SUPPLEMENTARY INFORMATION:
Mitigation choices impact carbon budget size compatible with low temperature goals

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Supplementary Figures

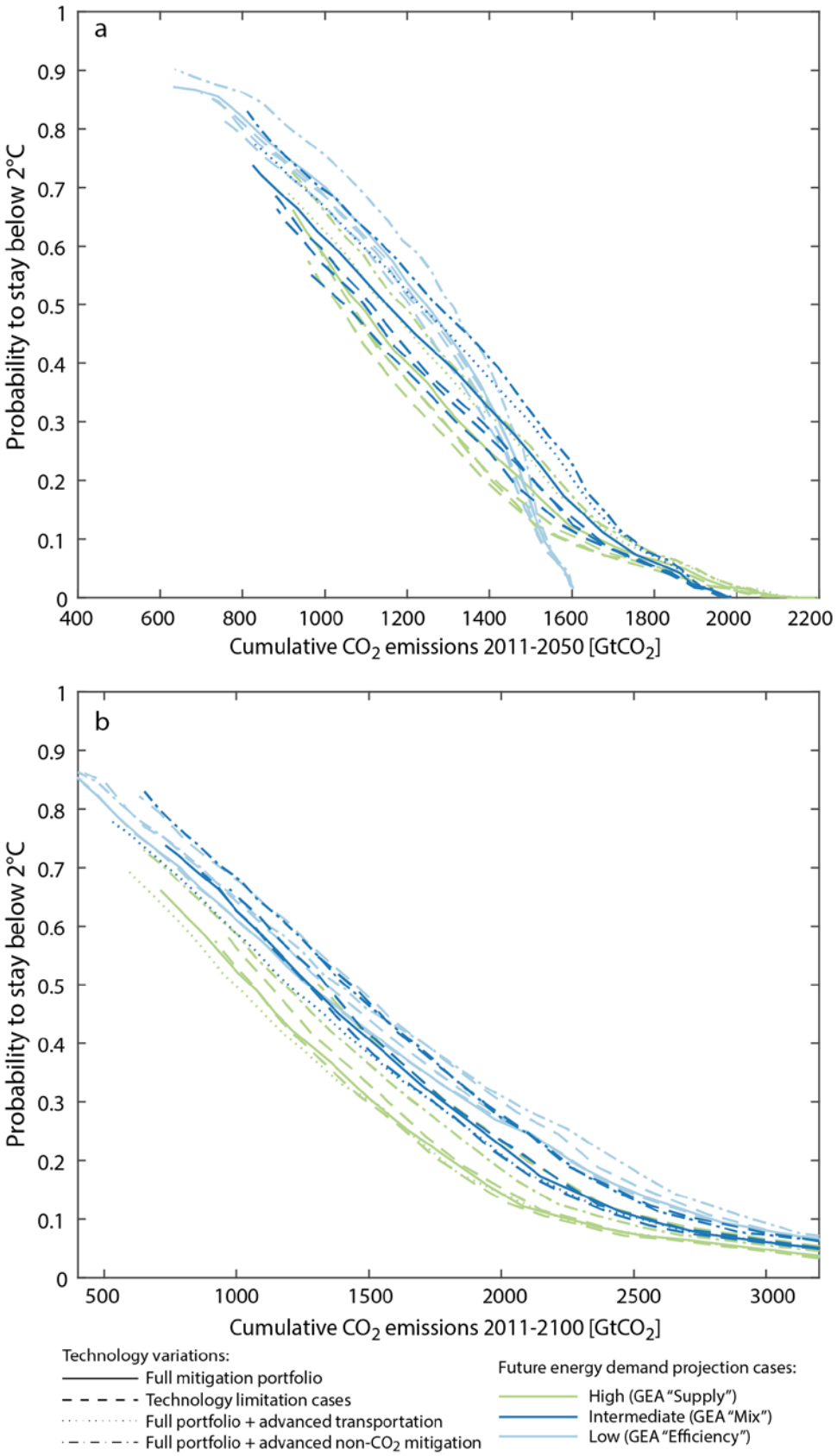

Figure S1: Cumulative CO_2 emission budgets versus probability of limiting warming below 2°C during the 21st century. Lines end at the last available feasible scenario of a particular subset, and are colour- and line-style-coded as a function of future energy demand assumptions and technology availability, respectively.

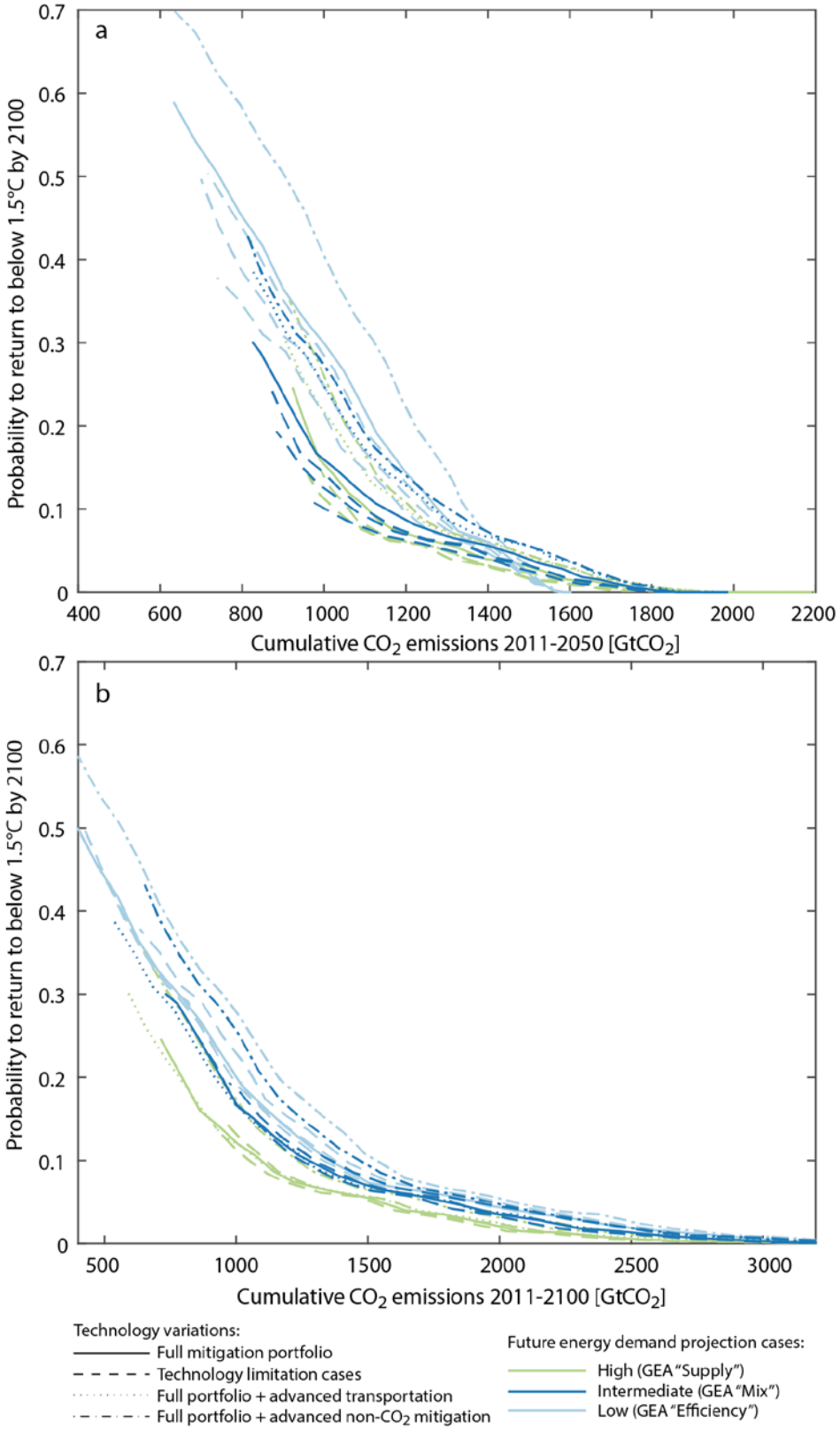

Figure S2: Cumulative CO_2 emission budgets versus probability of returning warming to below 1.5°C by 2100. Lines end at the last available feasible scenario of a particular subset, and are colour- and line-style-coded as a function of future energy-demand assumptions and technology availability, respectively.

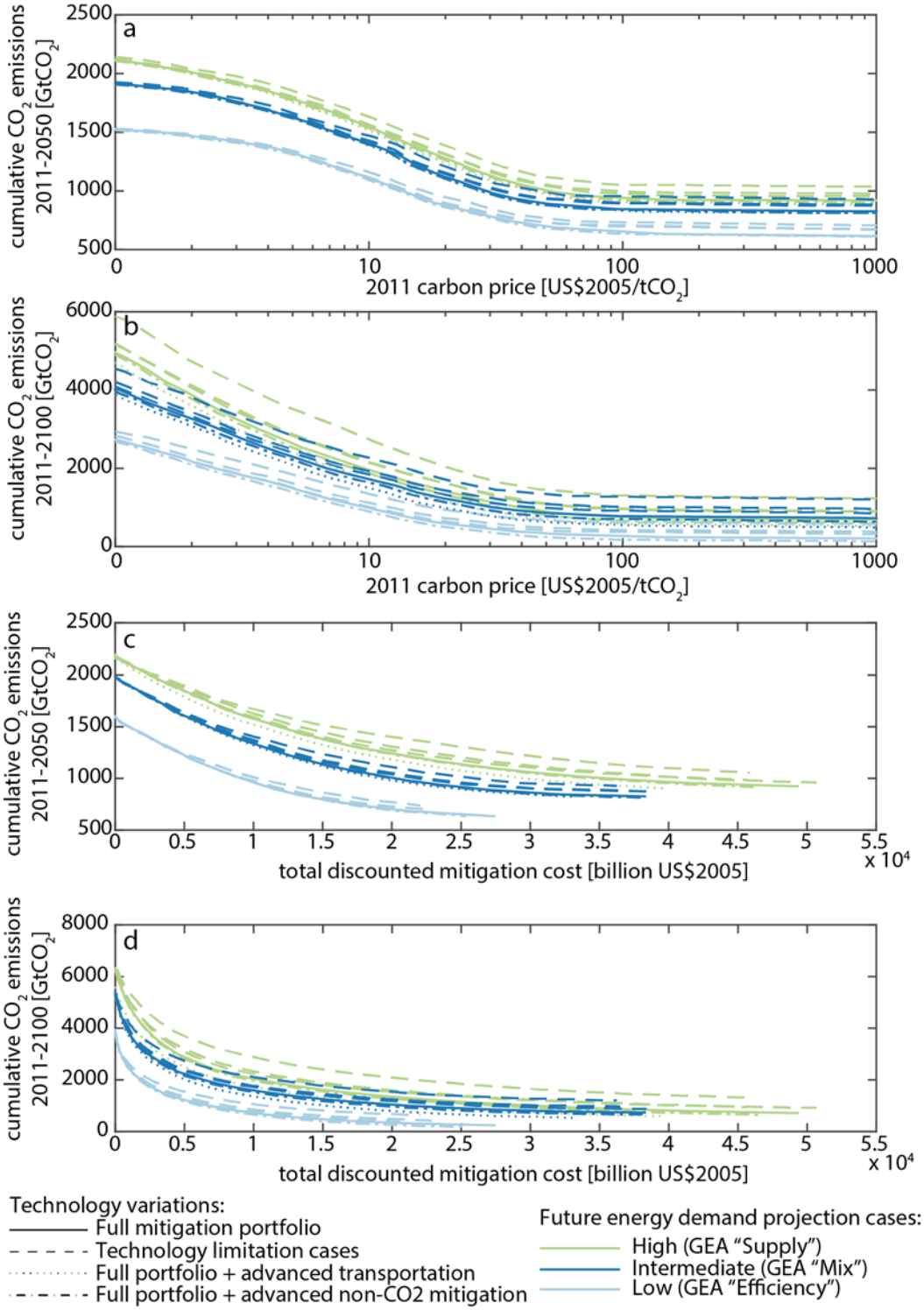

Figure S3: Costs for limiting cumulative CO_2 emissions between 2011-2050 and 2011-2100 to a given amount. Lines end at the last available feasible scenario of a particular subset, and are colour- and line style-coded as a function of future energy-demand assumptions and technology availability, respectively. Data is provided for both equivalent carbon prices (panels a and b), and total discounted mitigation costs during the 21st century (panels c and d; see main text for a more detailed description). Carbon prices are year-2020 carbon prices discounted back (discount rate 5%) to 2011.

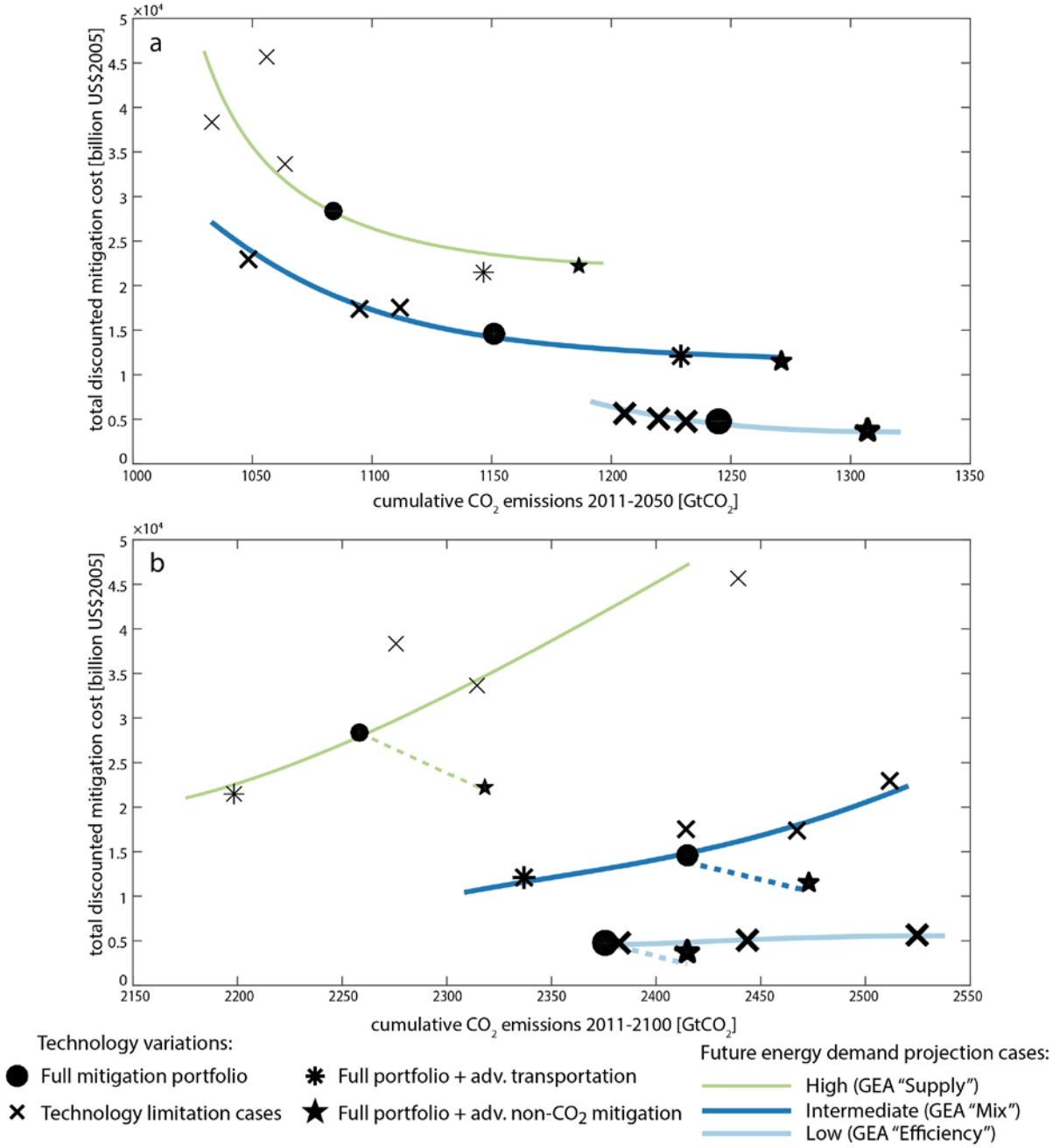

Figure S4: Integrated influence of costs and technologies on CO_2 budgets consistent with limiting warming below 2°C with 50% chance between 2011-2050 (panel a) and between 2011-2100 (panel b). Each symbol represents one unique scenario case. Symbols are grouped with coloured features based on the future energy-demand assumptions that underlie the scenarios (based on the Global Energy Assessment – GEA, Riahi *et al.*, 2012). Coloured features in the figures are visual guides to highlight data points which are grouped together, but do not represent quantitative data. Costs are provided as total discounted mitigation costs (see main text). For clarity only 2°C scenarios with 50% chance are shown, but consistent features can be seen for other probability levels in spite of a lower amount of scenarios being available (Figure S6).

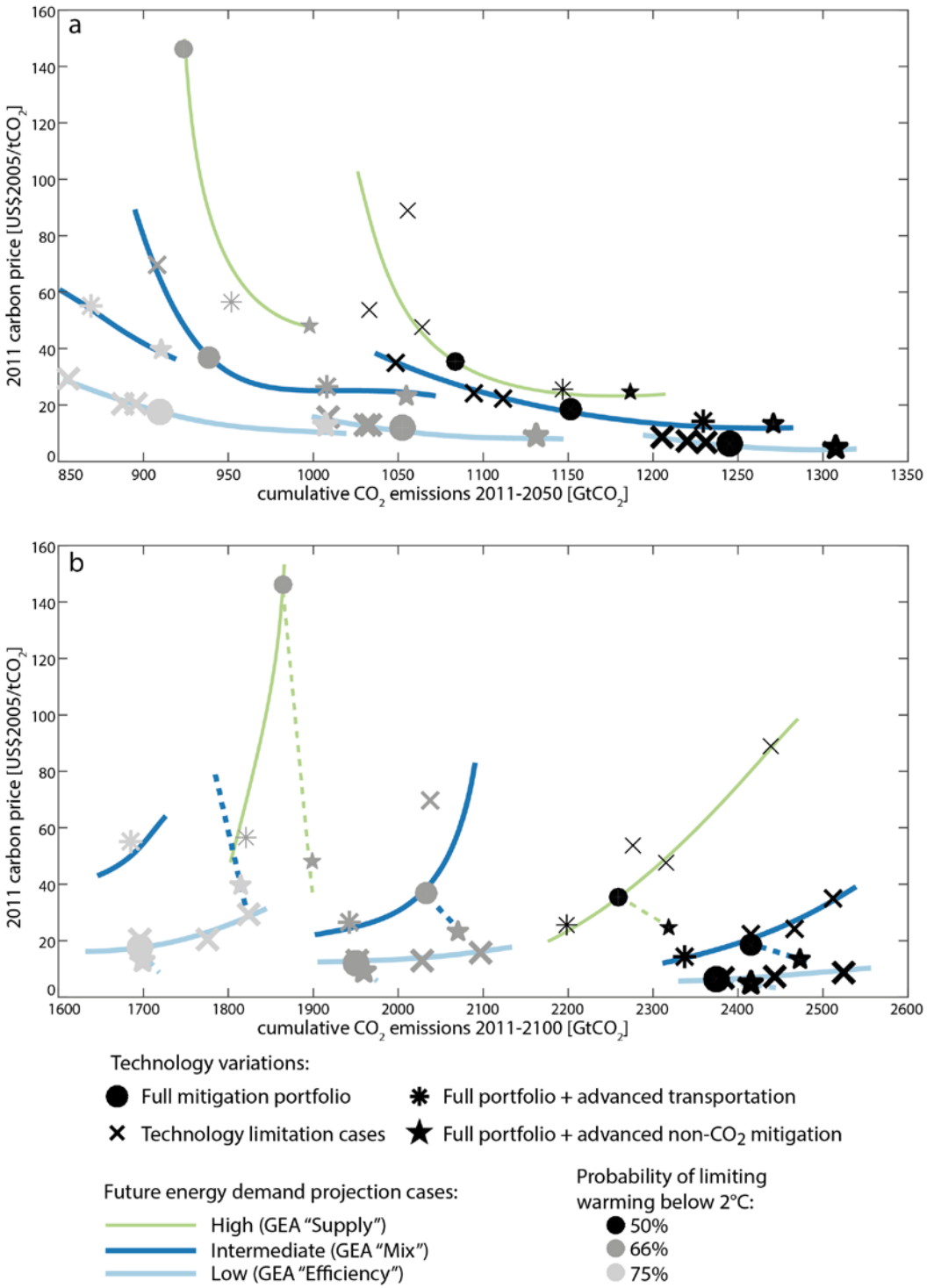

Figure S5: Integrated influence of costs and technologies on CO_2 budgets consistent with limiting warming below 2°C with 50, 66 and 75% chance between 2011-2050 (panel a) and between 2011-2100 (panel b). Each symbol represents one unique scenario case. Symbols are grouped with coloured features based on the future energy-demand assumptions that underlie the scenarios (based on the Global Energy Assessment – GEA, Riahi *et al.*, 2012). Coloured features in the figures are visual guides to highlight data points which are grouped together, but do not represent quantitative data. Costs are provided as year-2020 carbon prices discounted back (discount rate 5%) to 2011. Total mitigation costs are given in Figure S6. Different probability levels are identified by the intensity of the symbols.

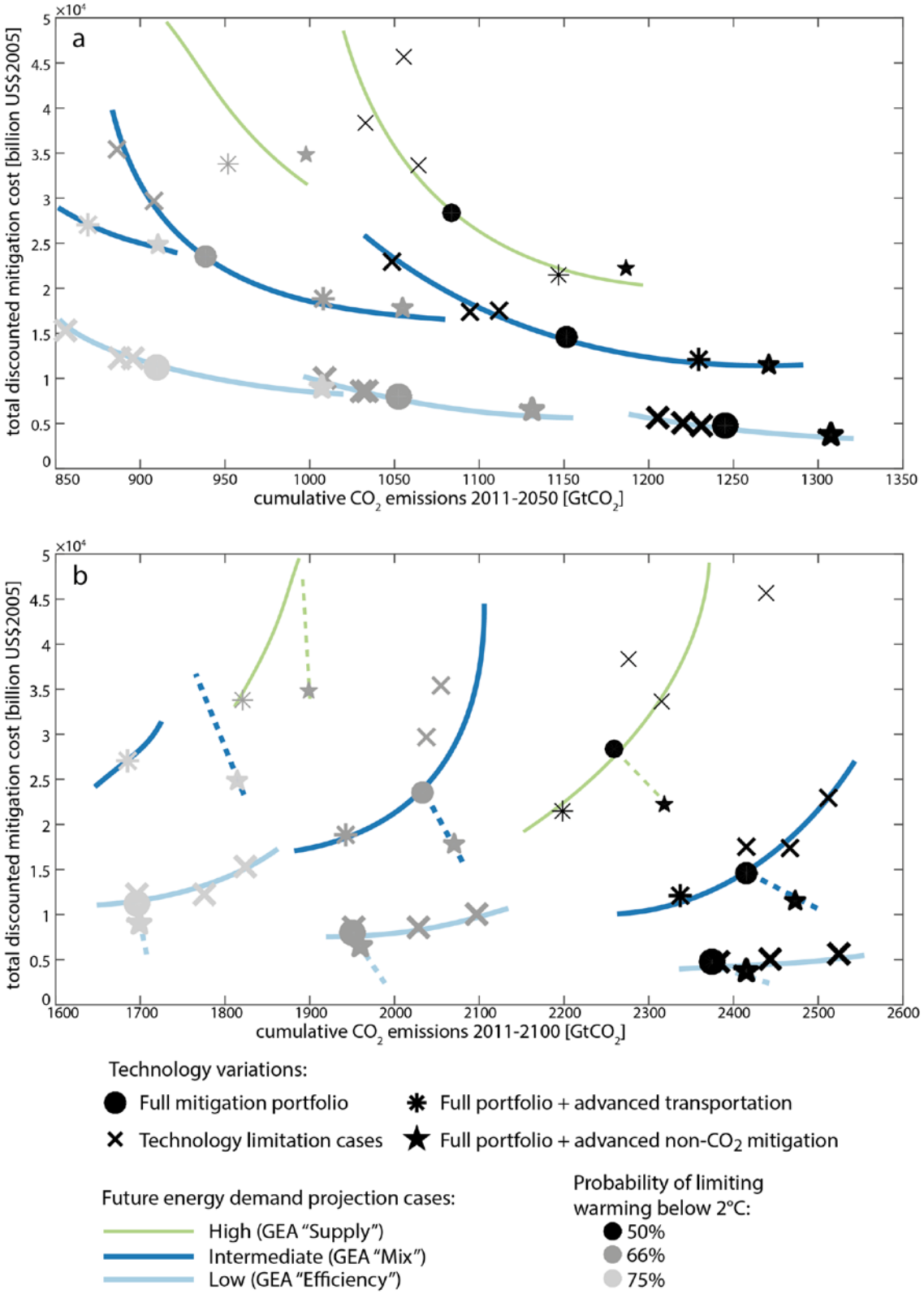

Figure S6: Integrated influence of costs and technologies on CO_2 budgets consistent with limiting warming below 2°C with 50, 66 and 75% chance between 2011-2050 (panel a) and between 2011-2100 (panel b). Each symbol represents one unique scenario case. Symbols are grouped with coloured features based on the future energy-demand assumptions that underlie the scenarios (based on the Global Energy Assessment – GEA, Riahi *et al.*, 2012). Coloured features in the figures are visual guides to highlight data points which are grouped together, but do not represent quantitative data. Costs are provided as total discounted mitigation costs (see main text). Carbon prices are given in Figure S5. Different probability levels are identified by the intensity of the symbols.

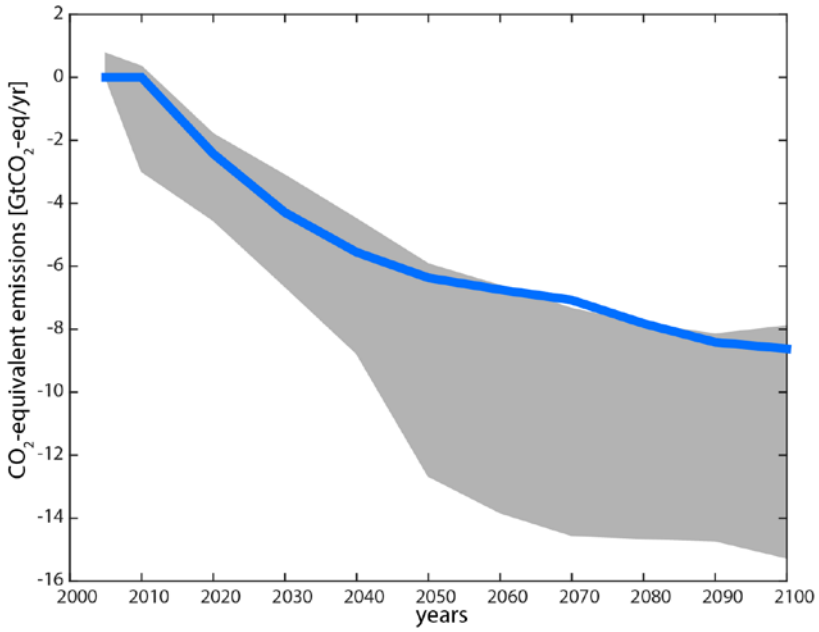

Figure S7: Non-CO_2 mitigation under a 50 USD carbon price. Comparison of decrease in non-CO_2 GHG emissions between a baseline in absence of climate change mitigation and a scenario with a 50 USD carbon price which increases over the 21st century. The decrease is expressed CO_2-equivalent emissions based on the 100-year Global Warming Potential as reported in the IPCC Fourth Assessment Report. The grey range shows the range of reductions across all the models for which data was available from the AMPERE model intercomparison (Kriegler *et al.*, 2015). The blue line represent the MESSAGE model which was used in this study.

Supplementary References

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