VALUATION OF ENERGY USE AND GREENHOUSE GAS

Guidance for using the toolkit
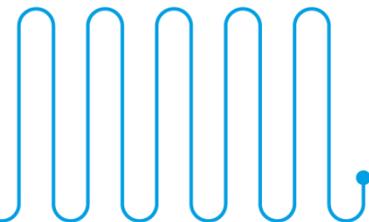
January 2018

The Toolkit is an Excel-based workbook that has been designed to aid the analyst conducting appraisals of policies and projects that result in changes to GHG emissions and energy consumption. It helps to implement the methodologies explained in the guidance on *Valuation of energy use and greenhouse gas (GHG) emissions*,[1] which is supplementary guidance to the *HM Treasury Green Book on Appraisal and Evaluation in Central Government*[2] provides additional tools to help analysts quickly conduct sensitivity analysis and assess cost-effectiveness.
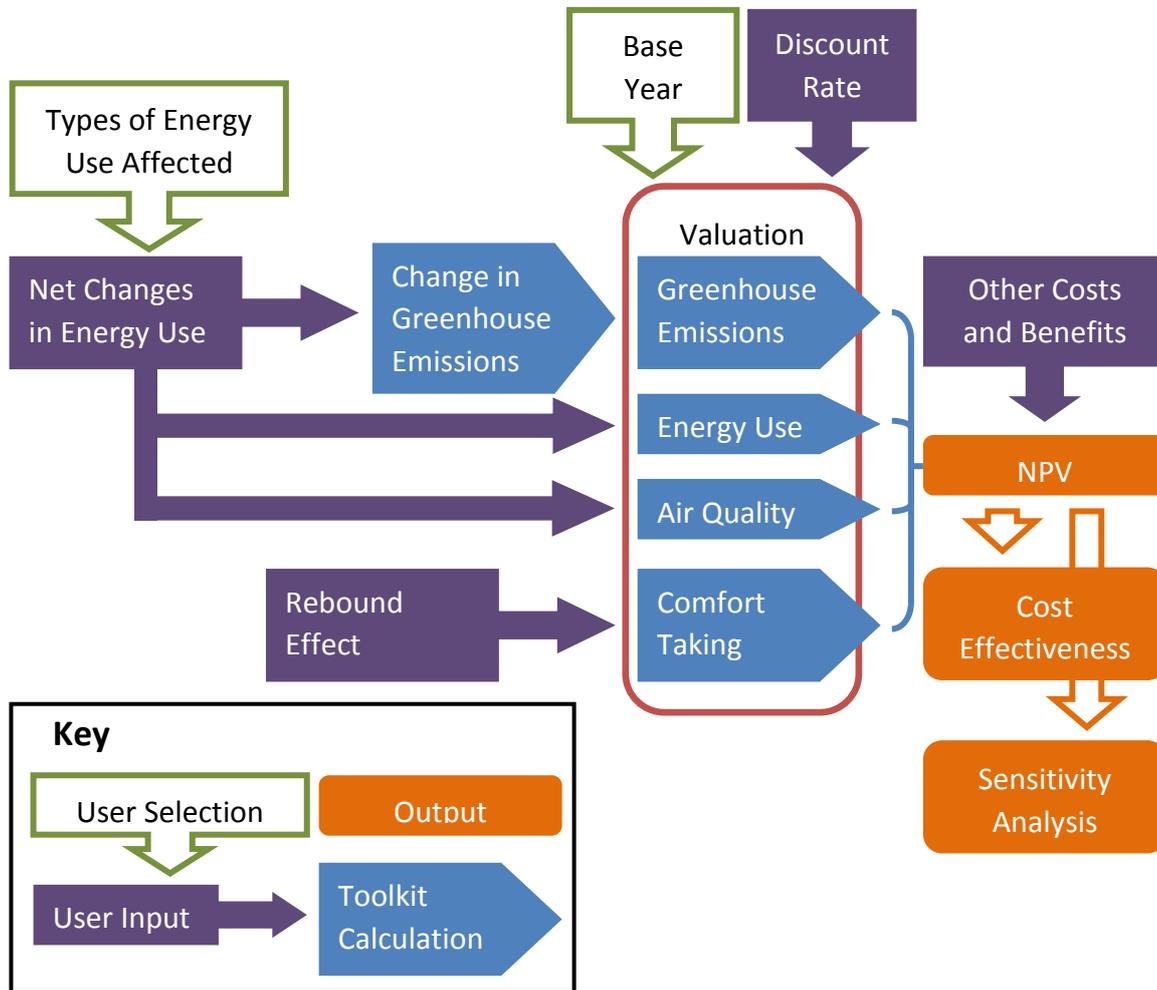
The diagram below provides a stylised overview of the Toolkit's function. After the analyst has determined the net changes in energy use attributable to his or her policy, these are entered into the Toolkit. Using this information, the Toolkit will then quantify the associated impact on emissions. It will also value the changes in energy use, the changes in emissions and the changes in air quality automatically. For energy efficiency policies, there is also the option of entering information on the size of any direct rebound effects, which the Toolkit will then value.

This document consists of a step-by-step guide to using the Toolkit. However, it is worth noting that if you wish to customise the Toolkit or add extensions specific to your analysis, the Toolkit is relatively easy to modify. Although its mechanics are largely hidden to avoid confusion, they can be revealed, and protected sections can be unlocked and then overwritten without using a password. For the majority of users however, the standard Toolkit should provide an easy way to ensure that your analysis is fully consistent with the guidance in this document.

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[1] The toolkit, guidance and background documentation are available here: https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal

[2] Available here: https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent

Figure 1: Toolkit Processes

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                                    ┌──────────┐  ┌──────────┐
                                    │  Base    │  │ Discount │
                                    │  Year    │  │  Rate    │
                                    └────┬─────┘  └────┬─────┘
                                         │             │
  ┌──────────────────┐                   ▼             ▼
  │ Types of Energy  │              ┌─────────────────────────┐
  │  Use Affected    │              │      Valuation          │
  └────────┬─────────┘              │  ┌───────────────┐      │  ┌──────────────┐
           │                        │  │  Greenhouse   │      │  │ Other Costs  │
           ▼                        │  │  Emissions    │──┐   │  │ and Benefits │
  ┌──────────────────┐  ┌─────────┐ │  └───────────────┘  │   │  └──────┬───────┘
  │  Net Changes     │─▶│Change in│ │  ┌───────────────┐  │   │         ▼
  │  in Energy Use   │  │Greenhouse│ │ │  Energy Use   │──┤   │  ┌──────────────┐
  └──────────────────┘  │Emissions │ │ └───────────────┘  ├──▶│  │     NPV      │
           │            └─────────┘ │  ┌───────────────┐  │   │  └──────┬───────┘
           ├────────────────────────│─▶│  Air Quality  │──┤   │         ▼
           │                        │  └───────────────┘  │   │  ┌──────────────┐
  ┌─────────────┐                   │  ┌───────────────┐  │   │  │     Cost     │
  │  Rebound    │───────────────────│─▶│   Comfort     │──┘   │  │ Effectiveness│
  │  Effect     │                   │  │   Taking      │      │  └──────┬───────┘
  └─────────────┘                   │  └───────────────┘      │         ▼
                                    └─────────────────────────┘  ┌──────────────┐
                                                                 │ Sensitivity  │
                                                                 │  Analysis    │
                                                                 └──────────────┘
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Key

User Selection	Output
User Input →	Toolkit Calculation

Step-by-Step Guide

The following section provides a step-by-step guide to using the Toolkit.

Introductory Page

Step 1 – Check version

The Toolkit is updated to reflect methodological changes and BEIS's latest projections. Before starting you should always check that the version number on the introductory page matches the version of the Toolkit available on BEIS's website.
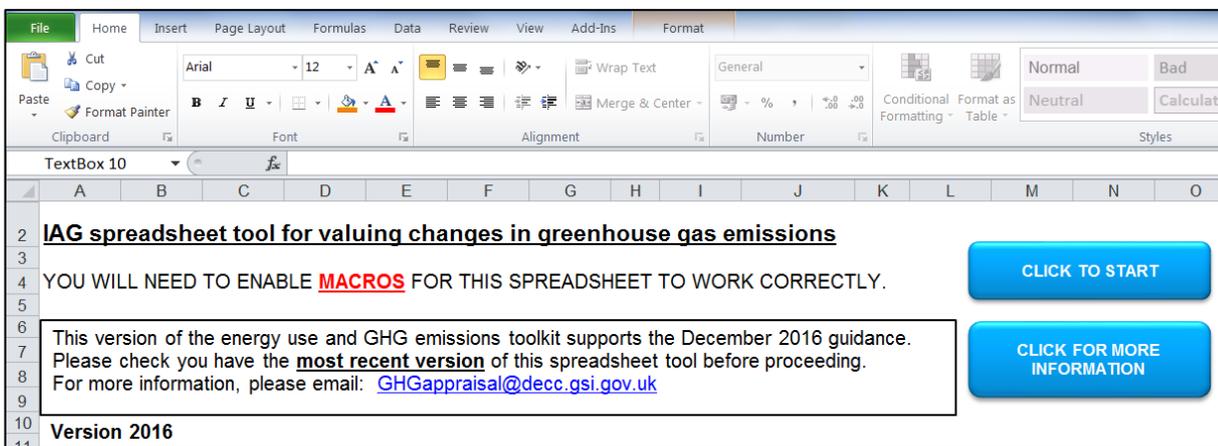
Step 2 – Enable macros

The Toolkit requires macros to be enabled. After enabling macros, click on the 'Click to Start' button.

Initial Inputs

Step 3 – Select the types of energy use influenced by your policy

Click on the checkboxes to select the types of energy use that you're interested in. Selecting a box displays some brief guidance on when it is likely to be affected. Forms of energy use that are not selected will be hidden in subsequent sections.

Step 4 – Select the start and end year of your appraisal period

Enter the first and last year in which your policy has a cost or benefit, even if these are not related to energy use or climate change. Years outside of this range will be hidden in subsequent sections. Note that the toolkit can only be used for appraising impacts in 2010 onwards.

Step 5 – Enter the name of your policy

Optionally, you can enter the name of your policy to help differentiate this version of the Toolkit.

Step 6 – Enter the year to discount to

Enter the base year that you want the Toolkit to discount all costs and benefits to.

Step 7 – Enter the current year

If your computer clock is incorrect, enter the current year. The toolkit uses this information to set the declining discount rate periods recommended in the Green Book. When you are ready to proceed, press 'Click to Continue'.

Changes in Energy Use

The Changes in Energy Use page is where most of the detailed data on a policy is entered. The types of energy use and the years shown reflect the initial inputs that were entered.

Step 8 – Enter the net change in energy use

All of the types of energy use that were selected on the previous page will have its own section on this page. These sections are arranged vertically and extend horizontally with a separate column for each year of the policy appraisal period. The first few rows in each section are labelled 'Net Change' and are followed by a unit (e.g. GWh). You should enter the net change in energy use for each type of energy in each year in the units given. Reductions in energy use should be inputted as negative numbers and should be net of any rebound effect. Cells can be left blank. Often, there will be three separate 'Net Change' rows: Domestic, Commercial and Industrial. Where there are several 'Net Change' rows, make sure that you enter the energy changes in the relevant row.

Step 9 – Enter your estimated rebound effect

Optionally, if your policy is expected to result in a rebound effect, you can enter the expected rebound using the rows labelled 'Direct Rebound'. Where the 'Net Change' has been subdivided (e.g. between domestic, commercial and industrial) the same division is used for the rebound effect. The rebound effect can be entered either as a percentage of the *gross* change in energy or as an absolute quantity. The rows for entering a percentage (labelled with '%') are shown above the rows for entering a quantity (labelled with the relevant unit, e.g. GWh). Note that each % cell is linked to the equivalent unit cell with a formula and vice versa. You will need to overwrite one or the other cell to enter your estimate of the rebound effect. When you do so, the other cell in the pair will automatically update itself to be consistent with your entry. If you want additional help on rebound effects, press 'Click for Help on Rebound Effect'. When you are ready to proceed, press 'Click to Continue'.

Additional Assumptions

Step 10 – Enter the discount rate

The Toolkit defaults to the discount rates recommended by the Green Book. However, if you wish to use different discount rate assumptions, you can enter them here for the time periods specified.

Step 11 – Enter road transport assumptions

Optionally, if you selected road transport earlier, you can specify how the net change in road fuel use is distributed among different vehicle types.[3] This information is used to value the resultant air quality impact. If you want to have the proportions attributable to different vehicle types differ between years, you can press 'Click to Edit Assumptions by Individual Year'. When you are ready to proceed, press 'Click to Continue'.

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[3] The default values are provided by the Department for Transport based on 2012 petroleum consumption statistics

Results

The Results page shows a number of summary outputs. It is divided into three sections: Results Summary, Other Major Outputs and Carbon Budgets. The Results Summary at the top of the page contains a box showing the energy and carbon price scenarios being used to generate the results on the rest of the page. Below that it shows the base year, to which all the values are discounted. The value of the changes in energy use, emissions and air quality are shown on the left. If other policy benefits and costs are entered (as described in more detail later), these will also be shown here, above the policy's NPV. The number of years in the policy appraisal period and the annualised NPV are shown to the right.

The 'Other Major Outputs' section appears in the bottom left. At the top it shows the change in greenhouse gas emissions disaggregated by traded and non-traded sector. Below this the value of changes in energy use, emissions and air quality are also shown disaggregated by sector.

The 'Carbon Budgets' section to the right shows the change in greenhouse gas emissions disaggregated by traded and non-traded sector and carbon budget period, as required for carbon budget reporting.

To the right of this page are three buttons, which are described in detail in the following sections.

Cost-Effectiveness

Press on 'Click to Add Other Policy Costs and Benefits' to allow the Toolkit to calculate the Cost Effectiveness Indicator for you. Doing so will take you to the Cost Effectiveness page.

Step 12 – Enter other costs

In the topmost row, enter any undiscounted costs that are not accounted for directly by the Toolkit. Costs should be entered as a positive number. The discounted equivalent will be shown in the row immediately below.

Step 13 – Enter other benefits

In the row labelled 'Other benefits (undiscounted)', enter any undiscounted benefits not accounted for directly by the Toolkit. If you previously entered the size of the rebound effect, the Toolkit will value the comfort taking separately; this should not be included in your entry here. Benefits should be entered as a positive number. The total discounted value and the value of any comfort taking will be summed in the row immediately below.

After completing these two steps, the Toolkit will correctly display the cost effectiveness indicator for traded and non-traded emissions in the two coloured boxes at the bottom of the page. It will also show the carbon savings and the NPV net of carbon benefits used to calculate the cost effectiveness indicator, as well as the weighted price of carbon against which the cost effectiveness indicator should be compared.

Any other costs and benefits entered on this page will now be reflected on the Results page.

When you are ready, press 'Click to Go Back' to return to the Results page.

Sensitivity Analysis

From the Results page, press on 'Click to Conduct Sensitivity Analysis' to quickly check how sensitive your results are to different energy and carbon price scenarios. Doing so will take you to the Sensitivity Analysis page.

Step 14 – Select energy and carbon price scenario

Clicking on the scenario names in the boxes at the top of this page will open up dropdown lists, allowing you to select one of several scenarios for each. The summary results below will update automatically to reflect your selections. Descriptions of the energy price scenarios are available on the BEIS website.[4] When you are ready, press 'Click to Reset Scenarios and Go Back' to return to the Results page.

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[4] https://www.gov.uk/government/collections/carbon-valuation--2

Detailed Outputs

Press on 'Click to Create Customised Detailed Outputs' to have the Toolkit display more detailed output tables. Doing so will prompt you to choose the set of outputs that you want to see. After you select an option, you will be taken to a new page containing a set of tables detailing the outputs covered by your selection. From this page you can press 'Click to View Complete Outputs' to have the Toolkit return a comprehensive set of detailed outputs covering all of the options listed previously. This can be useful if you want to conduct further analysis using these outputs.

			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
6	Change in energy use - electricity (traded)	(GWh)	0	0	0	0	0	0	0	0	0	0	0
7	Value of change in energy use (undiscounted)	(£,2016)	0	0	0	0	0	0	0	0	0	0	0
8	Value of change in energy use **(discounted)**	(£,2016)	0	0	0	0	0	0	0	0	0	0	0
9													
10	Change in energy use - gas (traded)	(GWh)	0	0	0	0	0	0	0	0	0	0	0
11	Value of change in energy use (undiscounted)	(£,2016)	0	0	0	0	0	0	0	0	0	0	0
12	Value of change in energy use **(discounted)**	(£,2016)	0	0	0	0	0	0	0	0	0	0	0
13													
14	Change in energy use - coal (traded)	(GWh)	0	0	0	0	0	0	0	0	0	0	0
15	Value of change in energy use (undiscounted)	(£,2016)	0	0	0	0	0	0	0	0	0	0	0
16	Value of change in energy use **(discounted)**	(£,2016)	0	0	0	0	0	0	0	0	0	0	0
17													
18	Change in energy use - gas (non-traded)	(GWh)	0	0	0	0	0	0	0	0	0	0	0
19	Value of change in energy use (undiscounted)	(£,2016)	0	0	0	0	0	0	0	0	0	0	0
20	Value of change in energy use **(discounted)**	(£,2016)	0	0	0	0	0	0	0	0	0	0	0

CLICK TO GO BACK TO OUTPUTS SHEET