COST OF CARBON CALCULATOR

FREQUENTLY ASKED QUESTIONS

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Query	Response
Can you provide more detail on how the "High Level" cost calculations were derived to enable confidence in the calculated values? **Which sources have been used to project emissions and calculate the 'business case' for different carbon reduction measures?** **What was the methodology used to calculate the total cost of decarbonisation for the sector?**	In order to calculate both the cost and benefit figures that feed into this calculator, the underlying research used emissions projection from the Future Energy Scenarios published by National Grid and the 6th Carbon Budget published by the Committee on Climate Change. Both of these sources have been used for an extensive list of carbon reduction measures. Where it has not been possible to identify a cost and benefit figure, Energise has prepared a 'business case' (using the RETScreen Energy Management software) and accordingly modelled the figures required for investment. The cost per tonne of investment is based on the median payback related to a specific decarbonisation area. To get a more detailed understanding of the overall methodology undertaken for this project, users can find information within 'The Cost of Net Zero' for the HE / FE Sector The total cost of decarbonisation for the sector was reached by calculating a weighted cost per tonne to decarbonise each carbon emissions category (based on current costs of decarbonisation). The sum of this was then multiplied by the sector emissions (tCO_2e).
What is the make-up of the sector costs to decarbonise mentioned in the report?	The analysis has been undertaken to estimate the primary cost of Net Zero - not any secondary costs. The meaning of primary costs is that the figure is intended to **include** *equipment, material and installation costs (and other equivalent costs),* but does **not** include secondary costs such as *decant (shifting from building) costs, asbestos removal, decoration/making good, any organisation specific procurement process costs, or any estimation of the level of unrecoverable VAT.* The figure also doesn't include any contingency value.

	The calculator provided alongside this report allows for adjustments to be made for the secondary costs.
Is the decarbonisation of UK power grid is factored into these cost calculations?	The projection figures used from the 6th Carbon Budget and the Future Energy Scenarios data factor in the impact of grid decarbonisation over time.
Does the tool factor in how some decarbonisation costs might be included in costs you would expect to see in any case anyway as part of an institution's usual activity?	It is important to note that the costs given in the investment tabs relate to additional expenditure associated with reaching Net Zero. For example, if the solution would be something typically done as a marginal improvement on top of existing expenditure, the investment figure provided would only show the marginal improvement cost, not the whole expenditure. If you would typically retrofit as a solution to reaching Net Zero, the investment cost provided will be the whole cost for this solution
How is innovation commercialisation and adoption factored in to the overall decarbonisation cost model?	The decarbonisation cost models used in the calculator is based on the projection figures used in the 6th Carbon Budget and the Future Energy Scenarios which factor in the impact of innovation commercialisation and adoption over time. The analysis done to create these models behind the tool were completed at a certain point in time and gives the best possible assumptions based on the data projections available. The assumptions used in the cost models would require updating as time passes in order to ensure accuracy.
Why is there carbon emissions from renewable energy? Shouldn't renewable energy generally have 0 emissions? **How does the model differentiate between market based 0gCO_2 (backed by energy attribute certificates) electricity emissions and standard grid emissions?**	The modelling assumes that emissions should be addressed on a location basis (refer to GHG Protocol Scope 2 guidance if there is uncertainty on what this is), and therefore treats electricity has attracting the nationally average emission for electricity as a whole. Allowing for the varieties of renewable energy procurement (onsite generation, Power Purchase Agreements, community energy) and how those would affect the numbers would be a complex element to introduce and there is an incentive to reduce electricity use by its inclusion in this manner as there are still Scope 3 emissions associated with the renewable energy in most costs of supply. The structure of this will be

	reviewed over time as the tool is developed/future releases are issued.
Does the tool reflect any change in the carbon abatement cost over time e.g. to reflect the falling capital cost of heat pumps / PV / batteries?	The tool uses the projection figures used in the 6th Carbon Budget and the Future Energy Scenarios which factor in the potential changes in the carbon abatement cost over time. The analysis done to create these cost models behind the tool were completed at a certain point in time and gives the best possible assumptions based on the data projections available. The assumptions used in the cost models would require updating as time passes in order to ensure accuracy.
Does the tool factor in electricity carbon intensity factor increases?	The analysis done to create the cost models behind the tool were completed at a certain point in time and gives the best possible assumptions based on the data projections available. It was completed just prior to the latest govt statistics release so this would need to be dealt with in updated versions of the calculator.
Which year's data should we use for baseline? Do we enter our baseline footprint, or most recent year?	You can add whichever base year you choose. If you have a historic baseline year, there is the option to add what percentage reductions you've already made for each SCEF category. If you haven't got one, then your most recent year can be used.
We have already implemented part of our decarbonisation plan. Is there a way by which the tool will allow us to factor this in when calculating the remaining cost and emissions reductions required?	Yes. The overall cost can be reduced by the percentage of your reduction programme already implemented and the cost related to that. Column F on the High Level tab allows you to add a % of Programme implemented. This will reduce the cost and emissions figure by the percentage selected.
Can you clarify how the "Programme implemented %" function works?	For those who have already started their decarbonisation plan, this function allows the user to reduce the emissions by the amount already reduced for any of the emissions categories by the Percentage (%) of the programme implemented since the baseline year.
Has there been any thought to linking scope 1&2 measure costs to DEC scores?	This was discussed within the original planning. There is a sufficient lack of reliability of DEC scores for them to not introduce too much uncertainty to the modelling. (if you wish to

	read more about this see this report - https://www.cibse.org/knowledge-research/knowledge-portal/cibse-review-of-energy-benchmarks-for-display-energy-certificates).
What are the assumptions behind your cost per tonne for decarbonising supply chains? Are there different expected costs for different product categories, and if so what's the logic behind these?	The underlying assumptions used emissions projections from the Future Energy Scenarios published by National Grid and the 6th Carbon Budget published by the Committee on Climate Change. Both of these sources have been used for an extensive list of carbon reduction measures. Where it has not been possible to identify a cost and benefit figure, Energise has prepared a 'business case' (using the RETScreen Energy Management software) and accordingly modelled the figures required for investment. The cost per tonne of investment is based on the median payback related to a specific decarbonisation area. The cost per tonne for decarbonisation of supply chain has been reached by calculating the cost of carbon of the Supply Chain categories set out by the EAUC's Standardised Carbon Emissions Framework (SCEF). Within each of these categories, we calculated the abatement costs (£/tCO2e) for the actions required to decarbonise these categories. An overview of the categories, and the decarbonisation actions within the categories identified, can be seen below: • Transportation of goods to the institution ▪ Energy efficiency ▪ Fuel switching • Capital goods ▪ Zero carbon regulated and unregulated buildings • Procurement & Supply Chain & Water ▪ Circularity/recycling ▪ Material and process efficiency ▪ Renewable power in the supply chain

	▪ Renewable heat in the supply chain ▪ Process design/re-engineering ▪ Nature based solutions ▪ Fuel switching ▪ Carbon capture • Waste ▪ Waste and Water Reduction
Is Energise engaged on an ongoing basis to keep improving the tool? With the data sources used (eg. average costs), will these be updated over the years? Or is this tool only created once without further revisions?	Energise will keep the calculator updated to ensure accuracy. Whenever any of the data sources used are updated and released, Energise will also release an updated version of the calculator.
For procurement costs, does the tool assume that the cost of goods will increase due to the cost of reducing carbon footprints of products / services?	The procurement costs projections are based on the projections that include underlying assumptions about inflation, but it should be noted those will be based on inflation targets which in recent years have been overshot. Over the fullness of the projected period, that could have an impact but there is no secondary dataset over that timeframe to use. The Office of Budget Responsibility only provides an inflation projection for the next 5 years. We will review opportunities to handle this risk in future updates to the tool given inflationary pressures.
Does the cost calculated by the tool incorporate adaptation costs, or just mitigation? If not, does AUDE currently have a rule of thumb/rough working which might be used to work backwards from a mitigation cost to reach a ball-park figure for adaptation costs? i.e. "for every £1 spent on mitigation, average HE estates will spend £x on adaptation"	We will review this alongside other future upgrades to a) identify if there is sufficient research basis for such a rule of thumb and b) how the tool could present/include this, but at present the tool is for mitigation costs only.
Are the costs which are described in the tool the marginal additional costs only related to decarbonisation, in addition to the BAU costs of running and maintaining an estate?	It is important to note that the costs given in the investment tabs of the calculator relate to additional expenditure associated with reaching Net Zero. For example, if the solution would be something typically done as a marginal improvement on top of existing expenditure, the investment figure provided would only show the marginal improvement cost, not the whole expenditure. If you would typically retrofit as a solution to reaching Net Zero, the investment

	cost provided will be the whole cost for this solution
What are your assumptions for the level of activity/decarbonisation/maintenance etc which would go on in a BAU scenario?	The assumptions for the level of decarbonisation undertaken in a BAU scenario incorporates the expected emissions if an institution took no additional action to decarbonise other than the minimum level of action required (e.g. due to legislation or market forces); despite the ongoing decarbonisation of UK electricity grid.
Are the costs described for decarbonising each line item capital or revenue or a mixture of both?	They are a mixture of both. We will review in future updates if there are any clear ways of showing or allowing allocation of capital/revenue. It is worth noting that this may vary from institution to institution based on the procurement approach to certain categories of activity. This is why at present it is presented as a mixture.
Can you disclose the methodology and / or conversion factors you are using for decarbonising each emissions source, and a description of what activities this is expected to cover (and any exclusions)?	The methodology used in this project is outlined on Page 5 of the Cost of Net Zero Report. The underlying assumptions used emissions projections from the Future Energy Scenarios published by National Grid and the 6th Carbon Budget published by the Committee on Climate Change. Further info on the assumptions made in the 6th Carbon Budget can be found here: https://www.theccc.org.uk/publication/sixth-carbon-budget/#key-recommendations Further info on The Future Energy Scenarios can be found here: https://www.nationalgrideso.com/future-energy/future-energy-scenarios We will review providing greater visibility of how different carbon factors are applied within the presentation of the workbook so that technical users can review in future updates.
Is there a graph showing the capital investment and the impact on revenue budget year on year?	The 'Investment Graph' tab shows the level of Direct and Indirect investment required year on year for the scenario selected. The 'Programme Phasing' tab shows the breakdown of those costs by category.

How is inflation captured in the calculator?	Inflation is built into the underlying datasets used in the modelling (National data sets outlined in respect of 6th carbon budget, or our modelling where we have derived the numbers). This is at national inflation target. We are reviewing the ability to allow institutions to adjust the inflationary data used in future versions given the discrepancy between inflation targets and actuals at present. We cannot build in a long term forecast of inflation beyond 5 years (as the only publicly available one of that standard is from the Office of Budget Responsibility), and as the tool needs to project to 2050, we've approached it this way at this time.
How should we treat emissions categories which have multiple decarbonisation models? e.g. Student accommodation is using the construction model but this isn't relevant for me and instead should be electricity decarbonisation and removal of gas. Same for any travel - should I model the surface and aviation emissions separately?	This is possible by using the 'Bespoke' function on the 'Net Zero Target Year' tab. You can input whatever decarbonisation percentages that you would like, and can also utilise the percentages used in other models, e.g. copy the reduction percentages for the 'Electricity Decarbonisation' and 'Removal of Gas' models and input these for the Student Accommodation emissions line / category.
(How) does this calculator decide whether or not further investment in decarbonising emissions is the right path, or if that is no longer economic and it's better to offset? What is the balance between internal action and offsetting, and how does that translate through into the actual formulae in the spreadsheet?	We have developed the model on the basis of assuming that offsetting is a residual action, and that the approach should be to decarbonise as much as possible. In addition to provide this analysis we would have to provide a judgement on where the final price of carbon offsets would be in each year for what will in due course be considered "acceptable" offsets. We felt this distracted from the purpose of the tool which is to support decarbonisation budgeting. If an individual organisation finds that when it is delivering its programme that it has no further returns and offsetting is the next step, then that is for that individual institution to decide. The primary purpose of the tool is to support strategic evaluation of the overall programme

	costs so we have not included extensive detail on offsetting.
Is there an option to set a start date, so if we delayed implementing the programme for an area by say 2 years, what would be the impact on the overall cost?	A delayed start date can be utilised by selecting the 'Bespoke' option on the 'Net Zero Target Year' tab and inputting the reduction percentages from the year that you would like to start from (prior to this 0% reduction can be used). The existing decarbonisation pathway reduction percentages can be reviewed and used as a reference point when deciding on the reduction percentages going forwards after the delayed start date, and amended to achieve the selected Net Zero Target Year.
What are the reasons for excluding Investments in the methodology, as we include them in our Scope 3 footprint?	From the start of this project, it was decided that **Investments**, **Sold Products**, **Leased Buildings & Vehicles (downstream)**, and **Franchises** would not be included in the scope due to significant variances observed from university to university. This made it difficult to accurately calculate a typical cost per carbon for these categories, including Investments.
Can you explain how a set of selected reduction options (from the long list) can be included in the model to understand their potential impact?	The long list of reduction measures have been included as part of the calculator to help to inform the decision makers at your institution on the kind of decarbonisation actions required to achieve the Net Zero Target set by your institution, whether short term, mid-term and long term, and the level of payback for those measures. They are not intended to be included in the model itself.
Can you enter an investment budget value per annum to calculate when decarbonisation would be achievable by, based on that level of that annual investment?	Currently, the calculator allows you to see the level of investment required per annum on the 'Programme Phasing' and 'Investment Graph' tabs, once you have input your emissions and selected the Net Zero Target Year for your institution overall or by category. You can play around with the 'Net Zero Target Year' function to see how much investment is required per annum for your institution and thereby select the most feasible target year based on the expected level of annual investment envisaged for your institution.
I have had interest from colleagues in other public bodies about using this tool to justify expanding teams (such as procurement / projects /	In theory, this tool could be used by other public bodies, but it would be advised to discuss with Energise further to discuss the intended

sustainability). Could it be used by councils/NHS trusts/etc.?	application of this calculator on a case-by-case approach.
Would there be any interest to run another Q&A session?	Yes, further Q&A sessions are planned. Details to be shared soon.

THANK YOU FOR BEING A ZERO HERO.

Keep up the good work!


Energise