

Instructions for Section 45Q Calculator

Warning! This calculator provides a basic estimate of credits only.

It is not a substitute for a life cycle assessment by an experienced practitioner. Actual results may vary, and any indication of benefit is based solely on input with an assumption of accuracy.

Introduction

This calculator has been designed to generate a rough estimate of §45Q credit which may be obtained from CO₂ capture and reuse. While the data and structure are in line with the NETL CO₂U LCA Guidance Document as modified by the §45Q addendum, the tool was not designed to create the high quality models required for §45Q submission.

There are two tabs visible in the calculator. The first tab contains the instructions for basic use. The second tab is where the user enters their data and views the results.

Entering data (Second tab)

§45Q requires the applicant to assess the amount of carbon that never makes it to the atmosphere in the form of carbon oxide equivalents. The assessment is a life cycle assessment, so includes not only the captured CO₂, but also the CO₂ and other greenhouse gases that are emitted from producing, purifying, and compressing the CO₂, as well as the emissions from producing any feedstocks or chemicals used in those processes. This assessment is then compared with the average process used to produce CO₂ for the market and the credit is based on the difference.

The calculator is set up with the assumption that there are two processes to be assessed: the first produces commercial products and emits CO₂, which is captured for reuse. Alternatively, this process captures CO₂ from air. The second process purifies and compresses the CO₂. The inputs and outputs for the first process are entered in Column B of the second tab. The inputs to the second process are entered in Column E.

The first section of the spreadsheet is to be filled in with details of what is co-produced with the CO₂. In most cases, the CO₂ is not the main product of the process; in fact, it may simply have been emitted in the past. Enter the coproducts produced in the blue cells in Column A. Enter the quantity of each, along with the quantity of CO₂ captured, into the blue cells in Column B. Enter the percent of the CO₂ which is biogenic or derived from plant or animal life in cell D4.

Products and Co-Products	Quantity	Unit	% is Biogenic
CO2		Metric tons	
		Metric tons	
		Metric tons	
		Metric tons	
		Metric tons	

Figure 1: Enter the amount of CO₂ and other coproducts in the blue cells in this section.

If the process captures CO₂ from air, CO₂ may be the only product. Leave the rest of the section blank.*

In the next section, you will enter the material inputs into the production process. These are the feedstock(s), chemicals, and other materials required to produce the products entered above. Use the dropdown in Column A to select the feedstock or chemical that most closely resembles your process. The unit field will automatically populate. Enter the appropriate quantity in Column B, keeping in mind the units.*

Material Inputs (Select from Drop-Down)	Quantity	Unit
		unit
		unit
		unit
		unit
		unit
		unit

Figure 2: Use the drop down to select the feedstock(s), chemicals, and other material inputs to the main process.

Next, enter the energy used to produce the CO₂. Keep in mind that the impacts of this energy use will be shared between all coproducts, so only include energy associated with the other products. Use the dropdown in Column A to select the energy source which most closely resembles your source. The unit field will automatically populate. Enter the appropriate quantity in Column B, keeping in mind the units. The energy section is split into two areas, electricity and other energy. Both work the same way.*

The next section is for an estimate of the transport impacts. Consider the material inputs entered above and select the transport modes associated with them from the dropdown. Enter the approximate distance those materials travel, using the appropriate prefilled units. The tool will assume all materials travel the same distance, meaning this section is the least accurate within the tool.

If the CO₂ is transported before purification and compression, enter that here. Do not include transportation to the end user, as the impacts of that process are the responsibility of the user.*

Next consider the waste and emissions from the process. Waste can go to landfill or incineration. Use the dropdowns to select the appropriate waste destination and enter the quantity. If a certain amount of CO₂ is not captured, enter it here. Do not include this amount in cell B4. Be sure to include any methane (CH₄) which may be lost from the process.

Next, consider the purification and compression of the CO₂. Enter the electricity required for that purification in Columns E and F. Keep in mind that this amount is not shared between the coproduct listed above. Enter any wastes or emissions from the purification process below.

* If there are more inputs or outputs than available spaces do not add more as it will break the calculations. If you use a material, energy source, or mode which is not listed, use the closest from the list provided. EarthShift Global can customize the sheet for a moderate charge.

Results (second tab)

The results will show in cells L7:R12. Identify the cell which is appropriate for your situation. This is your approximate tax credit for tax year 2023. Note that the results assume that 40% of the CO₂ market is from biogenic sources and the remainder from ammonia production and this assumption is based on research and an assessment by EarthShift Global. This mix will change over time.