**Supporting Information File (SI)**

**Environmental Efficiency of Electric Vehicles in Europe Under Various Electricity Production Mix Scenarios**

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Table S1. Environmental impact data per kWh average electricity generation (source: ecoinvent v3.7)

Table S2. Environmental impact data per kWh renewable energy-based electricity generation (source: ecoinvent v3.7)

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Table S4. Benchmark levels for the Czech Republic (CZ) in Scenario 2

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| Table S1. Environmental impact data per kWh average electricity generation (source: ecoinvent v3.7) | | | | | | | | | | |
| Impact Categories | | Climate  Change | Freshwater  ecotoxicity | Freshwater  eutrophication | Human toxicity | Metal depletion | Particulate  matterformation | Petrochemical  oxidant formation | Terrestrial acidification | Urban land occupation |
| Weighting factors\* | | 21.06 | 1.92 | 2.80 | 2.13 | 7.55 | 8.96 | 4.78 | 6.20 | 7.94 |
| Countries | Code |  |  |  |  |  |  |  |  |  |
| Austria | AT | 3.27E-01 | 2.28E-02 | 3.87E-04 | 2.83E-01 | 1.18E-02 | 3.29E-04 | 5.03E-04 | 1.30E-03 | 1.76E-03 |
| Belgium | BE | 2.43E-01 | 1.80E-02 | 7.14E-05 | 1.08E-01 | 1.28E-02 | 2.06E-04 | 3.73E-04 | 6.37E-04 | 1.36E-03 |
| Bulgaria | BG | 6.84E-01 | 3.90E-02 | 1.40E-03 | 8.89E-01 | 1.39E-02 | 1.43E-03 | 1.33E-03 | 3.71E-03 | 1.92E-03 |
| Cyprus | CY | 1.05E+00 | 1.82E-02 | 4.00E-05 | 1.34E-01 | 1.43E-02 | 2.23E-03 | 4.26E-03 | 7.97E-03 | 1.96E-03 |
| Czech Republic | CZ | 7.87E-01 | 3.58E-02 | 1.24E-03 | 8.00E-01 | 1.31E-02 | 8.09E-04 | 1.45E-03 | 2.81E-03 | 2.65E-03 |
| Germany | DE | 6.20E-01 | 3.03E-02 | 8.32E-04 | 5.44E-01 | 1.44E-02 | 4.94E-04 | 6.13E-04 | 2.31E-03 | 3.57E-03 |
| Denmark | DK | 4.02E-01 | 2.16E-02 | 2.16E-04 | 2.16E-01 | 1.44E-02 | 3.58E-04 | 5.76E-04 | 1.38E-03 | 4.75E-03 |
| Estonia | EE | 9.59E-01 | 1.94E-02 | 5.96E-05 | 1.83E-01 | 1.50E-02 | 2.00E-03 | 3.86E-03 | 6.99E-03 | 3.58E-03 |
| Spain | ES | 3.69E-01 | 2.08E-02 | 1.43E-04 | 1.50E-01 | 1.48E-02 | 9.29E-04 | 1.31E-03 | 2.60E-03 | 3.43E-03 |
| Finland | FI | 2.47E-01 | 1.80E-02 | 8.48E-05 | 1.35E-01 | 1.19E-02 | 3.06E-04 | 4.61E-04 | 8.18E-04 | 2.70E-03 |
| France | FR | 5.68E-02 | 1.77E-02 | 3.38E-05 | 8.16E-02 | 1.35E-02 | 1.38E-04 | 1.56E-04 | 3.10E-04 | 6.17E-04 |
| Greece | GR | 9.07E-01 | 5.47E-02 | 2.43E-03 | 1.53E+00 | 1.40E-02 | 2.10E-03 | 1.55E-03 | 4.94E-03 | 2.03E-03 |
| Croatia | HR | 4.49E-01 | 2.65E-02 | 5.90E-04 | 4.12E-01 | 1.22E-02 | 1.30E-03 | 1.30E-03 | 4.18E-03 | 2.28E-03 |
| Hungary | HU | 5.05E-01 | 2.87E-02 | 7.39E-04 | 5.36E-01 | 1.33E-02 | 7.21E-04 | 1.12E-03 | 2.27E-03 | 2.71E-03 |
| Ireland | IE | 6.06E-01 | 1.98E-02 | 1.20E-04 | 1.33E-01 | 1.25E-02 | 6.18E-04 | 1.02E-03 | 2.16E-03 | 3.28E-03 |
| Italy | IT | 4.15E-01 | 1.96E-02 | 1.26E-04 | 1.32E-01 | 1.39E-02 | 6.97E-04 | 9.03E-04 | 2.82E-03 | 4.70E-03 |
| Lithuania | LT | 7.45E-01 | 2.03E-02 | 1.53E-04 | 1.81E-01 | 1.59E-02 | 1.11E-03 | 1.73E-03 | 2.76E-03 | 2.98E-03 |
| Luxembourg | LU | 5.65E-01 | 2.60E-02 | 6.38E-04 | 4.26E-01 | 1.28E-02 | 4.12E-04 | 5.69E-04 | 1.86E-03 | 2.12E-03 |
| Latvia | LV | 8.01E-01 | 1.92E-02 | 1.09E-04 | 1.78E-01 | 1.43E-02 | 1.48E-03 | 2.48E-03 | 4.78E-03 | 3.08E-03 |
| Malta | MT | 1.37E+00 | 1.90E-02 | 4.63E-05 | 1.62E-01 | 1.53E-02 | 2.89E-03 | 5.58E-03 | 1.03E-02 | 2.34E-03 |
| Netherlands | NL | 6.20E-01 | 2.09E-02 | 2.65E-04 | 2.12E-01 | 1.14E-02 | 3.02E-04 | 6.51E-04 | 1.13E-03 | 2.79E-03 |
| Poland | PL | 1.06E+00 | 3.67E-02 | 1.28E-03 | 8.61E-01 | 1.20E-02 | 1.63E-03 | 2.18E-03 | 5.74E-03 | 5.45E-03 |
| Portugal | PT | 4.13E-01 | 2.04E-02 | 1.49E-04 | 1.46E-01 | 1.37E-02 | 8.17E-04 | 1.28E-03 | 2.86E-03 | 3.84E-03 |
| Romania | RO | 4.87E-01 | 3.39E-02 | 9.67E-04 | 6.28E-01 | 1.54E-02 | 1.61E-03 | 1.01E-03 | 2.63E-03 | 1.45E-03 |
| Sweden | SE | 4.34E-02 | 1.76E-02 | 3.59E-05 | 8.22E-02 | 1.20E-02 | 1.01E-04 | 1.34E-04 | 2.30E-04 | 1.04E-03 |
| Slovenia | SI | 4.58E-01 | 2.90E-02 | 8.07E-04 | 5.43E-01 | 1.22E-02 | 1.64E-03 | 1.50E-03 | 6.56E-03 | 1.48E-03 |
| Slovakia | SK | 4.61E-01 | 2.62E-02 | 6.45E-04 | 4.56E-01 | 1.21E-02 | 8.39E-04 | 1.03E-03 | 2.67E-03 | 1.90E-03 |

\* Panel-based weights assigned by the European Commission’s Joint Research Centre (JRC Technical Reports, 2018)

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| Table S2. Environmental impact data per kWh renewable energy-based electricity generation (source: ecoinvent v3.7) | | | | | | | | | | |
| Countries | Code | Environmental Impact Categories | | | | | | | | |
| Climate  Change | Freshwater  ecotoxicity | Freshwater  eutrophication | Human toxicity | Metal depletion | Particulate  matterformation | Petrochemical  oxidant formation | Terrestrial acidification | Urban land occupation |
| Austria | AT | 2.00E-01 | 2.74E-02 | 9.88E-05 | 2.10E-01 | 3.73E-02 | 2.17E-04 | 5.25E-04 | 1.26E-04 | 1.72E-03 |
| Belgium | BE | 2.07E-01 | 2.89E-02 | 1.07E-04 | 1.99E-01 | 4.03E-02 | 1.98E-04 | 4.43E-04 | -5.15E-06 | 1.33E-03 |
| Bulgaria | BG | 1.69E-01 | 2.53E-02 | 8.52E-05 | 1.83E-01 | 3.19E-02 | 1.76E-04 | 4.10E-04 | 8.48E-05 | 1.48E-03 |
| Cyprus | CY | 1.77E-01 | 2.21E-02 | 6.52E-05 | 1.27E-01 | 2.43E-02 | 1.25E-04 | 2.96E-04 | 6.44E-05 | 6.65E-04 |
| Czech Republic | CZ | 1.22E-01 | 2.75E-02 | 1.03E-04 | 2.07E-01 | 3.87E-02 | 1.87E-04 | 3.79E-04 | -3.22E-05 | 1.41E-03 |
| Germany | DE | 1.86E-01 | 2.81E-02 | 1.02E-04 | 2.08E-01 | 3.83E-02 | 2.06E-04 | 4.73E-04 | 6.87E-05 | 1.63E-03 |
| Denmark | DK | 1.78E-01 | 2.63E-02 | 8.71E-05 | 1.63E-01 | 3.35E-02 | 1.61E-04 | 3.36E-04 | 2.33E-05 | 1.03E-03 |
| Estonia | EE | 1.52E-01 | 2.80E-02 | 9.18E-05 | 1.73E-01 | 3.63E-02 | 1.59E-04 | 3.21E-04 | -1.61E-05 | 1.12E-03 |
| Spain | ES | 1.26E-01 | 2.77E-02 | 9.10E-05 | 1.72E-01 | 3.41E-02 | 1.71E-04 | 3.54E-04 | 4.36E-05 | 1.14E-03 |
| Finland | FI | 6.94E-02 | 2.46E-02 | 8.49E-05 | 2.00E-01 | 3.20E-02 | 1.70E-04 | 3.48E-04 | 5.58E-05 | 1.68E-03 |
| France | FR | 1.86E-01 | 2.75E-02 | 9.34E-05 | 1.79E-01 | 3.59E-02 | 1.78E-04 | 3.91E-04 | 2.76E-05 | 1.24E-03 |
| Greece | GR | 9.20E-02 | 2.97E-02 | 9.37E-05 | 1.80E-01 | 3.60E-02 | 1.54E-04 | 2.98E-04 | -2.18E-05 | 1.20E-03 |
| Croatia | HR | 4.00E-01 | 2.72E-02 | 7.56E-05 | 1.64E-01 | 3.00E-02 | 3.43E-04 | 6.75E-04 | 8.47E-04 | 1.40E-03 |
| Hungary | HU | 2.52E-01 | 2.68E-02 | 8.94E-05 | 1.72E-01 | 3.47E-02 | 2.08E-04 | 5.28E-04 | 1.75E-04 | 1.17E-03 |
| Ireland | IE | 7.46E-02 | 2.91E-02 | 9.53E-05 | 2.32E-01 | 3.65E-02 | 1.97E-04 | 4.21E-04 | 1.11E-04 | 2.21E-03 |
| Italy | IT | 1.60E-01 | 2.51E-02 | 8.52E-05 | 2.03E-01 | 3.22E-02 | 1.97E-04 | 4.73E-04 | 1.56E-04 | 1.87E-03 |
| Lithuania | LT | 2.01E-01 | 2.70E-02 | 9.97E-05 | 2.13E-01 | 3.70E-02 | 2.00E-04 | 4.64E-04 | 3.98E-05 | 1.75E-03 |
| Luxembourg | LU | 2.12E-01 | 2.37E-02 | 8.01E-05 | 1.47E-01 | 3.00E-02 | 1.54E-04 | 3.63E-04 | 3.38E-05 | 8.94E-04 |
| Latvia | LV | 1.42E-01 | 2.48E-02 | 8.79E-05 | 2.19E-01 | 3.26E-02 | 2.03E-04 | 4.83E-04 | 1.52E-04 | 2.14E-03 |
| Malta | MT | 9.35E-02 | 2.83E-02 | 1.12E-04 | 2.07E-01 | 4.03E-02 | 1.71E-04 | 3.40E-04 | -1.36E-04 | 1.35E-03 |
| Netherlands | NL | 2.13E-01 | 2.62E-02 | 9.61E-05 | 1.84E-01 | 3.54E-02 | 1.87E-04 | 4.33E-04 | 3.25E-05 | 1.30E-03 |
| Poland | PL | 1.05E-01 | 2.74E-02 | 9.42E-05 | 1.87E-01 | 3.59E-02 | 1.65E-04 | 3.18E-04 | -2.61E-05 | 1.24E-03 |
| Portugal | PT | 7.09E-02 | 3.23E-02 | 9.67E-05 | 1.95E-01 | 3.79E-02 | 1.59E-04 | 2.93E-04 | -6.32E-06 | 1.42E-03 |
| Romania | RO | 1.68E-01 | 2.84E-02 | 9.47E-05 | 2.05E-01 | 3.60E-02 | 1.94E-04 | 4.40E-04 | 8.97E-05 | 1.70E-03 |
| Sweden | SE | 8.29E-02 | 2.69E-02 | 9.86E-05 | 1.98E-01 | 3.71E-02 | 1.69E-04 | 3.14E-04 | -5.92E-05 | 1.30E-03 |
| Slovenia | SI | 1.58E-01 | 2.40E-02 | 8.23E-05 | 1.93E-01 | 3.07E-02 | 1.84E-04 | 4.38E-04 | 1.27E-04 | 1.75E-03 |
| Slovakia | SK | 6.89E-02 | 2.44E-02 | 8.44E-05 | 1.72E-01 | 3.19E-02 | 1.46E-04 | 2.64E-04 | -3.43E-05 | 1.10E-03 |

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| Table S3. Environmental impact data per kWh marginal energy-based electricity generation (source: ecoinvent v3.7) | | | | | | | | | | |
| Countries | Code | Environmental Impact Categories | | | | | | | | |
| Climate  Change | Freshwater  ecotoxicity | Freshwater  eutrophication | Human toxicity | Metal depletion | Particulate  matterformation | Petrochemical  oxidant formation | Terrestrial acidification | Urban land occupation |
| Austria | AT | 4.07E-01 | 1.93E-02 | 4.78E-05 | 1.10E-01 | 1.87E-02 | 2.06E-04 | 6.23E-04 | 5.36E-04 | 1.30E-03 |
| Belgium | BE | 6.82E-02 | 2.82E-02 | 6.00E-05 | 1.26E-01 | 2.84E-02 | 1.73E-04 | 2.40E-04 | 3.69E-04 | 7.15E-04 |
| Bulgaria | BG | 3.14E-01 | 1.96E-02 | 3.82E-05 | 1.08E-01 | 1.77E-02 | 1.56E-04 | 4.48E-04 | 3.60E-04 | 1.05E-03 |
| Cyprus | CY | 3.34E-01 | 2.06E-02 | 3.94E-05 | 9.36E-02 | 1.70E-02 | 1.23E-04 | 3.87E-04 | 2.70E-04 | 4.02E-04 |
| Czech Republic | CZ | 8.67E-01 | 4.81E-02 | 1.49E-03 | 9.58E-01 | 2.57E-02 | 8.29E-04 | 1.58E-03 | 2.71E-03 | 2.44E-03 |
| Germany | DE | 8.21E-02 | 4.45E-02 | 1.26E-04 | 2.10E-01 | 4.72E-02 | 1.51E-04 | 2.32E-04 | 2.68E-05 | 1.31E-03 |
| Denmark | DK | 4.25E-02 | 2.41E-02 | 5.82E-05 | 3.22E-01 | 2.68E-02 | 2.86E-04 | 7.38E-04 | 7.15E-04 | 4.80E-03 |
| Estonia | EE | 1.14E+00 | 3.29E-02 | 4.61E-04 | 4.07E-01 | 2.51E-02 | 2.46E-03 | 3.79E-03 | 8.25E-03 | 9.86E-03 |
| Spain | ES | 1.56E-01 | 3.05E-02 | 7.49E-05 | 1.78E-01 | 3.30E-02 | 1.56E-04 | 3.67E-04 | 1.49E-04 | 1.54E-03 |
| Finland | FI | 1.75E-01 | 2.37E-02 | 9.73E-05 | 1.36E-01 | 2.09E-02 | 1.82E-04 | 2.23E-04 | 4.50E-04 | 1.66E-03 |
| France | FR | 6.86E-02 | 3.62E-02 | 9.29E-05 | 1.94E-01 | 4.04E-02 | 1.48E-04 | 2.77E-04 | 3.55E-05 | 1.45E-03 |
| Greece | GR | 4.50E-01 | 2.38E-02 | 5.55E-05 | 1.17E-01 | 2.54E-02 | 2.91E-04 | 7.58E-04 | 7.89E-04 | 8.11E-04 |
| Croatia | HR | 3.97E-01 | 2.70E-02 | 7.03E-05 | 1.61E-01 | 2.99E-02 | 3.23E-04 | 6.65E-04 | 8.24E-04 | 1.37E-03 |
| Hungary | HU | 6.22E-01 | 1.92E-02 | 3.81E-05 | 8.59E-02 | 2.08E-02 | 2.83E-04 | 9.66E-04 | 8.15E-04 | 6.67E-04 |
| Ireland | IE | 3.40E-02 | 4.49E-02 | 7.77E-05 | 1.56E-01 | 3.87E-02 | 1.15E-04 | 1.19E-04 | 1.26E-04 | 1.01E-03 |
| Italy | IT | 6.22E-01 | 2.06E-02 | 1.77E-04 | 1.99E-01 | 1.98E-02 | 7.37E-04 | 1.25E-03 | 2.08E-03 | 3.68E-03 |
| Lithuania | LT | 4.59E-01 | 1.74E-02 | 3.34E-05 | 9.05E-02 | 1.56E-02 | 1.44E-04 | 4.64E-04 | 3.09E-04 | 8.28E-04 |
| Luxembourg | LU | 5.07E-02 | 5.37E-02 | 9.66E-05 | 2.02E-01 | 4.88E-02 | 1.67E-04 | 2.10E-04 | 2.06E-04 | 1.54E-03 |
| Latvia | LV | 5.43E-02 | 4.21E-02 | 7.71E-05 | 2.06E-01 | 3.83E-02 | 1.74E-04 | 3.00E-04 | 2.91E-04 | 2.06E-03 |
| Malta | MT | 3.89E-01 | 1.92E-02 | 4.23E-05 | 8.29E-02 | 1.88E-02 | 1.41E-04 | 4.40E-04 | 2.71E-04 | 4.74E-04 |
| Netherlands | NL | 5.13E-02 | 3.35E-02 | 7.74E-05 | 2.26E-01 | 3.61E-02 | 1.84E-04 | 3.87E-04 | 2.68E-04 | 2.42E-03 |
| Poland | PL | 5.51E-01 | 2.91E-02 | 5.04E-04 | 4.15E-01 | 2.02E-02 | 1.94E-03 | 1.41E-03 | 2.56E-03 | 2.96E-03 |
| Portugal | PT | 1.41E-01 | 1.83E-02 | 4.27E-05 | 9.46E-02 | 1.51E-02 | 5.27E-04 | 5.97E-04 | 2.02E-03 | 6.21E-04 |
| Romania | RO | 4.60E-01 | 2.45E-02 | 4.05E-04 | 3.14E-01 | 1.72E-02 | 3.80E-04 | 6.74E-04 | 1.15E-03 | 1.04E-03 |
| Sweden | SE | 1.36E-01 | 3.34E-02 | 6.42E-05 | 2.08E-01 | 3.09E-02 | 1.91E-04 | 4.33E-04 | 3.89E-04 | 2.39E-03 |
| Slovenia | SI | 3.69E-01 | 3.79E-02 | 7.26E-04 | 5.73E-01 | 2.72E-02 | 1.53E-03 | 1.47E-03 | 6.06E-03 | 2.00E-03 |
| Slovakia | SK | 1.03E-01 | 1.98E-02 | 1.95E-04 | 2.21E-01 | 1.63E-02 | 7.46E-04 | 3.88E-04 | 7.01E-04 | 1.27E-03 |

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| Table S3. Benchmark levels for Romania (RO) in Scenario 1 | | | |
| Inputs | Romania  Best Level | Reference Set | Average Projection  Level (%) |
| Climate change | 0.01446 | Austria (AT), Netherland (NL), Sweden (SE) | 61.33 |
| Freshwater ecotoxicity | 0.00338 |
| Freshwater eutrophication  Human toxicity  Metal depletion  Particulate matter formation  Photochemical oxidant formation  Terrestrial acidification  Urban land occupation | 1.4E-05  0.01936  0.00224  2.3E-05  0.00019  6.5E-05  0.00021 |

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| Table S4. Benchmark levels for the Czech Republic (CZ) in Scenario 2 | | | |
| Inputs | Czech Republic  Best Level | Reference Set | Average Projection  Level (%) |
| Climate change | 0.0594 | Cyprus (CY), Portugal (PT) | 69.56 |
| Freshwater ecotoxicity | 0.0038 |
| Freshwater eutrophication  Human toxicity  Metal depletion  Particulate matter formation  Photochemical oxidant formation  Terrestrial acidification  Urban land occupation | 7.4E-06  0.01746  0.00314  2.9E-05  4.7E-05  7.7E-05  7.8E-05 |

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| Table S5. Benchmark levels for Lithuania (LT) in Scenario 3 | | | |
| Inputs | Lithuania  Best Level | Reference Set | Average Projection  Level (%) |
| Climate change | 0.02784 |  |  |
| Freshwater ecotoxicity | 0.04252 |  |  |
| Freshwater eutrophication | 0.08172 |  |  |
| Human toxicity | 0.10746 | Cyprus (CY) | 4.57 |
| Metal depletion | 0.12576 | Slovakia (SK) |  |
| Particulate matter formation | 0.12785 |  |  |
| Photochemical oxidant formation | 0.12793 |  |  |
| Terrestrial acidification | 0.00098 |  |  |
| Urban land occupation | 0.03844 |  |  |

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| Table S6. Benchmark levels for Czech Republic (CZ) in WScenario 1 | | | |
| Inputs | Czech Republic  Best Level | Reference Set | Average Projection  Level (%) |
| Climate change | 0.00987 |  |  |
| Freshwater ecotoxicity | 0.00329 |  |  |
| Freshwater eutrophication | 6.4E-06 |  |  |
| Human toxicity | 0.01525 | France (FR) | 73.63 |
| Metal depletion | 0.00245 | Sweden (SE) |  |
| Particulate matter formation | 2.4E-05 |  |  |
| Photochemical oxidant formation | 0.00012 |  |  |
| Terrestrial acidification | 5.4E-05 |  |  |
| Urban land occupation | 0.00014 |  |  |

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| Table S7. Benchmark levels for Estonia (EE) in WScenario 2 | | | |
| Inputs | Estonia  Best Level | Reference Set | Average Projection  Level (%) |
| Climate change | 0.06234 | Cyprus (CR) | 75.09 |
| Freshwater ecotoxicity | 0.00384 |
| Freshwater eutrophication  Human toxicity  Metal depletion  Particulate matter formation  Photochemical oxidant formation  Terrestrial acidification  Urban land occupation | 7.3E-06  0.01744  0.00317  2.3E-05  2.8E-05  5E-05  7.5E-05 |

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| Table S8. Benchmark levels for Hungary (HU) in WScenario 3 | | | |
| Inputs | Hungary  Best Level | Reference Set | Average Projection  Level (%) |
| Climate change | 0.01307 | Cyprus (CR), Slovakia (SK) | 8.62 |
| Freshwater ecotoxicity | 0.04283 |
| Freshwater eutrophication  Human toxicity  Metal depletion  Particulate matter formation  Photochemical oxidant formation  Terrestrial acidification  Urban land occupation | 0.08172  0.11373  0.12679  0.12785  0.12795  0.00097  0.0385 |