Carbon Designer for Ireland Full Guidance
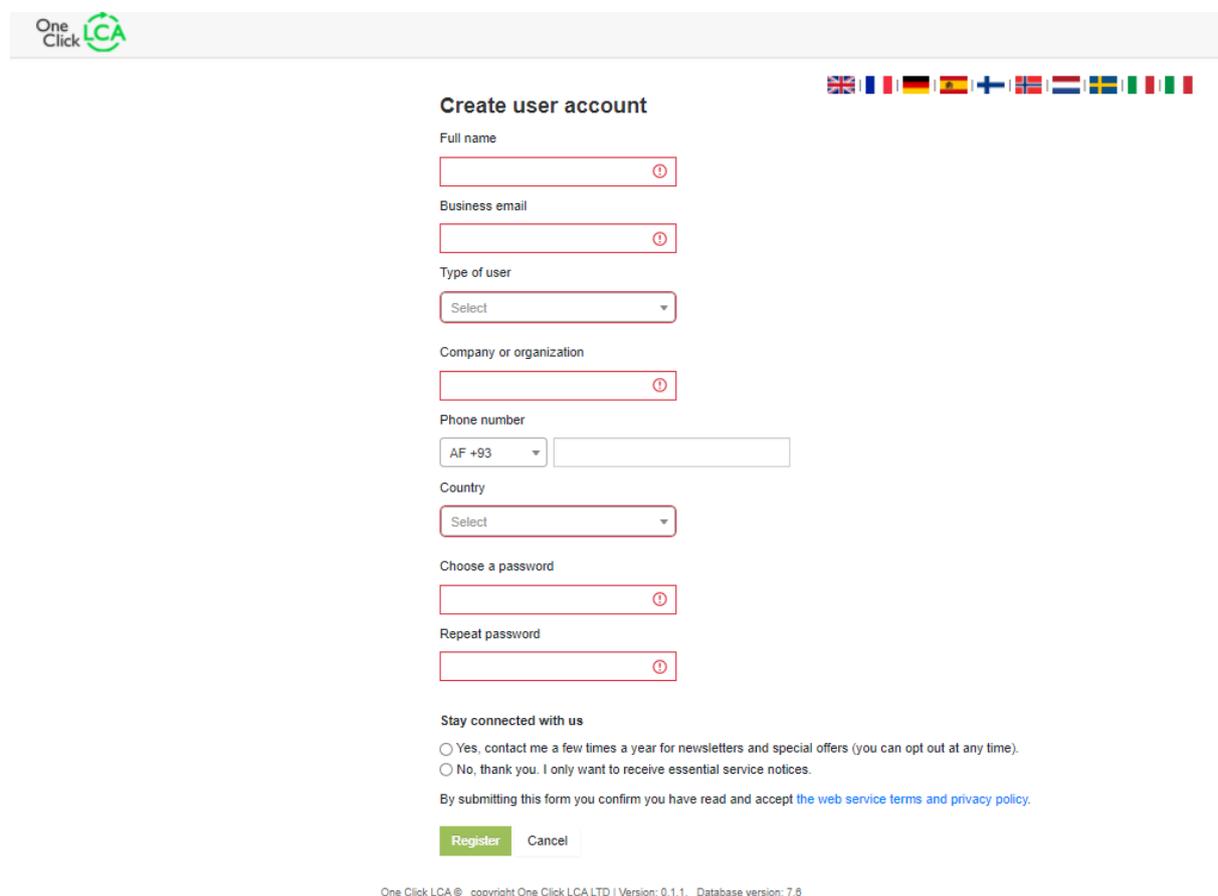
(Based on https://oneclicklca.zendesk.com/hc/en-us/articles/360014985940)

The Carbon Designer tool allows very quick baseline building creation with minimal knowledge about the project and shows the impacts of different optioneering choices quickly and clearly. You can make variants by changing between pre-defined building structures or adjusting individual material choices.

As only very limited background information is needed to start, the tool can be used in early design stages and target setting. The modelled building can also be saved to any of OneClickLCA's more advanced LCA calculation tools.

The first step is to create an account at OneClickLCA.

Go to www.oneclicklca.com/carbon-designer-tool-ireland/, scroll down and follow the link at Step 1 to register:
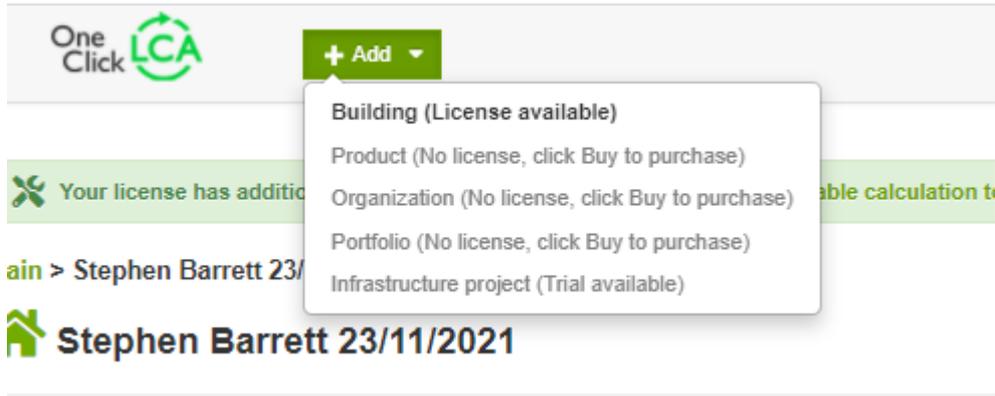

Once you have signed up to OneClick and verified your email, create a project by clicking on Add > Building:

Link the project to your Carbon Designer License by clicking the dropdown, and name your project whatever you wish:

Click 'Next' and add the optional information if you wish. It is not necessary at this stage.

Click Next

You now have a project where you can save multiple design experiments. To create a baseline design model, choose a Building type from the dropdown menu on the left:

Carbon Designer: Create baseline

Create Baseline

This tool allows creating and optimizing the constructions and materials used in a construction project. It can be used for a new construction project or a renovation project.

Project materials scope

Building parameters

- ☑ Foundations and substructure
- ☑ Ground Slab
- ☑ Structure
- ☑ Enclosure
- ☑ Finishes
- ☐ Services
- ☐ Default values

Building type, size and number of floors

Irish reference building 2021

Building type

Office buildings

One-dwelling buildings

Apartment buildings

Hotels and similar buildings

Office buildings

Hospitals and healthcare centers

Social welfare buildings

Educational buildings

Industrial production buildings

Cultural buildings

Building dimensions

+ Import areas from Excel

One Click LCA ® copyright One Click LCA LTD | Version: 0.1.1, Database version: 7.6

Input the total floor area, the number of floors above ground and the calculation period in the red boxes. We recommend a period of 50 years in line with the EU Level(s) documents on building LCA.

You can leave the other boxes empty to adjust later.

Main > CarbonDesigner Demo > My Design > Carbon Designer: Create baseline

Carbon Designer: Create baseline

Create Baseline

This tool allows creating and optimizing the constructions and materials used in a construction project. It can be used for a new construction project or a renovation project.

Project materials scope

Building parameters

- ☑ Foundations and substructure
- ☑ Ground Slab
- ☑ Structure
- ☑ Enclosure
- ☑ Finishes
- ☐ Services
- ☐ Default values

Building type, size and number of floors

Irish reference building 2021 ▾

Building type

Office buildings ▾

Total gross floor area (GFA) ❓ [   ] m²

Number of above ground floors [   ]

Calculation period ❓ [   ] years

+ More options

Scenarios

Baseline scenario

Not applied ▾

Comparison scenario

Not applied ▾

Cancel   Calculate areas   Create Baseline

Building dimensions

+ Import areas from Excel ❓

One Click LCA ® copyright One Click LCA LTD | Version: 0.1.1, Database version: 7.6

Click **Calculate areas** in the bottom left corner.

The tool will estimate the dimensions of the building based on your floor area and number of floors and its own assumptions, and offer figures for you to adjust if you wish. Place your mouse on each question mark ❷ to read the explanation of each calculation. You can make adjustments, for example floor heights can be adjusted under 'Building Dimensions' and the window to wall ratio can be adjusted under 'Enclosure':

> If this is your first time using the tool, this is a good point to stop and take a closer look at all the assumptions. This way you will have a better understanding of the results later, you can begin to relate the assumptions to your design, and you can adjust them now or in future to better reflect your plans.

When you are happy the assumptions relate to your early design thoughts, click **Create Baseline**.

Your initial result will look like this:

Carbon Designer: Project carbon breakdown

Baseline CO₂e **412 kg/m² GFA** Optimized CO₂e **- kg/m² GFA** Carbon change **-% / - tonnes CO₂e** Assumptions   Select groupings▾
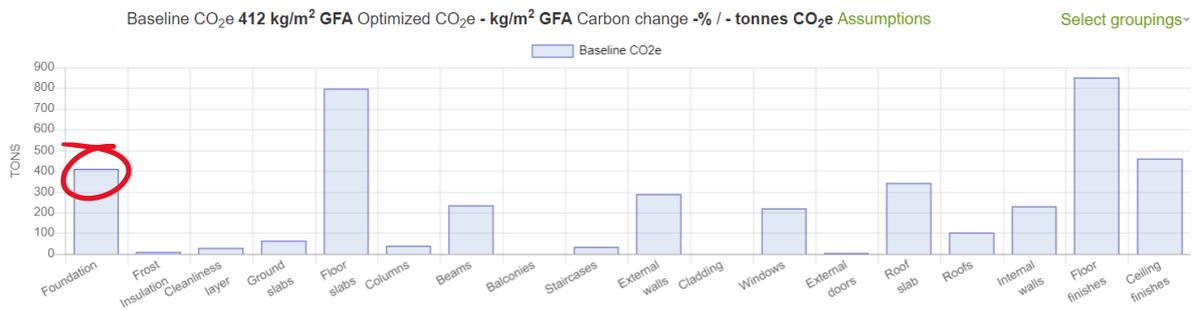
The tool has broken down the model into its main elements and allocated a carbon score to each element based on the calculated volume and assumed materials. Beneath the bar chart you will see a list containing the same elements in the same order, starting with Foundation, Frost Insulation etc.

Apply scenario: Make a choice to change ▾ ●

BUILDING ELEMENTS AND MATERIALS	Amount	Tons CO₂e	Carbon Share
+ Foundation	10000 m²	411 tn	10.0%
+ Frost Insulation	280 m	8.2 tn	0.2%
+ Cleanliness layer	2000 m²	29 tn	0.71%
+ Ground slabs	2000 m²	63 tn	1.5%
+ Floor slabs	8000 m²	799 tn	19%

Choose types of constructions you wish to use, and adjust the materials used in them as desired. You can also save the adjusted data to a design.

As you can see above – the 411 tn CO2e in the foundation is the same as in the bar chart. You can edit this list in three ways and the results will show in the bar charts.

1 – Scenarios: Edit the list by selecting a scenario from the dropdown at the top of the list;

Apply scenario: Make a choice to change ▾ ●

This will apply a scenario to all elements at the same time. Below you can see how selecting the Wood scenario compares to the default. The bar chart elements in green show an improvement from the default, and the figures at the top show the overall improvement;
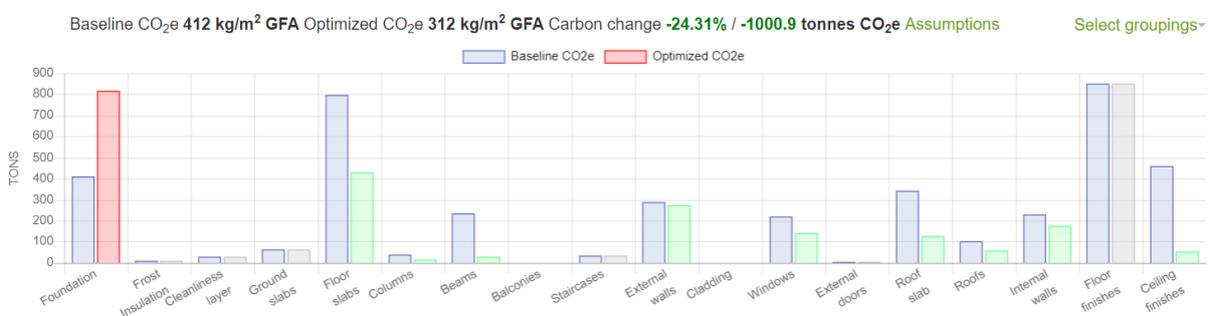
Baseline CO$_2$e **412 kg/m^2 GFA** Optimized CO$_2$e **271 kg/m^2 GFA** Carbon change **-34.19%** / **-1407.83 tonnes CO$_2$e** Assumptions   Select groupings⌄

Apply scenario: Wood

2 – Build-up types: Click on the '+' beside an element. This will show a list of all the possible build ups for that element. Notice that one of them will have '100%' in the third column. This means 100% of the element is allocated to that build-up type.

— Foundation	10000 m^2	Share 100%	411 tn	15%	Carbon intensity	Comment	
Strip footing foundation assembly with solid masonry wall ?	10000 m^2	100	411 tn	100%	41 kg		Edit
Raft foundation assembly ?	0 m^2	0	0 tn	0%	0 kg		View
Passive raft foundation assembly, incl. insulation, Please set share to 0 for the following constructions when this is used: Frost insulation, Strip	0 m^2	0	0 tn	0%	0 kg		View

You can edit this and spread your 100% across different build up types. In this example the share is divided across two types of foundation. Note the other columns automatically update to show the totals for each build-up type selected:

— Foundation	10000 m^2	Share 100%	818 tn	26%	Carbon intensity	Comment	
Strip footing foundation assembly with solid masonry wall ?	5000 m^2	50	205 tn	25%	41 kg		Edit
Raft foundation assembly ?	5000 m^2	50	612 tn	75%	122 kg		Edit
Passive raft foundation assembly, incl. insulation, Please set share to 0 for the following constructions when this is used: Frost insulation, Strip	0 m^2	0	0 tn	0%	0 kg		View

The bar charts have automatically updated to show the impact of your choice too:

Baseline CO$_2$e **412 kg/m^2 GFA** Optimized CO$_2$e **312 kg/m^2 GFA** Carbon change **-24.31%** / **-1000.9 tonnes CO$_2$e** Assumptions   Select groupings⌄

3 Build-up Components: To the right you will see a link that reads View or Edit. This link shows the detailed build-up of the element. If the line of data has a share in the % column this will read 'Edit', otherwise it will be 'View'. Click on this to make more detailed adjustment to the build-up.

	10000 m²	Share 100%	818 tn	26%	Carbon intensity	Comment	
— Foundation							
Strip footing foundation assembly with solid masonry wall ?	5000 m²	50	205 tn	25%	41 kg		Edit
Raft foundation assembly ?	5000 m²	50	612 tn	75%	122 kg		Edit
Passive raft foundation assembly, incl. insulation, Please set share to 0 for the following constructions when this is used: Frost insulation, Strip ... ?	0 m²	0	0 tn	0%	0 kg		View

Depending on the element, the choices will vary, but typically you can use it to experiment with different proportions of recycled content in cement or rebar, or try different insulation types in a wall cavity or roof build-up.

Strip footing foundation assembly with solid masonry wall
total CO_2e [*186 tn*]

Component	CO_2e	Material	Amount	Thickness mm	Comment
Concrete block	161 tn	Concrete block, masonry, B40, 200x500x200/250 ∨ ? ?	1000000 kg		
Ready-mix concrete	18 tn	Ready-mix concrete, generic (consultation), C30/3' ∨ ? ?	242013 kg		
Reinforcement	7.7 tn	Reinforcement steel (rebar), generic, 100% recycle ∨ ? ?	15750 kg		

Reinforcement steel (rebar), generic, 90% recycled content, A615
Reinforcement steel (rebar), generic, 0% recycled content (only virgin materials), A615
Reinforcement steel (rebar), generic, 60% recycled content, A615
Reinforcement steel (rebar), generic, 80% recycled content, A615
Reinforcement steel (rebar), generic, 97% recycled content (typical), A615
Reinforcement steel (rebar), generic, 100% recycled content, A615

Cancel   Update

Changes here will update the component's CO_2e on the same page, and update the overall figures and charts. Each element works exactly the same way as the above description.

The idea is to quickly understand which are the largest impact elements of your planned design, those with the highest bars in the chart. The example above is a five storey building, so unsurprisingly floor elements were most impactful. A one storey building of the same floor area would have a more impactful roof as there would be much more material required in that element. It will vary depending on your choices.

When you have identified the most impactful elements, you can then experiment with different (1) scenarios, (2) build-up types and (3) build-up components to see the impacts of different choices.

Once you have made all the changes you wish to see you can either set your new building type as the baseline, replacing the original baseline, or save the design to view more in depth results and generate a report.

At the bottom of the page, Click **Save design to query** to view results in more detail. You can ignore any warnings.

Your design is now saved in the project page created at the beginning, and an overall carbon figure displayed. Detailed results can be seen by clicking on the figure and selecting 'View results':

From here you can:

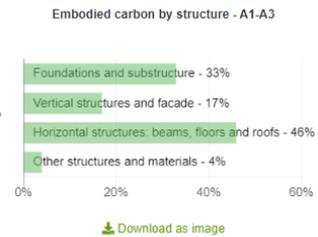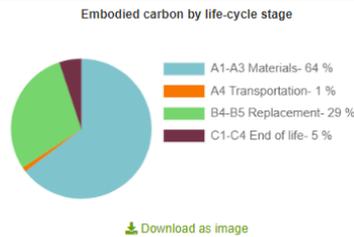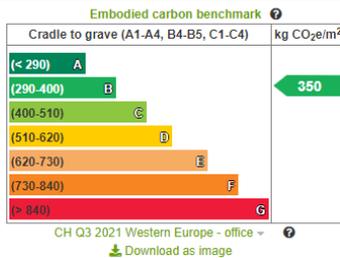- View detailed results by clicking on the carbon figure and selecting 'View results' from the dropdown;
- Edit the design by clicking on the carbon figure and selecting 'Carbon Designer Optimize design';
- Copy the design by clicking its name and selecting 'Copy' from the dropdown menu. You can now make further material changes and compare them to your original;
- Create a new design by clicking . The new design will be saved in the same project alongside the current design.

Viewing results

Results are displayed in a table and a selection of charts. The table at the top of the results page outlines the totals for each stage of the building's lifecycle and provides the total per square meter Gross Internal Floor Area (GIFA) at the bottom. You can dig into the details in the links on the right.

∨ Results

Building life-cycle carbon footprint for Level(s) in compliancy with EN 15978   Download Results Summary

Incomplete lifecycle according to Level(s) definitions (Draft Beta v1.0)

	Result category	Global warming kg CO_2e ⑦	Biogenic carbon storage kg CO_2e bio ⑦	
A1-A3 ⑦	Construction Materials	2 154 655	877 610	Details
➕ A4 ⑦	Transportation to site	43 065		Details
➕ A5 ⑦	Construction/installation process	160 641		Details
➕ B1 ⑦	Use Phase			Hide empty
➕ B3 ⑦	Repair	0		Details
➕ B4-B5 ⑦	Material replacement and refurbishment	569 143		Details
B6 ⑦	Energy use			Hide empty
B7 ⑦	Water use			Hide empty
➕ C1-C4 ⑦	End of life	169 585		Details
➕ D ⑦	External impacts (not included in totals)	-543 548		Details
	Total	**3 097 090**	**877 610**	
	Results per denominator			
	Per gross internal floor area m2 / year	7	2	
	Per gross internal floor area m2	326	92	

Create a report

You can create a report by selecting **More actions ▾** in the top left and choosing 'Generate Word report'. The numerical details of the current design are copied into a report template which also includes the methodology of the analysis and the supporting background data. Please note though, there are generic statemets in the report that will require the user to edit and amend in line with their own work. Charts can be downloaded from the results as PNG or JPG files and saved into the report to enhance appearance and understanding.