

- 4.2.19 Where a scheme impacts upon emissions from more than one transport mode, the net change in carbon dioxide equivalent (CO₂e) emissions for impacts on each mode should be estimated. That is, the difference between the sum of emissions from each mode in the 'with scheme' case and the sum of emissions from each mode in the 'without scheme' case should be estimated for each year.

Monetary valuation of greenhouse gas impacts

- 4.2.20 The **fourth** step is to apply monetary values to the estimates of changes in carbon emissions. The Department for Energy Security & Net Zero (DESNZ) publish guidance on the [valuation of greenhouse gas emissions for policy appraisal](#). This sets out the methodology for carbon valuation in UK policy appraisal based on the estimated abatement costs per tonne of carbon dioxide equivalent to achieve the government's emissions targets.
- 4.2.21 Where impacts are in the **non-traded** sector (petrol, diesel and gas oil emissions), they are to be valued using the values given in [TAG Data Book Table A3.4, £ per Tonne of CO₂e](#), which are based on those referred to in the DESNZ guidance. These values are estimated by the target-consistent marginal abatement costs consistent with the Government's commitments on carbon emissions. The values will be updated periodically to reflect updates published by DESNZ. Higher and lower estimated values are provided for sensitivity analysis.
- 4.2.22 The value per tonne of CO₂e emissions, which varies for each year, should be applied to the difference in emissions in each year. This should then be discounted at standard HM Treasury rates (see [TAG Data Book Table A1.1.1](#)) and summated to give the NPV of the change in non-traded sector fuel consumption related CO₂e emissions over the appraisal period. A positive number would suggest there has been an overall reduction in CO₂e emissions and conversely a negative number would suggest that there has been an overall increase in CO₂e emissions.
- 4.2.23 For transport appraisal purposes, estimates of monetised carbon impacts based on the appraisal values in TAG Data Book Table A3.4 should be assumed to reflect the "factor cost" unit of account, following the explanation of appraisal units of account in [TAG Unit A1.1: Cost-Benefit Analysis](#). Therefore, estimates of monetised carbon impacts should be updated by the indirect tax correction factor provided in TAG Data Book Table A1.3.1 to ensure comparability with other monetised impacts typically presented in the "market price" unit of account.
- 4.2.24 Where there are changes to the use of transport fuel that is in the **traded** sector, for example electricity, the changes in emissions should be valued using the carbon appraisal values provided in TAG Data Book Table A3.4 but with an appropriate adjustment for existing carbon pricing mechanisms – refer to 4.1.8 for further details.

4.2.25 To be consistent with the accounting of traded sector emissions across Government, the following approach should be used (again using electricity for illustration)²⁰:

- estimate the electricity consumption in the 'with scheme' and 'without scheme' cases as discussed in step two above;
- use electricity prices which include the UK ETS allowance price (see [TAG Data Book Table A1.3.7](#));
- account for electricity costs in the 'with scheme' and 'without scheme' cases in line with standard guidance, which sets out where such transport fuel costs should feature in the appraisal. See [TAG Unit A1.2 – Scheme Costs](#).

4.2.26 The Department should be contacted with any queries regarding this approach.

4.3 Software

4.3.1 For road and multi-modal schemes using the TUBA program, the net present value of the change in carbon dioxide equivalent (CO₂e) emissions from road-based fuel consumption that is in the non-traded sector will be presented as an automatic output of the program in the Department's standard base year prices and values for the whole appraisal period. Please note that **if TUBA is being used to estimate the change in carbon dioxide emissions it is essential that all 8,760 hours of the year are included and properly represented in the analysis**. Note also that TUBA estimates fuel consumption based on the average speed for an entire journey. In some circumstances, this may result in biases. For more details on TUBA, see the TUBA Manual (Mott MacDonald, 2006). The non-traded carbon dioxide values for the Department's standard base year and the annual growth rate are programmed as default into the TUBA software. The TUBA program also outputs the NPV based on the upper and lower estimates of the carbon dioxide values.

4.3.2 Alternatively, road-based fuel consumption related carbon dioxide equivalent emissions for the 'with scheme' and 'without scheme' cases can be estimated using the DMRB LA 105 air quality screening spreadsheet. Note, however, that the screening method requires adjustment to correct for biases. If these adjustments are not made, a comment should be provided in the 'Key Impacts' column of the Appraisal Summary Table (AST). **DMRB guidance on carbon is presented in units of carbon equivalent. These must be converted to units of carbon dioxide equivalent by multiplying by a factor of 44/12.**

4.3.3 Where TUBA is not used and for rail schemes, the [TAG Greenhouse Gases Workbook](#) which accompanies this unit can be used to carry out the monetisation, generating the same outputs as TUBA. **Users of the DMRB spreadsheet can also use the TAG Greenhouse Gases excel spreadsheet to calculate the valuation of the emissions, but it is essential that they**

²⁰ Guidance on the appraisal of GHG emissions associated with aviation schemes and policies is provided in [TAG Unit A5.2: Aviation Appraisal](#).