | 36.2 | 179  | 179  | 179  | 257  |
| Trunk (km)                                     |      | 0    | 135  | 135  | 135  | 135  | 135  |

#### 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    |      |      |      |      |      |      | 0     |
| deployment - Corn-ethanol to energy   |      |      |      |      |      |      |       |
| grasses (1000 tCO2e/y)                |      |      |      |      |      |      |       |
| Carbon sink potential - Aggressive    |      |      |      |      |      |      | -105  |
| deployment - Cropland measures (1000  |      |      |      |      |      |      |       |
| tCO2e/y)                              |      |      |      |      |      |      |       |
| Carbon sink potential - Aggressive    |      |      |      |      |      |      | 0     |
| deployment - Cropland to woody energy |      |      |      |      |      |      |       |
| crops (1000 tCO2e/y)                  |      |      |      |      |      |      |       |
| Carbon sink potential - Aggressive    |      |      |      |      |      |      | 0     |
| deployment - Pasture to energy crops  |      |      |      |      |      |      |       |
| (1000 tC02e/y)                        |      |      |      |      |      |      |       |
| Carbon sink potential - Aggressive    |      |      |      |      |      |      | -3.29 |
| deployment - Permanent conservation   |      |      |      |      |      |      |       |
| cover (1000 tCO2e/y)                  |      |      |      |      |      |      |       |
| Carbon sink potential - Aggressive    |      |      |      |      |      |      | -109  |
| deployment - Total (1000 tCO2e/y)     |      |      |      |      |      |      |       |

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

| Item                                     | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050  |
|--|------|------|------|------|------|------|-------|
| Carbon sink potential - Moderate         |      |      |      |      |      |      | 0     |
| deployment - Corn-ethanol to energy      |      |      |      |      |      |      |       |
| grasses (1000 tC02e/y)                   |      |      |      |      |      |      |       |
| Carbon sink potential - Moderate         |      |      |      |      |      |      | -55   |
| deployment - Cropland measures (1000     |      |      |      |      |      |      |       |
| tCO2e/y)                                 |      |      |      |      |      |      |       |
| Carbon sink potential - Moderate         |      |      |      |      |      |      | 0     |
| deployment - Cropland to woody energy    |      |      |      |      |      |      |       |
| crops (1000 tCO2e/y)                     |      |      |      |      |      |      |       |
| Carbon sink potential - Moderate         |      |      |      |      |      |      | 0     |
| deployment - Pasture to energy crops     |      |      |      |      |      |      |       |
| (1000 tC02e/y)                           |      |      |      |      |      |      |       |
| Carbon sink potential - Moderate         |      |      |      |      |      |      | -1.64 |
| deployment - Permanent conservation      |      |      |      |      |      |      |       |
| cover (1000 tC02e/y)                     |      |      |      |      |      |      |       |
| Carbon sink potential - Moderate         |      |      |      |      |      |      | -56.7 |
| deployment - Total (1000 tC02e/y)        |      |      |      |      |      |      |       |
| Land impacted for carbon sink -          |      |      |      |      |      |      | 0     |
| Aggressive deployment - Corn-ethanol to  |      |      |      |      |      |      | ·     |
| energy grasses (1000 hectares)           |      |      |      |      |      |      |       |
| Land impacted for carbon sink -          |      |      |      |      |      |      | 157   |
| Aggressive deployment - Cropland         |      |      |      |      |      |      | 101   |
| measures (1000 hectares)                 |      |      |      |      |      |      |       |
| Land impacted for carbon sink -          |      |      |      |      |      |      | 0     |
| Aggressive deployment - Cropland to      |      |      |      |      |      |      | U     |
| woody energy crops (1000 hectares)       |      |      |      |      |      |      |       |
| Land impacted for carbon sink -          |      |      | +    |      |      |      | 1.5   |
| Aggressive deployment - Pasture to       |      |      |      |      |      |      | 1.0   |
| energy crops (1000 hectares)             |      |      |      |      |      |      |       |
| Land impacted for carbon sink -          |      |      |      |      |      |      | 5.98  |
| Aggressive deployment - Permanent        |      |      |      |      |      |      | 3.70  |
| conservation cover (1000 hectares)       |      |      |      |      |      |      |       |
| Land impacted for carbon sink -          |      |      |      |      |      |      | 164   |
| Aggressive deployment - Total (1000      |      |      |      |      |      |      | 104   |
| hectares)                                |      |      |      |      |      |      |       |
|  |      |      |      |      |      |      | 0     |
| Land impacted for carbon sink - Moderate |      |      |      |      |      |      | U     |
| deployment - Corn-ethanol to energy      |      |      |      |      |      |      |       |
| grasses (1000 hectares)                  |      |      |      |      |      |      | 00.0  |
| Land impacted for carbon sink - Moderate |      |      |      |      |      |      | 33.2  |
| deployment - Cropland measures (1000     |      |      |      |      |      |      |       |
| hectares)                                |      |      |      |      |      |      |       |
| Land impacted for carbon sink - Moderate |      |      |      |      |      |      | 0     |
| deployment - Cropland to woody energy    |      |      |      |      |      |      |       |
| crops (1000 hectares)                    |      |      |      |      |      |      |       |
| Land impacted for carbon sink - Moderate |      |      |      |      |      |      | 1.5   |
| deployment - Pasture to energy crops     |      |      |      |      |      |      |       |
| (1000 hectares)                          |      |      |      |      |      |      |       |
| Land impacted for carbon sink - Moderate | T    |      | T    |      |      |      | 2.99  |
| deployment - Permanent conservation      |      |      |      |      |      |      |       |
| cover (1000 hectares)                    |      |      |      |      |      |      |       |
| Land impacted for carbon sink - Moderate |      |      |      |      |      |      | 37.7  |
| deployment - Total (1000 hectares)       |      |      |      |      |      |      |       |

### 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)    |      |      |      |      |      |      | -36.4  |
| Carbon sink potential - High - All (not counting overlap) (1000 tCO2e/y) |      |      |      |      |      |      | -4,728 |
| Carbon sink potential - High - Avoid deforestation (1000 tCO2e/y)        |      |      |      |      |      |      | -1,146 |

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

| Item  | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050   |
|---|------|------|------|------|------|------|--------|
| Carbon sink potential - High - Extend                                   |      |      |      |      |      |      | -1,955 |
| rotation length (1000 tCO2e/y)  |      |      |      |      |      |      |        |
| Carbon sink potential - High - Improve                                  |      |      |      |      |      |      | 0      |
| plantations (1000 tC02e/y)  |      |      |      |      |      |      |        |
| Carbon sink potential - High - Increase                                 |      |      |      |      |      |      | -518   |
| retention of HWP (1000 tCO2e/y)   |      |      |      |      |      |      | 04.0   |
| Carbon sink potential - High - Increase                                 |      |      |      |      |      |      | -210   |
| trees outside forests (1000 tC02e/y)                                    |      |      |      |      |      |      |        |
| Carbon sink potential - High - Reforest                                 |      |      |      |      |      |      | 0      |
| cropland (1000 tCO2e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - High - Reforest                                 |      |      |      |      |      |      | -307   |
| pasture (1000 tC02e/y)  |      |      |      |      |      |      |        |
| Carbon sink potential - High - Restore                                  |      |      |      |      |      |      | -555   |
| productivity (1000 tC02e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Accelerate                                |      |      |      |      |      |      | -18.3  |
| regeneration (1000 tCO2e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - Low - All (not                                  |      |      |      |      |      |      | -1,417 |
| counting overlap) (1000 tCO2e/y)  |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Avoid                                     |      |      |      |      |      |      | -191   |
| deforestation (1000 tCO2e/y)  |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Extend                                    |      |      |      |      |      |      | -751   |
| rotation length (1000 tCO2e/y)  |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Improve                                   |      |      |      |      |      |      | 0      |
| plantations (1000 tCO2e/y)  |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Increase                                  |      |      |      |      |      |      | -173   |
| retention of HWP (1000 tCO2e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Increase                                  |      |      |      |      |      |      | -73.7  |
| trees outside forests (1000 tCO2e/y)                                    |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Reforest                                  |      |      |      |      |      |      | 0      |
| cropland (1000 tCO2e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Reforest                                  |      |      |      |      |      |      | -23.3  |
| pasture (1000 tC02e/y)  |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Restore                                   |      |      |      |      |      |      | -187   |
| productivity (1000 tCO2e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - Mid - Accelerate                                |      |      |      |      |      |      | -27.4  |
| regeneration (1000 tCO2e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - Mid - All (not                                  |      |      |      |      |      |      | -3,072 |
| counting overlap) (1000 tC02e/y)  |      |      |      |      |      |      | 0,012  |
| Carbon sink potential - Mid - Avoid                                     |      |      |      |      |      |      | -669   |
| deforestation (1000 tC02e/y)  |      |      |      |      |      |      | 007    |
| Carbon sink potential - Mid - Extend                                    |      |      |      |      |      |      | -1,353 |
| rotation length (1000 tCO2e/y)  |      |      |      |      |      |      | -1,000 |
| Carbon sink potential - Mid - Improve                                   |      |      |      |      |      |      | 0      |
| plantations (1000 tCO2e/y)  |      |      |      |      |      |      | U      |
| Carbon sink potential - Mid - Increase                                  |      |      |      |      |      |      | -345   |
| · ·   |      |      |      |      |      |      | -340   |
| retention of HWP (1000 tC02e/y)  Carbon sink potential - Mid - Increase |      |      |      |      |      |      | -142   |
| ·   |      |      |      |      |      |      | -142   |
| trees outside forests (1000 tC02e/y)                                    |      |      |      |      |      |      | 0      |
| Carbon sink potential - Mid - Reforest                                  |      |      |      |      |      |      | U      |
| cropland (1000 tC02e/y)   |      |      |      |      |      |      | 1/5    |
| Carbon sink potential - Mid - Reforest                                  |      |      |      |      |      |      | -165   |
| pasture (1000 tC02e/y)  |      |      |      |      |      |      |        |
| Carbon sink potential - Mid - Restore                                   |      |      |      |      |      |      | -371   |
| productivity (1000 tCO2e/y)   |      |      |      |      |      |      |        |
| Land impacted for carbon sink potential -                               |      |      |      |      |      |      | 5.96   |
| High - Accelerate regeneration (1000                                    |      |      |      |      |      |      |        |
| hectares)   |      |      |      |      |      |      |        |
| Land impacted for carbon sink potential -                               |      |      |      |      |      |      | 155    |
| High - Avoid deforestation (over 30 years)                              |      | 1    | 1    |      |      | I    |        |

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

| Table of: E By occination if IEE/III of Earla |      | 000 (00110111 | -    |      |      |      |       |
|---|------|---------------|------|------|------|------|-------|
| Item  | 2020 | 2025          | 2030 | 2035 | 2040 | 2045 | 2050  |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 997   |
| High - Extend rotation length (1000           |      |               |      |      |      |      |       |
| hectares)                                     |      |               |      |      |      |      |       |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 0     |
| High - Improve plantations (1000              |      |               |      |      |      |      |       |
| hectares)                                     |      |               |      |      |      |      |       |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 0     |
| High - Increase retention of HWP (1000        |      |               |      |      |      |      | U     |
| = -   |      |               |      |      |      |      |       |
| hectares)                                     |      |               |      |      |      |      |       |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 20    |
| High - Increase trees outside forests         |      |               |      |      |      |      |       |
| (1000 hectares)                               |      |               |      |      |      |      |       |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 0     |
| High - Reforest cropland (1000 hectares)      |      |               |      |      |      |      |       |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 8.73  |
| High - Reforest pasture (1000 hectares)       |      |               |      |      |      |      |       |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 184   |
| High - Restore productivity (1000             |      |               |      |      |      |      | 104   |
| =   |      |               |      |      |      |      |       |
| hectares)                                     |      |               |      |      |      |      | 4.074 |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 1,371 |
| High - Total impacted (over 30 years)         |      |               |      |      |      |      |       |
| (1000 hectares)                               |      |               |      |      |      |      |       |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 2.98  |
| Low - Accelerate regeneration (1000           |      |               |      |      |      |      |       |
| hectares)                                     |      |               |      |      |      |      |       |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 146   |
| Low - Avoid deforestation (over 30 years)     |      |               |      |      |      |      | 140   |
|   |      |               |      |      |      |      |       |
| (1000 hectares)                               |      |               |      |      |      |      |       |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 382   |
| Low - Extend rotation length (1000            |      |               |      |      |      |      |       |
| hectares)                                     |      |               |      |      |      |      |       |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 0     |
| Low - Improve plantations (1000               |      |               |      |      |      |      |       |
| hectares)                                     |      |               |      |      |      |      |       |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 0     |
| Low - Increase retention of HWP (1000         |      |               |      |      |      |      | · ·   |
| hectares)                                     |      |               |      |      |      |      |       |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 10.5  |
|   |      |               |      |      |      |      | 10.5  |
| Low - Increase trees outside forests          |      |               |      |      |      |      |       |
| (1000 hectares)                               |      |               |      |      |      |      |       |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 0     |
| Low - Reforest cropland (1000 hectares)       |      |               |      |      |      |      |       |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 1.51  |
| Low - Reforest pasture (1000 hectares)        |      |               |      |      |      |      |       |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 111   |
| Low - Restore productivity (1000              |      |               |      |      |      |      |       |
| hectares)                                     |      |               |      |      |      |      |       |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 654   |
|   |      |               |      |      |      |      | 654   |
| Low - Total impacted (over 30 years)          |      |               |      |      |      |      |       |
| (1000 hectares)                               |      |               |      |      |      |      |       |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 4.47  |
| Mid - Accelerate regeneration (1000           |      |               |      |      |      |      |       |
| hectares)                                     |      |               |      |      |      |      |       |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 150   |
| Mid - Avoid deforestation (over 30 years)     |      |               |      |      |      |      |       |
| (1000 hectares)                               |      |               |      |      |      |      |       |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 689   |
|   |      |               |      |      |      |      | 007   |
| Mid - Extend rotation length (1000            |      |               |      |      |      |      |       |
| hectares)                                     |      |               |      |      |      |      |       |
| Land impacted for carbon sink potential -     |      |               |      |      |      |      | 0     |
| Mid - Improve plantations (1000 hectares)     |      |               |      |      |      |      |       |
|   |      |               |      |      |      | 1    |       |

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 -  |      |      |      |      |      |      | 0     |
| Mid - Increase retention of HWP (1000      |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 15.3  |
| Mid - Increase trees outside forests (1000 |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 0     |
| Mid - Reforest cropland (1000 hectares)    |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 10.9  |
| Mid - Reforest pasture (1000 hectares)     |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 224   |
| Mid - Restore productivity (1000           |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 1,095 |
| Mid - Total impacted (over 30 years) (1000 |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |

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

| Item                                  | 2020 | 2025  | 2030  | 2035  | 2040  | 2045  | 2050  |
|---------------------------------------|------|-------|-------|-------|-------|-------|-------|
| Monetary damages from air pollution - |      | 557   | 0.598 | 0.597 | 0.568 | 0.345 | 0.018 |
| Coal (million 2019\$)                 |      |       |       |       |       |       |       |
| Monetary damages from air pollution - |      | 283   | 116   | 54.9  | 43.4  | 26.5  | 14.5  |
| Natural Gas (million 2019\$)          |      |       |       |       |       |       |       |
| Monetary damages from air pollution - |      | 2,064 | 2,069 | 1,991 | 1,771 | 1,392 | 941   |
| Transportation (million 2019\$)       |      |       |       |       |       |       |       |
| Premature deaths from air pollution - |      | 62.9  | 0.068 | 0.067 | 0.064 | 0.039 | 0.002 |
| Coal (deaths)                         |      |       |       |       |       |       |       |
| Premature deaths from air pollution - |      | 32    | 13.1  | 6.2   | 4.9   | 2.99  | 1.63  |
| Natural Gas (deaths)                  |      |       |       |       |       |       |       |
| Premature deaths from air pollution - |      | 232   | 233   | 224   | 199   | 157   | 106   |
| Transportation (deaths)               |      |       |       |       |       |       |       |

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

| Item                                       | 2020 | 2025   | 2030   | 2035 | 2040  | 2045  | 2050 |
|--|------|--------|--------|------|-------|-------|------|
| Commercial HVAC investment in 2020s -      | 0    | 13,153 | 13,534 | 0    | 0     | 0     | 0    |
| Cumulative 5-yr (million \$2018)           |      |        |        |      |       |       |      |
| Sales of cooking units - Electric          | 36.9 | 39     | 38.6   | 38.5 | 38.3  | 38.5  | 38.4 |
| Resistance (%)                             |      |        |        |      |       |       |      |
| Sales of cooking units - Gas (%)           | 63.1 | 61     | 61.4   | 61.5 | 61.7  | 61.5  | 61.6 |
| Sales of space heating units - Electric    | 4.31 | 12.9   | 41     | 64   | 67.7  | 68.1  | 68.2 |
| Heat Pump (%)                              |      |        |        |      |       |       |      |
| Sales of space heating units - Electric    | 2.07 | 2.89   | 7.66   | 20   | 30.1  | 31.7  | 31.8 |
| Resistance (%)                             |      |        |        |      |       |       |      |
| Sales of space heating units - Fossil (%)  | 23.7 | 33.3   | 23.6   | 9.31 | 1.33  | 0.106 | 0    |
| Sales of space heating units - Gas Furnace | 69.9 | 50.9   | 27.8   | 6.73 | 0.854 | 0.047 | 0    |
| (%)  |      |        |        |      |       |       |      |
| Sales of water heating units - Electric    | 2.04 | 2.38   | 2.35   | 2.36 | 2.34  | 2.36  | 2.35 |
| Heat Pump (%)                              |      |        |        |      |       |       |      |
| Sales of water heating units - Electric    | 10.2 | 11.3   | 11.1   | 11.3 | 11.2  | 11.1  | 11.1 |
| Resistance (%)                             |      |        |        |      |       |       |      |
| Sales of water heating units - Gas Furnace | 84.8 | 82.1   | 82.5   | 82.3 | 82.3  | 82.6  | 82.5 |
| _ (%)                                      |      |        |        |      |       |       |      |
| Sales of water heating units - Other (%)   | 2.99 | 4.16   | 4.05   | 4.05 | 4.14  | 3.96  | 4.03 |

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

| Item  | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|------|------|------|------|------|------|------|
| Electricity distribution capital invested - |      | 1.9  | 1.89 | 4.44 | 4.74 | 4.91 | 5.2  |
| Cumulative 5-yr (billion \$2018)            |      |      |      |      |      |      |      |

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

| Item                                   | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|--|------|------|------|------|------|------|------|
| Final energy use - Commercial (PJ)     | 253  | 246  | 249  | 250  | 251  | 258  | 269  |
| Final energy use - Industry (PJ)       | 81.4 | 81.9 | 84.8 | 88.8 | 94.4 | 99.2 | 104  |
| Final energy use - Residential (PJ)    | 286  | 272  | 264  | 261  | 258  | 256  | 255  |
| Final energy use - Transportation (PJ) | 501  | 474  | 444  | 426  | 429  | 442  | 458  |

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

| Item   | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|--|------|------|------|------|------|------|------|
| Residential HVAC investment in 2020s vs.<br>REF - Cumulative 5-yr (billion \$2018) | 0    | 5.48 | 5.7  | 0    | 0    | 0    | 0    |
| Sales of cooking units - Electric<br>Resistance (%)                                | 63.6 | 63.6 | 63.6 | 63.6 | 63.6 | 63.6 | 63.6 |
| Sales of cooking units - Gas (%)   | 36.4 | 36.4 | 36.4 | 36.4 | 36.4 | 36.4 | 36.4 |
| Sales of space heating units - Electric<br>Heat Pump (%)                           | 6.66 | 9.84 | 10.2 | 10.6 | 10.9 | 11.2 | 11.6 |
| Sales of space heating units - Electric<br>Resistance (%)                          | 6.21 | 8.92 | 8.73 | 8.57 | 8.52 | 8.08 | 7.76 |
| Sales of space heating units - Fossil (%)  | 32.5 | 40.9 | 22.6 | 9.73 | 8.85 | 8.82 | 8.8  |
| Sales of space heating units - Gas (%)   | 54.6 | 40.4 | 58.5 | 71.1 | 71.7 | 71.9 | 71.8 |
| Sales of water heating units - Electric<br>Heat Pump (%)                           | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Sales of water heating units - Electric<br>Resistance (%)                          | 30.5 | 48.1 | 48.1 | 48.2 | 48.2 | 48.2 | 48.2 |
| Sales of water heating units - Gas Furnace (%)                                     | 60   | 45.1 | 45.1 | 45   | 45   | 45   | 45   |
| Sales of water heating units - Other (%)   | 9.47 | 6.78 | 6.78 | 6.83 | 6.83 | 6.84 | 6.85 |

#### 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 (%)          | 1.4   | 1.84  | 2.16  | 2.01  | 1.81  | 1.68  | 1.6   |
| Vehicle sales - Light-duty - EV (%)              | 4.05  | 6.23  | 7.05  | 8.7   | 10.6  | 12.1  | 13.3  |
| Vehicle sales - Light-duty - gasoline (%)        | 89.4  | 85.7  | 83.4  | 81.3  | 79.2  | 77.3  | 75.8  |
| Vehicle sales - Light-duty - hybrid (%)          | 4.92  | 5.75  | 7     | 7.55  | 8.08  | 8.59  | 8.94  |
| Vehicle sales - Light-duty - hydrogen FC         | 0.11  | 0.372 | 0.337 | 0.298 | 0.293 | 0.293 | 0.303 |
| (%)  |       |       |       |       |       |       |       |
| Vehicle sales - Light-duty - other (%)           | 0.095 | 0.099 | 0.095 | 0.096 | 0.095 | 0.094 | 0.096 |
| 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<br>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

| The second Title S |      | 0005 | 0000 | 0005 | 00/0 | 00/5 | 0050   |
|--|------|------|------|------|------|------|--------|
| Item   | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050   |
| Carbon sink potential - High - Accelerate  |      |      |      |      |      |      | -36.4  |
| regeneration (1000 tCO2e/y)  |      |      |      |      |      |      |        |
| Carbon sink potential - High - All (not  |      |      |      |      |      |      | -4,728 |
| counting overlap) (1000 tCO2e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - High - Avoid   |      |      |      |      |      |      | -1,146 |
| deforestation (1000 tC02e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - High - Extend  |      |      |      |      |      |      | -1,955 |
| rotation length (1000 tCO2e/y)   |      |      |      |      |      |      | .,     |
| Carbon sink potential - High - Improve   |      |      |      |      |      |      | 0      |
| plantations (1000 tCO2e/y)   |      |      |      |      |      |      | Ü      |
|  |      |      |      |      |      |      | E10    |
| Carbon sink potential - High - Increase  |      |      |      |      |      |      | -518   |
| retention of HWP (1000 tCO2e/y)  |      |      |      |      |      |      |        |
| Carbon sink potential - High - Increase  |      |      |      |      |      |      | -210   |
| trees outside forests (1000 tCO2e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - High - Reforest  |      |      |      |      |      |      | 0      |
| cropland (1000 tCO2e/y)  |      |      |      |      |      |      |        |
| Carbon sink potential - High - Reforest  |      |      |      |      |      |      | -307   |
| pasture (1000 tC02e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - High - Restore   |      |      |      |      |      |      | -555   |
| productivity (1000 tCO2e/y)  |      |      |      |      |      |      | 000    |
| Carbon sink potential - Low - Accelerate   |      |      |      |      |      |      | -18.3  |
|  |      |      |      |      |      |      | -10.3  |
| regeneration (1000 tCO2e/y)  |      |      |      |      |      |      | 4 (47  |
| Carbon sink potential - Low - All (not   |      |      |      |      |      |      | -1,417 |
| counting overlap) (1000 tCO2e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Avoid  |      |      |      |      |      |      | -191   |
| deforestation (1000 tCO2e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Extend   |      |      |      |      |      |      | -751   |
| rotation length (1000 tCO2e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Improve  |      |      |      |      |      |      | 0      |
| plantations (1000 tCO2e/y)   |      |      |      |      |      |      | _      |
| Carbon sink potential - Low - Increase   |      |      |      |      |      |      | -173   |
| retention of HWP (1000 tC02e/y)  |      |      |      |      |      |      | -113   |
|  |      |      |      |      |      |      | 70.7   |
| Carbon sink potential - Low - Increase   |      |      |      |      |      |      | -73.7  |
| trees outside forests (1000 tC02e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Reforest   |      |      |      |      |      |      | 0      |
| cropland (1000 tCO2e/y)  |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Reforest   |      |      |      |      |      |      | -23.3  |
| pasture (1000 tCO2e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - Low - Restore  |      |      |      |      |      |      | -187   |
| productivity (1000 tCO2e/y)  |      |      |      |      |      |      |        |
| Carbon sink potential - Mid - Accelerate   |      |      |      |      |      |      | -27.4  |
| regeneration (1000 tCO2e/y)  |      |      |      |      |      |      | -21.4  |
|  |      |      |      |      |      |      | 0.070  |
| Carbon sink potential - Mid - All (not   |      |      |      |      |      |      | -3,072 |
| counting overlap) (1000 tCO2e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - Mid - Avoid  |      |      |      |      |      |      | -669   |
| deforestation (1000 tCO2e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - Mid - Extend   |      |      |      |      |      |      | -1,353 |
| rotation length (1000 tCO2e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - Mid - Improve  |      |      |      |      |      |      | 0      |
| plantations (1000 tCO2e/y)   |      |      |      |      |      |      | •      |
| Carbon sink potential - Mid - Increase   |      |      |      |      |      | +    | -345   |
| retention of HWP (1000 tC02e/y)  |      |      |      |      |      |      | -545   |
|  |      |      |      |      |      |      | -142   |
| Carbon sink potential - Mid - Increase   |      |      |      |      |      |      | -142   |
| trees outside forests (1000 tC02e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - Mid - Reforest   |      |      |      |      |      |      | 0      |
| cropland (1000 tCO2e/y)  |      |      |      |      |      |      |        |
| Carbon sink potential - Mid - Reforest   |      |      |      |      |      |      | -165   |
| pasture (1000 tC02e/y)   |      |      |      |      |      |      |        |
| Carbon sink potential - Mid - Restore  |      |      |      |      |      |      | -371   |
| productivity (1000 tCO2e/y)  |      |      |      |      |      |      | J. 1   |
| p. 54451(, (.555 t5525/1)  |      |      |      |      |      |      |        |

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

| Table 64: REF scenario - PILLAR 6: Land si                |      |      | •    | 000- | 0010 | 00/- | 00    |
|---|------|------|------|------|------|------|-------|
| Item  | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050  |
| Land impacted for carbon sink potential -                 |      |      |      |      |      |      | 5.96  |
| High - Accelerate regeneration (1000                      |      |      |      |      |      |      |       |
| hectares) Land impacted for carbon sink potential -       |      |      |      |      |      | +    | 155   |
| High - Avoid deforestation (over 30 years)                |      |      |      |      |      |      | 100   |
| (1000 hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -                 |      |      |      |      |      |      | 997   |
| High - Extend rotation length (1000                       |      |      |      |      |      |      | //1   |
| hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -                 |      |      |      |      |      |      | 0     |
| High - Improve plantations (1000                          |      |      |      |      |      |      | _     |
| hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -                 |      |      |      |      |      |      | 0     |
| High - Increase retention of HWP (1000                    |      |      |      |      |      |      |       |
| hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -                 |      |      |      |      |      |      | 20    |
| High - Increase trees outside forests                     |      |      |      |      |      |      |       |
| (1000 hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -                 |      |      |      |      |      |      | 0     |
| High - Reforest cropland (1000 hectares)                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -                 |      |      |      |      |      |      | 8.73  |
| High - Reforest pasture (1000 hectares)                   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -                 |      |      |      |      |      |      | 184   |
| High - Restore productivity (1000                         |      |      |      |      |      |      |       |
| hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -                 |      |      |      |      |      |      | 1,371 |
| High - Total impacted (over 30 years)                     |      |      |      |      |      |      |       |
| (1000 hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -                 |      |      |      |      |      |      | 2.98  |
| Low - Accelerate regeneration (1000                       |      |      |      |      |      |      |       |
| hectares)   |      |      |      |      |      |      | 1//   |
| Land impacted for carbon sink potential -                 |      |      |      |      |      |      | 146   |
| Low - Avoid deforestation (over 30 years) (1000 hectares) |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -                 |      |      |      |      |      |      | 382   |
| Low - Extend rotation length (1000                        |      |      |      |      |      |      | 302   |
| hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -                 |      |      |      |      |      |      | 0     |
| Low - Improve plantations (1000                           |      |      |      |      |      |      | U     |
| hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -                 |      |      |      |      |      |      | 0     |
| Low - Increase retention of HWP (1000                     |      |      |      |      |      |      | U     |
| hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -                 |      |      |      |      |      |      | 10.5  |
| Low - Increase trees outside forests                      |      |      |      |      |      |      |       |
| (1000 hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -                 |      |      |      |      |      |      | 0     |
| Low - Reforest cropland (1000 hectares)                   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -                 |      |      |      |      |      |      | 1.51  |
| Low - Reforest pasture (1000 hectares)                    |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -                 |      |      |      |      |      |      | 111   |
| Low - Restore productivity (1000                          |      |      |      |      |      |      |       |
| hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -                 |      |      |      |      |      |      | 654   |
| Low - Total impacted (over 30 years)                      |      |      |      |      |      |      |       |
| (1000 hectares)   |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -                 |      |      |      |      |      |      | 4.47  |
| Mid - Accelerate regeneration (1000                       |      |      |      |      |      |      |       |
| hectares)   |      |      |      |      |      |      |       |

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

| Item                                       | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050  |
|--|------|------|------|------|------|------|-------|
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 150   |
| Mid - Avoid deforestation (over 30 years)  |      |      |      |      |      |      |       |
| (1000 hectares)                            |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 689   |
| Mid - Extend rotation length (1000         |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 0     |
| Mid - Improve plantations (1000 hectares)  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 0     |
| Mid - Increase retention of HWP (1000      |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 15.3  |
| Mid - Increase trees outside forests (1000 |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 0     |
| Mid - Reforest cropland (1000 hectares)    |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 10.9  |
| Mid - Reforest pasture (1000 hectares)     |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 224   |
| Mid - Restore productivity (1000           |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |
| Land impacted for carbon sink potential -  |      |      |      |      |      |      | 1,095 |
| Mid - Total impacted (over 30 years) (1000 |      |      |      |      |      |      |       |
| hectares)                                  |      |      |      |      |      |      |       |

#### 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)                | -4.85  |      | -2.63  |      |      |      | -2.35  |
| Business-as-usual carbon sink - Retained in Hardwood Products (Mt CO2e/y) | -0.141 |      | -0.253 |      |      |      | -0.263 |
| Business-as-usual carbon sink - Total (Mt<br>CO2e/y)                      | -4.99  |      | -2.89  |      |      |      | -2.62  |

#### Table 66: REF scenario - IMPACTS - Health

| Item                                  | 2020 | 2025  | 2030  | 2035  | 2040  | 2045  | 2050  |
|---------------------------------------|------|-------|-------|-------|-------|-------|-------|
| Monetary damages from air pollution - |      | 1,560 | 979   | 909   | 885   | 867   | 767   |
| Coal (million 2019\$)                 |      |       |       |       |       |       |       |
| Monetary damages from air pollution - |      | 223   | 162   | 211   | 251   | 229   | 208   |
| Natural Gas (million 2019\$)          |      |       |       |       |       |       |       |
| Monetary damages from air pollution - |      | 2,059 | 2,091 | 2,116 | 2,147 | 2,176 | 2,204 |
| Transportation (million 2019\$)       |      |       |       |       |       |       |       |
| Premature deaths from air pollution - |      | 176   | 111   | 103   | 100   | 98    | 86.7  |
| Coal (deaths)                         |      |       |       |       |       |       |       |
| Premature deaths from air pollution - |      | 25.2  | 18.3  | 23.8  | 28.4  | 25.8  | 23.5  |
| Natural Gas (deaths)                  |      |       |       |       |       |       |       |
| Premature deaths from air pollution - |      | 232   | 235   | 238   | 242   | 245   | 248   |
| Transportation (deaths)               |      |       |       |       |       |       |       |