

Sphera[®] Managed LCA Content (MLC)

Land Use Change LCI Modelling & Assessment 2024



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Introduction

Emissions from land use change (LUC) in LCA have become an important issue. Therefore, we decided some years ago to introduce this feature in our managed LCA content datasets. We give you the opportunity to introduce or to omit emissions from LUC in your calculations – this is supported by respective variants of the LCIA methods delivered with all our databases.

How to model LUC and related emissions in LCA for Experts Software with MLC Databases

CO₂ emissions related to LUC are managed in a transparent way at each step of your LCA model, from process/plan to LCIA. In order to illustrate how LCA for Experts manages LUC and associated CO₂ emissions in this document, one example is shown in the next paragraphs.

The chosen example is the process: “Soybean at field border (13% H₂O content)” from the managed LCA content Extension database XII: Renewable materials, as depicted in [Figure 1](#). In the process, CO₂ emissions related to LUC will appear in the output table of your process as “Carbon dioxide (land use change) [Inorganic emissions to air]”.

BR: Soy bean at field border (13% H₂O content) ts [Cereals (except rice), leguminous crops, oil seeds] -- DB Process

Object Edit View Help

Name: BR Soy bean at field border (13% H₂O content) ts agg - LCI result

Parameter

Parameter	Formula	Value	Minimum	Maximum	Standard	Comment
Parameter						

Completeness: All relevant flows recorded

Inputs

Flow	Quantity	Amount	Unit	Tr	Standard	Origin	Comment
Agriculture [Occupation]	Areatime	1,95E-017	m ² *yr	0 %	(No statement)		
Air [Renewable resources]	Mass	0,495	kg	0 %	(Calculated)		
Anhydrite (Rock) [Non renewable resources]	Mass	8,96E-016	kg	0 %	Calculated		
Antimony [Non renewable elements]	Mass	1,96E-007	kg	0 %	(No statement)		
Arable [Occupation]	Areatime	3,17	m ² *yr	0 %	(No statement)		
Arable, irrigated, intensive [Occupation]	Areatime	6,14E-023	m ² *yr	0 %	(No statement)		
Arable, irrigated, intensive (regionalized)	Areatime	3,68	m ² *yr	0 %	(No statement)		
Arable, irrigated, intensive (regionalized)	Areatime	0,0182	m ² *yr	0 %	(No statement)		

Outputs

Flow	Quantity	Amount	Unit	Tr	Standard	Origin
Carbon dioxide (aviation) [Inorganic emissions to air]	Mass	1,69E-007	kg	0 %	Calculated	
Carbon dioxide (biotic) [Inorganic emissions to air]	Mass	0,00587	kg	0 %	Literature	
Carbon dioxide (land use change) [Inorganic emissions to air]	Mass	3,97	kg	0 %	Calculated	
Carbon dioxide (peat oxidation) [Inorganic emissions to air]	Mass	3,03E-010	kg	0 %	Calculated	
Carbon disulphide [Inorganic emissions to air]	Mass	7,96E-018	kg	0 %	Literature	
Carbon disulphide [Inorganic emissions to fresh water]	Mass	1,12E-012	kg	0 %	(No statement)	
Carbon monoxide [Inorganic emissions to air]	Mass	0,000374	kg	0 %	(Literature)	
Carbon, organically bound [Organic emissions to fresh water]	Mass	0,0554	kg	0 %	Literature	
Carbonate [Inorganic emissions to fresh water]	Mass	0,000103	kg	0 %	Literature	
Carbonate [Inorganic emissions to sea water]	Mass	1,63E-005	kg	0 %	Literature	

Figure 1: Input-Output table of Soybean at field border (13% H₂O content) in Brazil. The flow carbon dioxide (land use change) is highlighted.

In case you calculate the results of your process/plan (in this example only the process “BR: Soybean at field border (13% H₂O content)” is considered), you can obtain the results as presented in [Figure 2](#). To obtain the results you have to calculate them via right click on the process or the results calculation button in a plan.

1. Select the **Results** tab.
2. Click the checkbox to activate the **Quantity** view.
3. Double-click **Environmental quantities** to open the LCIA methodologies.
4. Select an impact assessment method. For example: Double-click CML 2001 – Jan. 2016.

Note: The approach is the same for any other GWP impact assessment method.

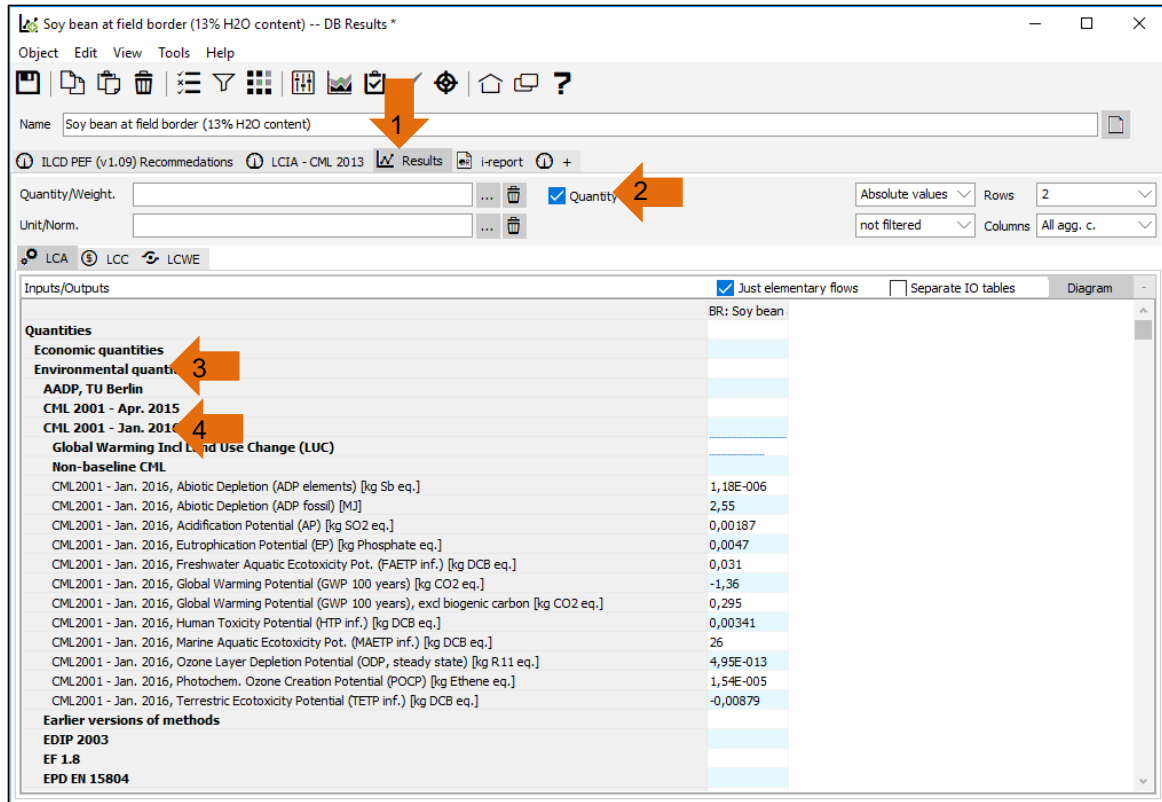


Figure 2: Results (quantity view) of Soybean at field border (13% H2O content) in Brazil

5. To obtain the focus on GWP, including emission from LUC, double-click **Global Warming Incl Land Use Change (LUC)**.

A table like the one shown in Figure 3 is presented with the details about several GWP emissions. CML 2001 – Jan. 2016 considers:

- Global Warming Potential (GWP 100), excl biog. C, incl LUC, no norm/weight [kg CO2-Equiv.];
- Global Warming Potential (GWP 100), incl biog. C, incl LUC, no norm/weight [kg CO2-Equiv.];
- Global Warming Potential (GWP 100), Land Use Change only, no norm/weight [kg CO2-Equiv.].

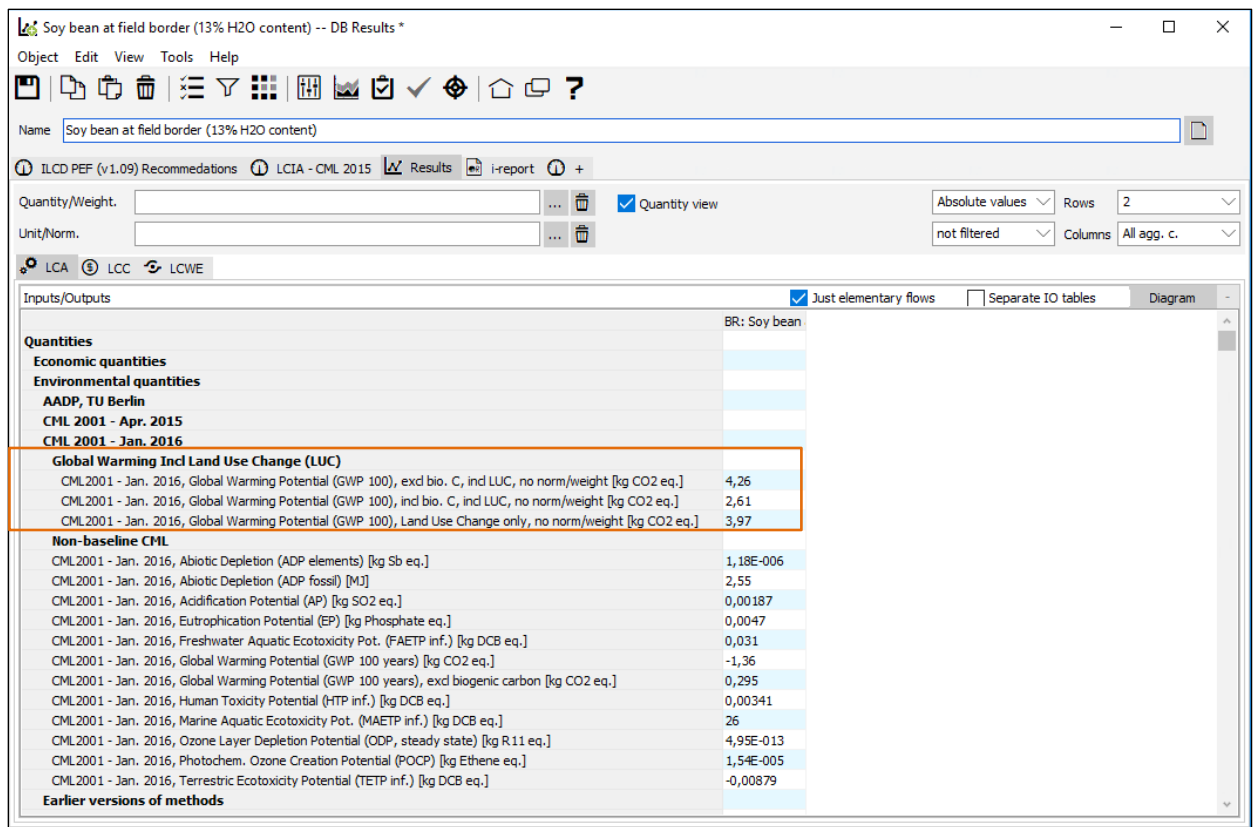


Figure 3: Results (quantity view) of Soybean at field border (13% H2O content) in Brazil, the impact assessment with LUC is highlighted.

Another Option to Assess GWP Including Land Use Chance

As a user, you can choose to create your own table and present GWP emissions linked to LUC as well as other impact assessment categories, or specific flows. In your results window, the following procedure must be completed (see Figure 4 for one selected example):

1. Select the **Results** tab.
2. Click **...** (**More**) after the Quantity/Weight field.
The Select Window is displayed.
3. In the Select window, scroll and choose the impact category you want to display.

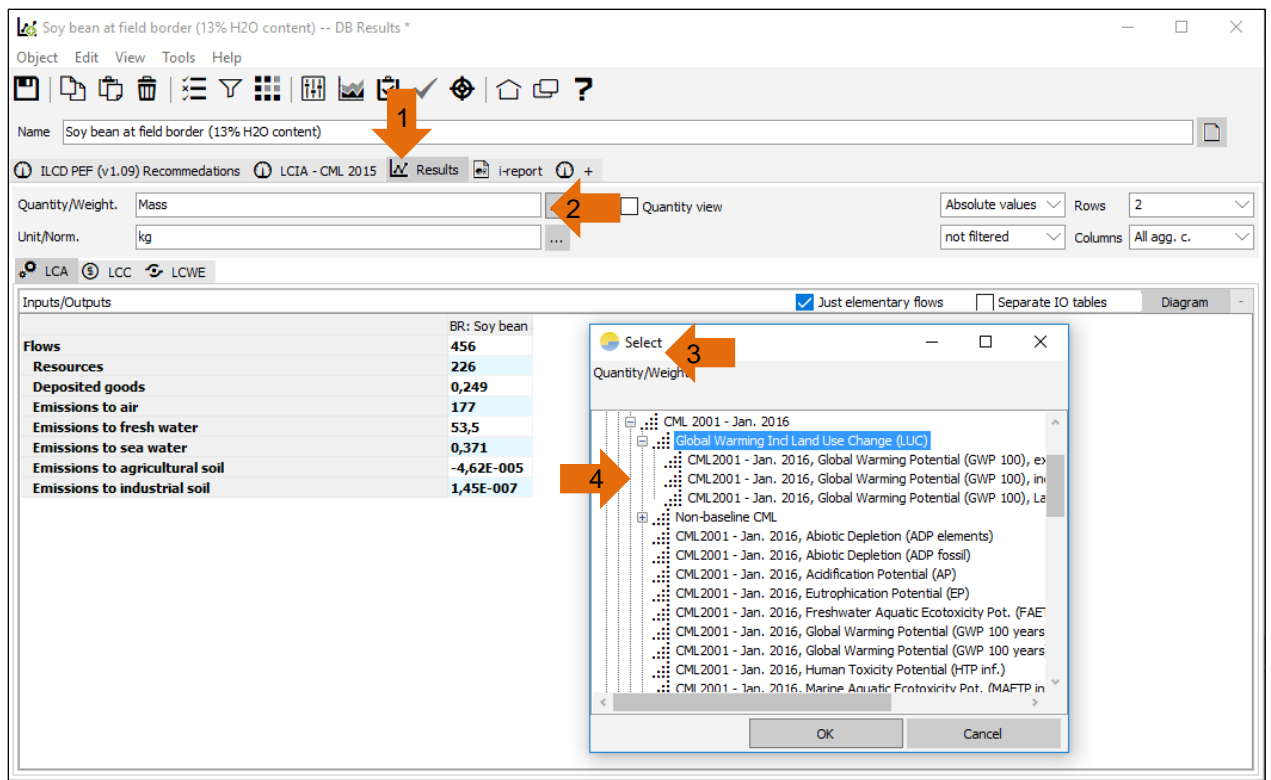


Figure 4: Results of Soybean at field border (13% H₂O content) in Brazil, the impact assessment with LUC is highlighted.

After following the procedure described in Figure 4, a table like the one presented in Figure 5 is displayed, which presents three GWP quantities, e.g. the *Global Warming Potential (GWP 100)*, *excl biog. C, incl LUC, no norm/weight*.

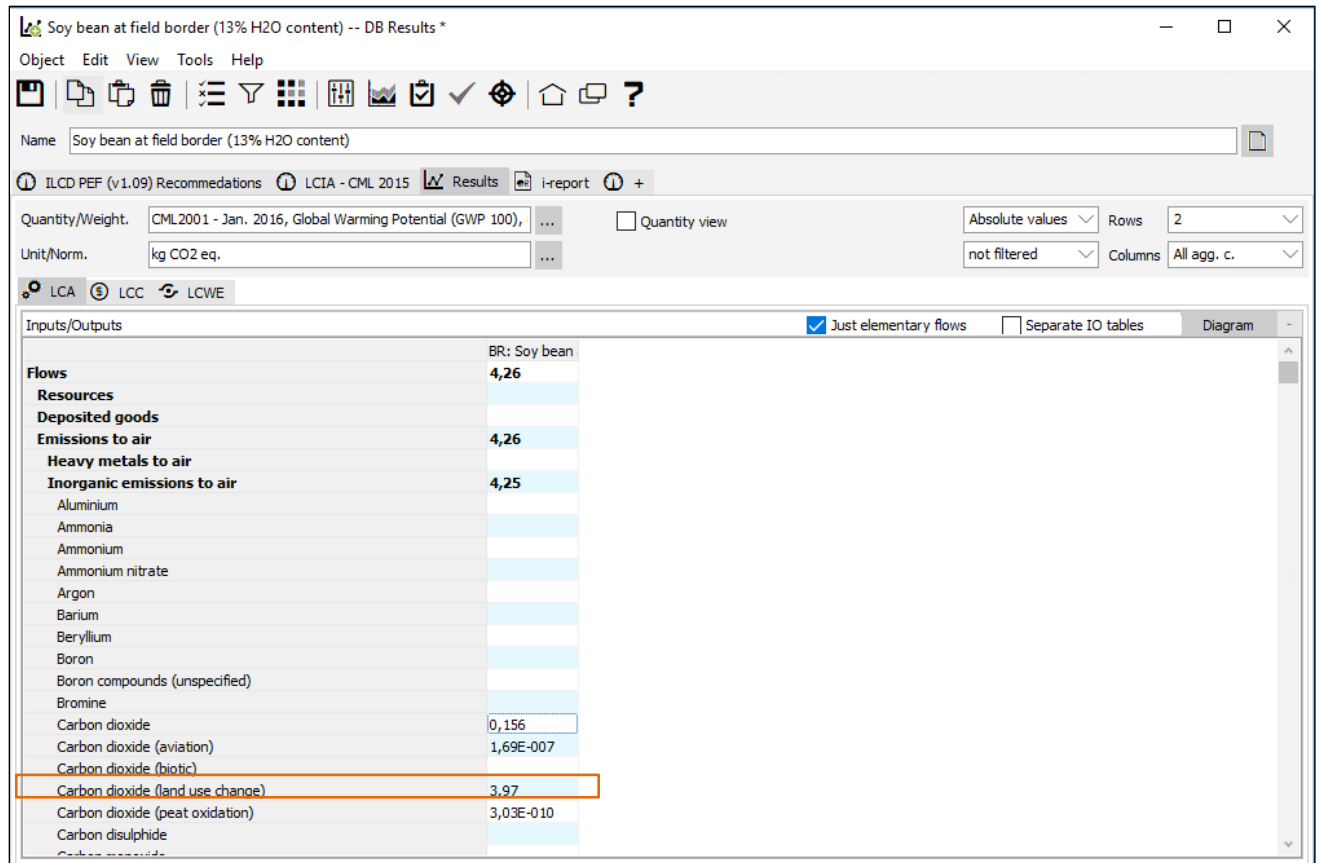


Figure 5: Results of Soybean at field border (13% H₂O content) in Brazil, the impact of emissions from LUC is highlighted.

Emissions from LUC and respective impact assessment can be displayed with other options as well, e.g., via the dashboard.