

whole life costing (+ CO₂) user guide



Forum for the Future - the not-for-profit sustainable development organisation - works in partnership with more than 120 leading businesses and public sector bodies, helping them devise more sustainable strategies and deliver these in the form of new products and services.

Our vision is of business and communities thriving in a future that is environmentally sustainable and socially just. We believe that a sustainable future can be achieved, that it is the only way business and communities will prosper, but that we need bold action now to make it happen. We play our part by inspiring and challenging organisations with positive visions of a sustainable future; finding innovative, practical ways to help realise those visions; enabling leaders to bring about change; and sharing success through our communications.

www.forumforthefuture.org

Email: info@forumforthefuture.org and call: 020 7324 3630

Contact: Anna Warrington, Sustainability Advisor, a.warrington@forumforthefuture.org

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Registered office: Overseas House, 19-23 Ironmonger Row, London, EC1V 3QN, UK.
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1. purpose of this guide

This guide has been written for procurement professionals from any sector wanting to use the Whole Life Costing (WLC) and CO₂ tool developed by Forum for the Future in partnership with Fife Council. It's likely that the tool will be most useful to those of you that evaluate different options put forward by suppliers, but it will also be of use to others with roles at other points in the procurement process.

It will help you get the most out of the tool – to understand what it does, plus when and how to use it.

This guide has been written by Forum for the Future, and the views expressed within it are ours and not necessarily those of Fife Council (unless otherwise stated).

2. why use the WLC + CO₂ tool?

We must address climate change. If we are to avoid a dangerous 2°C rise in global temperatures, we need to dramatically reduce our emissions of carbon dioxide (CO₂) and other greenhouse gases. Every individual and organisation has a part to play. And action needs to be taken now.

Many organisations have recognised this urgency. Many local authorities for instance have committed to reducing their CO₂ emissions by 80% (from 1990 levels) by 2050 in order to meet the legislative requirements of the Climate Change Act 2008¹. And associated indicators, such as the English NI 185 - CO₂ reduction from local authority operations have been put in place to monitor this.

The time has come for systematically putting these targets into action. Sir Nicolas Stern has made it clear that the cost of inaction will be far higher than strong, early investment to meet targets². The financial penalties of failing to reduce emissions under the Carbon Reduction Commitment³ are but one element of this potentially huge future cost faced by all organisations.

A major factor that determines an organisation's emissions is the equipment that it uses. And the people that decide on this equipment are you – the procurement professionals.

For example, by making the decision to replace a computer with a more efficient model, you will more than likely reduce the emissions from your organisation.

But you need to understand which product is going to result in fewer emissions over its entire lifetime. Whilst looking for the most energy efficient product is a good start, you also need to understand the emissions that result from product disposal. And is it better to use an efficient product that needs to be replaced every two years, or a less efficient one that lasts much longer?

What's more, you need to understand the financial implications – both in traditional whole life terms (maintenance, fuel costs, training costs, disposal costs etc) and in terms of the financial cost incurred by your organisation from your CO₂ emissions through schemes such as the Carbon Reduction Commitment.

This tool will help you to answer these questions, putting you firmly on track to achieving effective whole life costing and real emissions reductions.

¹ <http://www.defra.gov.uk/environment/climatechange/uk/legislation/>

² HMT and Cabinet Office (2006), *The Stern Review on the Economics of Climate Change*, http://www.hm-treasury.gov.uk/sternreview_index.htm

³ <http://www.defra.gov.uk/environment/climatechange/uk/business/crc/index.htm>



3. a bit of history

This WLC tool has been developed in partnership with Forum for the Future and Fife Council. It draws on Forum's metrics and sustainability expertise and public sector procurement knowledge within Fife Council. It has been developed over the course of a year (2008/09) and has been greatly informed by a piloting process using first a hypothetical and then a live procurement.

The tool is now available for the use of any organisation, with support from Forum for the Future where appropriate. To find out how to make use of this support contact Anna Warrington on a.warrington@forumforthefuture.org.

4. purpose

4.1 what it does

The WLC tool calculates the total cost of a product from its purchase through to, and including, its end of life. This includes not only the traditional financial costs, but also the amount of CO₂ emitted from that product during that time, and the financial cost of those emissions (to the organisation directly, or society as a whole).

This cost is calculated:

- i. in traditional financial terms (£)
- ii. in emissions of Carbon Dioxide (tonnes of CO₂ and in £); and
- iii. in a measure that combines the traditional financial cost and the financial cost of CO₂ (£).

This cost includes:

- Commissioning and purchase
 - purchase price
 - delivery costs
 - design costs
 - installation and commissioning
 - user training
- Operation
 - energy use (electricity, gas, oil)
 - vehicle fuel
 - public transport
 - water consumption
 - maintenance and upkeep
- End of life
 - disposal of packaging
 - disposal of product
 - residual value (where appropriate)
- Health, safety and environment costs
 - water effluent treatment
 - annual PPE equipment cost
 - annual health and safety training and documentation cost

You can compare up to five different products using the tool. You can assess above this number – you simply need to use more copies of the spreadsheet. The different options you are assessing



could be the different tender responses you have received. Or they could be a comparison between a new option and the one already in place ('business as usual').

4.2 what it doesn't do

The tool covers only the costs incurred (in terms of finance and amount of CO₂ emitted) from the point of purchase, shown within the pink box in Figure 1.

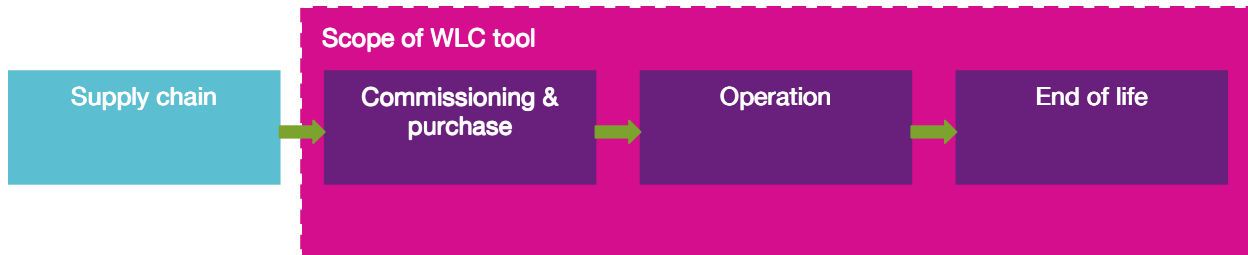


Figure 1: Scope of the tool

It therefore does not include the embedded or embodied carbon incurred during supply chain activities such as manufacturing.

The decision not to include this within the tool was made on the basis that reliable, independent and accurate assessments are still difficult and costly to obtain. Even where they can be gained, where different methodologies have been used⁴ they would not be comparable and therefore difficult to use in any public procurement decision.

We also felt that since this tool is primarily designed to show an organisation's procurement costs and the costs to society from the use of that procurement, it was currently legitimate to exclude embodied carbon in favour of producing a simpler tool which can quickly and easily be used.

When the area of transparent and standardised embodied carbon progresses to a sufficient degree of rigor we anticipate that this functionality will be added into the model.

5. when to use it

5.1 product groups

The tool is more useful for some product and service groups than others. It can be used for any procurement that incurs any of the costs in section 4.1, but in general it will be most appropriate for assessing the whole life cost and CO₂ emissions (from purchase to end of life) of any product or service that consumes:

- electricity
- gas
- oil
- vehicle fuel
- water

⁴ Particularly with regard to the boundaries of the scope of assessment and the carbon conversion factors applied to each unit of product (e.g. tonne of steel)

Examples include vehicles; IT equipment; white goods; and energy using works machinery.

Other products like furniture, crockery and stationery can be assessed with the tool but they are unlikely to result in any significant direct CO₂ emissions. The tool will therefore only provide figures for the more traditional financial costs such as purchase price and disposal costs. Where items are delivered by vehicles or disposed of in a certain way, there may be a figure provided for emissions at purchase and end of life, but these are likely to be the only CO₂ impacts identified.

This is as it should be. Remember, the tool is designed to give you information about the whole life financial and CO₂ costs of your decisions in order to influence them for the better. It therefore focuses on products that affect your CO₂ footprint through using resources that cause CO₂ to be emitted (i.e. the energy and water resources listed above). So products like a sofa or a set of crockery, for instance, that don't use these CO₂ emitting resources don't need to be assessed specifically for their CO₂ footprint.

If, however, that item of crockery also required a new means of washing to maintain it, then the procurement of that (in comparison to the previous case of no washing) can be assessed by the tool.

5.2 stage in the procurement process

The tool logically sits within the evaluation stage of the procurement process as it helps you to choose suppliers, just as any other comparison of costs and quality would. However, it also needs to inform the questions asked of suppliers in the invitation to tender, and in some cases within the pre-qualification questionnaire as well.

Fife Council has mapped out its procurement processes. The diagram (Figure 2) shows how the tool fits into this. Each organisation's processes will look slightly different, but this diagram should help you understand how to fit the tool into yours.

It also shows that there is clear potential for using the tool with outsourced or centralised procurement functions. The only proviso is that there needs to be adequate information available from suppliers.

Figure 2 also highlights the need for appropriate recording and monitoring post contract award.



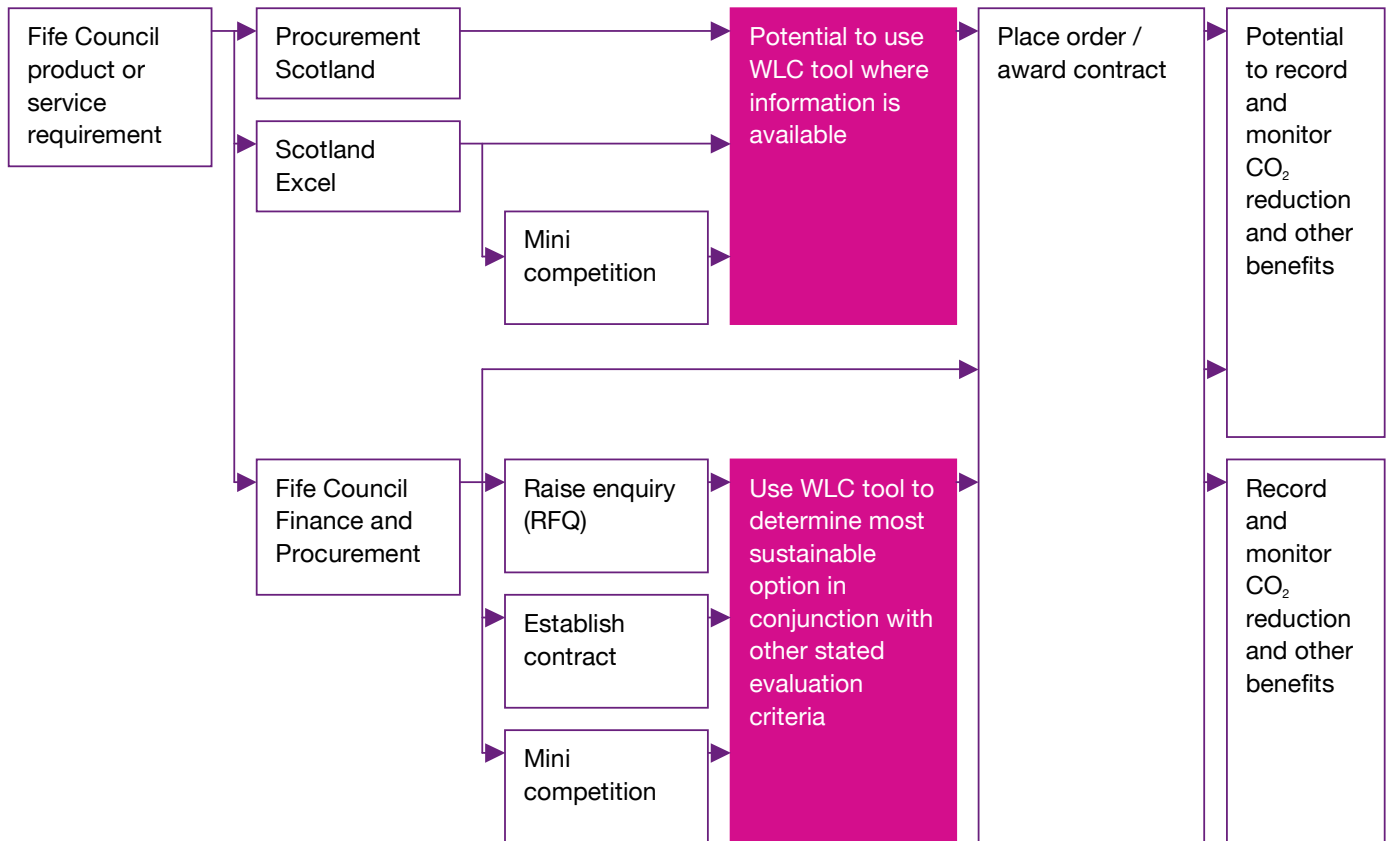


Figure 2: How the tool fits into Fife Council's procurement process

6. how to use it

6.1 communicate your intentions to the market

The WLC and CO₂ tool can shift supplier behaviour and improve the sustainability of their products. To make sure this happens, it is essential to communicate what you are doing to all potential suppliers, and to be clear why this is important to you. We'd recommend doing so even before issuing the invitation to tender.

An important part of this transparency is being clear about the weightings that you will use when evaluating options – for instance, what will be the relative weighting given to total cost versus total CO₂ emissions.

6.2 information you need from your suppliers

You will need specific information from suppliers to make decisions using the tool. You might already be asking for some of this in your invitation to tender, but there are likely to be elements that you will need to add.



All the information that you need from bidding suppliers is listed in the table below.

Information required from potential suppliers	Units information is required in
Product lifetime	Years
Purchase price	£
Delivery costs	£
Installation and commissioning costs	£
User training costs	£
The type(s) of energy required	Electricity, gas, heating oil or ULSD
The amount of energy required per year given the operating hours	Units / year
The type(s) of vehicle fuel required	Type
The amount of vehicle fuel required per year given the operating hours	Litres / year
Any public transport requirement	Type and km / year
Water consumption per year given operating hours	m ³ / year
Any other consumption	Type
Scheduled labour costs	£
Interval period between minor services	Hours
Cost of minor service	£
Interval period between major services	Hours
Cost of major service	£
Forecast for unplanned repair (where appropriate)	£ and hours
Residual value after contract period	£
Is this residual value verified	Yes / no
Weight of packaging	Kg
Weight of product	Kg
Weight of any other mass that will be disposed of	Kg
Any water effluent treatment required given operating hours	m ³ / year
What PPE equipment is required	Item
Annual health and safety training and documentation requirements	Item

We can't stress enough the importance of gaining reliable and comparable information. We recognise that it is always important in public procurement. We also recognise that you have to trust suppliers to provide accurate figures. But to encourage reliable and comparable information you need to communicate that figures must be provable upon request and that they will be used as the basis of decisions.

Elements of this information will be more relevant for some contracts than others. For instance, you're not likely to need the water consumption with a contract for PCs. We leave it up to your discretion to decide what elements are relevant to your contract. As a general rule, if in doubt, ask the suppliers to provide the information.



6.3 information you need from your organisation

To complement the information you receive from suppliers, you will require the information in the table below from your own organisation.

Information required from your organisation	Units information is required in
External price of carbon	£ / tonne CO ₂
Any annual inflation factor on external price of carbon	Annual %
Internal price of carbon (if desired)	£ / tonne CO ₂
Likely length of contract	Years
Whether the invest is likely to be renewed at end of life	Yes / No
Whether you want to use inflation / deflation factors	Yes / No
Inflation price escalator	% change per year
Annual operating hours	Hours / year
The specific type of energy that will be used	Grid electricity (½ hourly), grid electricity (not ½ hourly), green electricity, gas (small site), gas (large site), heating oil, ULSD
Unit cost of the different types of energy required	£ / unit
CO ₂ emissions from a unit of each of the different energy types	Kg CO ₂ / unit
Unit cost of different types of vehicle fuel	£ / litre
CO ₂ emissions from each unit of different vehicle fuel	Kg CO ₂ / unit
Average price of public transport journeys by type	£ / km
CO ₂ emissions from each unit of public transport by type	Kg CO ₂ / km
Unit cost of water	£ / m ³
CO ₂ emissions from each unit of water	Kg CO ₂ / m ³
Unit cost of water effluent treatment	£ / m ³
CO ₂ emissions from each unit of water effluent treatment	Kg CO ₂ / m ³
Unit costs of disposing of different types of waste (standard and hazardous)	£ / tonne
Additional cost of PPE for this contract over what is already owned	£
CO ₂ emissions from each unit of waste	Kg CO ₂ / tonne
Additional cost of H&S training and documentation for this contract over what is already in place	£
Labour costs	£ / hour

We have supplied figures for some of the above within the 'data' worksheet of the tool. This is all based on accepted and recognised sources. You need to look at these figures and decide whether they are in line with your organisation's policies, or whether your finance department uses a different inflation rate, for instance. Forum can help you with this, but we would recommend that you talk to your finance and facilities people first.

Whether you choose to use the figures provided it is important that these are checked regularly for accuracy and to ensure that they reflect the most current national guidance⁵.

We recommend communicating appropriate elements of this information within the invitation to tender, in order to demonstrate transparency and fairness.

⁵ <http://www.defra.gov.uk/environment/business/reporting/index.htm>



6.4 what to enter where

The labels we have used for the cells will show you what information needs to be entered where.

But the following guidance will support you in doing so.

6.4.1 types of cells

You will only ever need to enter data in the yellow cells.

Colour	Information contained within cell type	Can I change the information in this cell?
Yellow	Data to be inputted by user	Yes
Blue	Data label or instruction	No
Green	Unit type or table heading	No
Pink	Key results and totals	No
Orange	Cells used for calculations	No

6.4.2 the different worksheets

Within the tool there are three separate 'worksheets' or pages: 'results', 'model' and 'data'. You can access each one by clicking on the tabs at the bottom left of the screen.

Worksheet	Information contained within worksheet	Can I change the information in this worksheet?
Data	Background data for your reference and use in calculations including prices of inputs and emissions factors.	Yes
Model	The main sheet into which data is entered	Yes
Results	The headline results from the comparison	No

Currently the information within the 'data' worksheet is not automatically used in the calculations, apart from the inflation percentage where required. Instead you can refer back to the sheet and enter the corresponding figure.

The decision to design the tool in this way is based on the assumption that the background data may vary depending on the contract circumstance, and that over time the data may also change. This can be adjusted where required. Just contact the procurement team at Forum for the Future.



6.5 steps to use the tool

Once you have the information in the tables above, you can start to use the tool.

Step 1: In the 'model' worksheet, select the number of options that you are evaluating by clicking on the yellow cell next to the label 'number of tenders for assessment'. Choose the appropriate number from the drop down list. This will reconfigure the spreadsheet to account for the number of options you are considering.

Step 2: Name your different options. This will help you identify which option scores well in the 'results' worksheet.

Step 3: Enter the data that you have collected and the choices that you have made regarding the following:

- *Do you want to use inflation / deflation factors?*

It is important to realise that the longer the comparison period, the more effect the inflation factor will have. It is likely that prices will shift, though by how much is uncertain. The accounting profession uses recognised inflation factors and it would be good practice to use these. We would recommend that you find out your internal policy on this, act consistently with it, and make sure that you communicate what you decide to the market.

Please note that it is possible to vary the inflation / deflation factors of every variable independently. So you can, for example, choose to put a higher inflation factor on the price of oil-based fuel sources than on renewable ones. You would do this if you felt that this was a likely scenario over the duration of your assessment, and wanted to reflect the impact that this might have on the cost of using the different options.

- *Do you want to use an annual inflation factor for the external carbon price?*

Again, the longer the comparison period, the more effect the inflation factor will have. The cost of carbon is uncertain in the future – perhaps even more so than the price of other resources. It could escalate dramatically or it could reduce. Again, we would recommend that you find out your internal policy on this, act consistently with it, and make sure that you communicate what you decide to the market.

Your decisions here will also depend on which external price you choose. You could, for instance, apply an external social cost of carbon of £250 / t CO₂ (upwards)⁶, a shadow cost of carbon of £25 / t CO₂⁷, or an actual cost of CO₂ to the organisation – whether from buying offsets, or participating in schemes such as the Carbon Reduction Commitment. If the latter were the case, the decision about inflation factors would depend on what you felt was likely to happen to the cost of a tonne of CO₂ after the end of the first three years fixed £12 / t CO₂ period.

- *Do you want to use a separate internal price of carbon?*

It is not necessary for the comparison of options to use a separate internal price of carbon. This functionality is provided as an extra for those organisations that practice internal carbon trading or use carbon pricing to drive decision-making within the organisation. It enables departments to understand what the impact of their buying decisions will be on their carbon budgets, as well as on the organisational carbon budget.

⁶ Equivalent to £70 per tonne of Carbon. See <http://www.hm-treasury.gov.uk/d/SCC.pdf>

⁷ <http://www.defra.gov.uk/environment/climatechange/research/carboncost/pdf/background.pdf>



The internal price of carbon is frequently set higher than an external price (where that external price is based on traded market prices rather than full external social costs) as a way of driving more rapid sustainable internal decision-making.

- *Over how many years would you like to compare these investments?*

This is the length of the contract or expected period of need for the product.

- *Is this investment essential over the entire comparison period – e.g. will it be replaced / renewed at the end of its life?*

This is asking whether the computer that you are buying, for instance, will be needed for a particular length of time. To see how this can affect the results see the example below.

This is important because it potentially rewards longer-lasting, more durable options over shorter-lasting ones. The assumption in the model is that if an investment is essential, then it must last the full duration of the comparison period, and that if it doesn't then the same procurement must be made as many times as is necessary to cover the period.

example

So, for instance, you have a desired comparison period of ten years. Your investment is essential, so the product you are buying needs to last at least those 10 years. Product A has a lifetime of ten years, whilst B only last 7 years. At the end of 7 years, procurement B will have to be made again to reach the essential ten-year period.

If the procurement is deemed 'non-essential' over the entire ten year period, then there would be no need to replace product B at the end of its 7 year lifetime. The model will then compare product B for 7 of the ten years of your desired comparison period, and product A for the full length of time.

You can see from this, therefore, that choice of comparison period, and whether a procurement is necessary over the entirety of that time, can have significant positive or negative implications for procurement choices with different life spans.

Step 4: once you have entered your information in the 'model' worksheet, switch over to the 'results' worksheet. Here you will be able to see how the different options compare against one another.

6.6 how to read the results

The different sections of the 'results' worksheet will provide you with different aspects of the comparisons. Please note that if you have not entered figures in key cells within the 'model' worksheet, no results will be displayed. These key cells include the length of the comparison period and product lifetime.



Section 1 provides you with a top line view, showing which option is the cheapest from:

- a) A **purely financial perspective** (excluding residual values) – which does not include the cost of carbon at all but looks at the more traditional costs associated with WLC
- b) A **purely environmental perspective** – in terms of the amount of CO₂ emitted, so this is the option that emits the least
- c) A **combined perspective (a + b) using the external cost of carbon** (chosen by you) – which calculates the cost of (b) using the external cost of carbon and adds it to (a). This is the option that is the cheapest in terms of CO₂ and the traditional WLC. This information would likely be a significant part of your decision between options
- d) A **combined perspective (a + b) using the internal cost of carbon** – which calculates the cost of the (b) using the internal cost of carbon you have chosen and adds it to (a)

Section 2 shows how the different options compare to each other in financial terms (this does not include the cost of the CO₂). It shows how much each option costs, a ranking of the cheapest option (number 1 in the 'rank' column) to the most expensive, and the relative savings made or extra costs incurred by choosing each option over the others.

Section 3 shows how the different options compare to each other in emissions of CO₂. It shows how much each option emits, a ranking of the least emitting option (number 1 in the 'rank' column) to the most emitting, and the relative savings made or extra tonnes of CO₂ incurred by choosing each option over the others.

Section 4 provides a breakdown of the costs over the comparison period so that the different aspects of each option can be compared where desired. Please note that if you have not entered a figure in the cell that asks you "over how many years would you like to compare these investments" in section 3 in the 'model' worksheet, no results will be shown.

6.7 making your decision

You will now have the cost of the product (including the cost of CO₂) and the amount of CO₂ emitted. You will be able to weight this appropriately (as set out in your Invitation To Tender) in order to ensure that the CO₂ emissions of the procurement over its lifetime are firmly part of the decision making process. The weighting that you attribute to the CO₂ component over that of the basic economic is up to you - we do not recommend any particular weighting for the CO₂ impact, but see it as important to ensure that it plays its part in the decision.

6.8 monitoring and reporting

You will benefit from a systematic approach to recording your decisions made using the tool in a number of ways. You will be able to monitor the emissions reductions against the previous products used. And you will be able to challenge suppliers to reduce the emissions of their products from previous procurements.



7. encouraging suppliers

Throughout this process you will be sending a signal to the market that your organisation takes the mitigation of climate change seriously. You will be encouraging innovation as your suppliers recognise that they need to compete on lower carbon products and services. Your organisation is therefore contributing to the shift to a low-carbon economy.

8. key terms

- Annual inflation factor or inflation price escalator – the forecasted percentage rise in the price of products and services every year.
- Annual operating hours – the average amount of hours for which the product will be used e.g. how many hours a year a PC will be switched on.
- Emissions factor – the average amount of pollutant (CO₂ in this case) emitted per unit of something used (e.g. electricity, water).
- External price of carbon – the price of carbon used for the assessment of options. This is the price communicated to suppliers and upon which decisions are based.
- Internal price of carbon – the price of carbon used internally at the buying organisation. This price is not communicated to the suppliers when it is not used as part of the decision making process. This functionality has been added so that organisations and departments within them can understand the impact of their procurement decisions on any internal carbon budgets where a different price is used to that used externally.
- PPE – Personal Protective Equipment.
- Product lifetime – how long the product will be useful for. This may be longer or shorter than the timeframe over which the options are compared. This enables the comparison of options of different durability.
- Temporal assessment parameters – the timeframes and likely price changes used within the assessment. These include the length of time over which the assessment is made, how long the product is likely to last and whether inflation should be considered.
- ULSD – Ultra Low Sulphur Diesel

9. further support

For further support on this tool, please contact the lead at your organisation.

Should you have difficulties in arriving at solutions to your questions, please contact Anna Warrington at a.warrington@forumforthefuture.org and we will endeavour to provide assistance.

