



Long Trail Sustainability Training

Modeling Recycling in LCA

Used in the Modeling Recycling in LCA Training Course

January 2021

Version 1.12

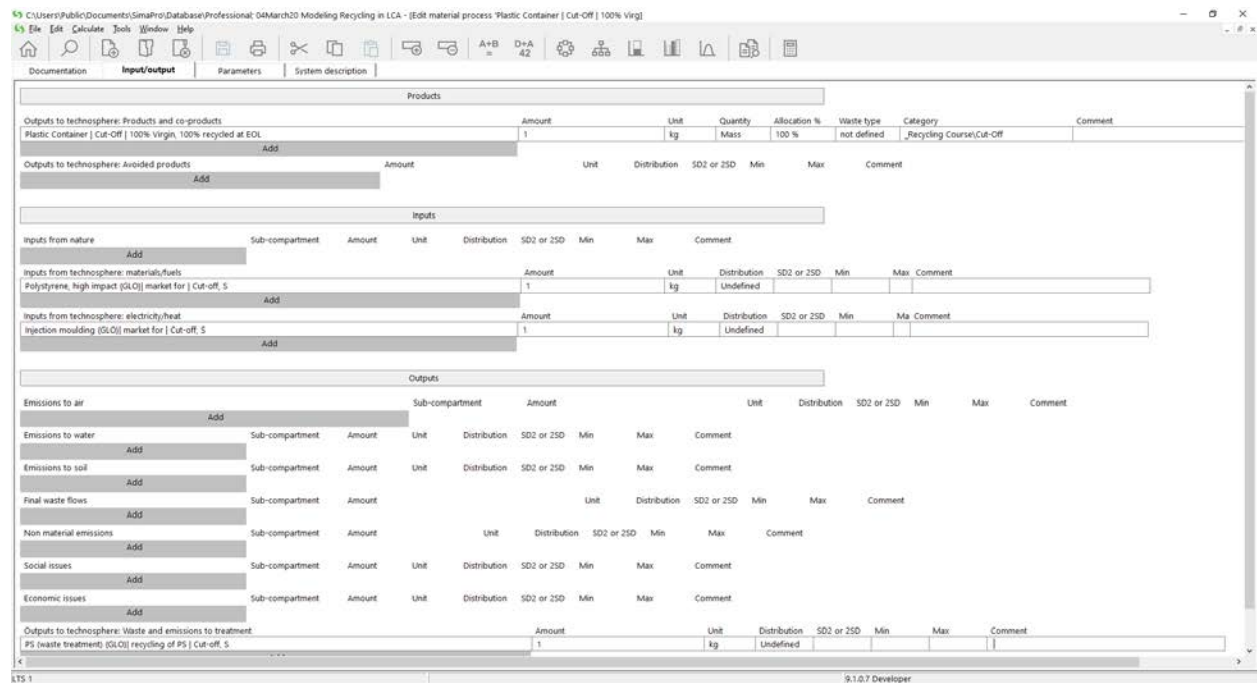
**This is a fictitious class example that should not be used to
derive any judgment**

Project Set-Up

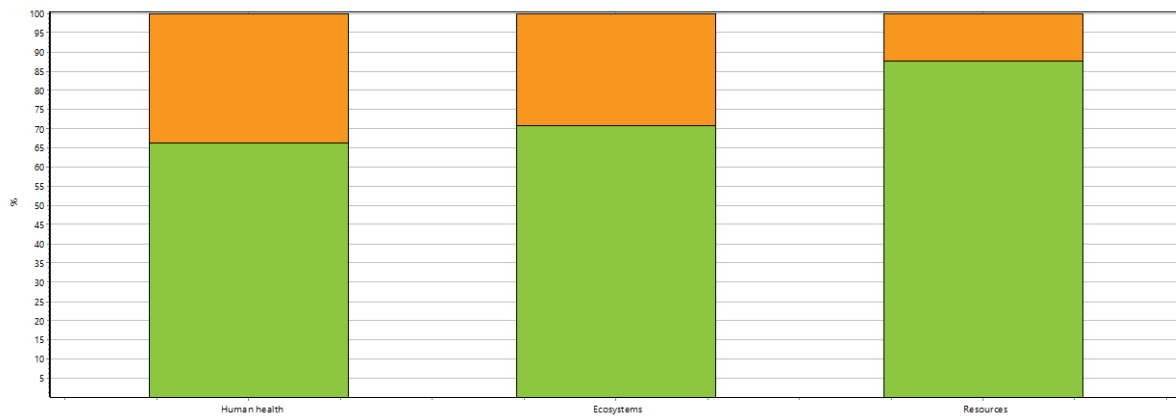
First create a new project in SimaPro. Then set the ReCiPe 2016 Endpoint (H) method as the default.

Exercise 1: Cut-Off | 100% Virgin, 100% recycled

1. Under *Goal and scope*, select the *Ecoinvent 3 – allocation, cut-off by classification – system and Method* libraries.
2. Go to category waste treatment > recycling > transformation
 - View *PS (waste treatment) {GLO}| recycling of PS | Cut-off, S*
3. Create new Material category “_Recycling Course”
4. Create new sub category “Cut-Off”
5. Create new material
 - Output (Product)
 1. Name: Plastic Container | Cut-Off | 100% Virgin, 100% recycled at EOL; Amount: 1 kg
 - Inputs:
 1. Polystyrene, high impact {GLO}| market for | Cut-off, S; 1 kg
 2. Injection moulding {GLO}| market for | Cut-off, S; 1 kg
 - Output (Waste)
 1. PS (waste treatment) {GLO}| recycling of PS | Cut-off, S; 1 kg; 100% recycled.



6. Analyze container.



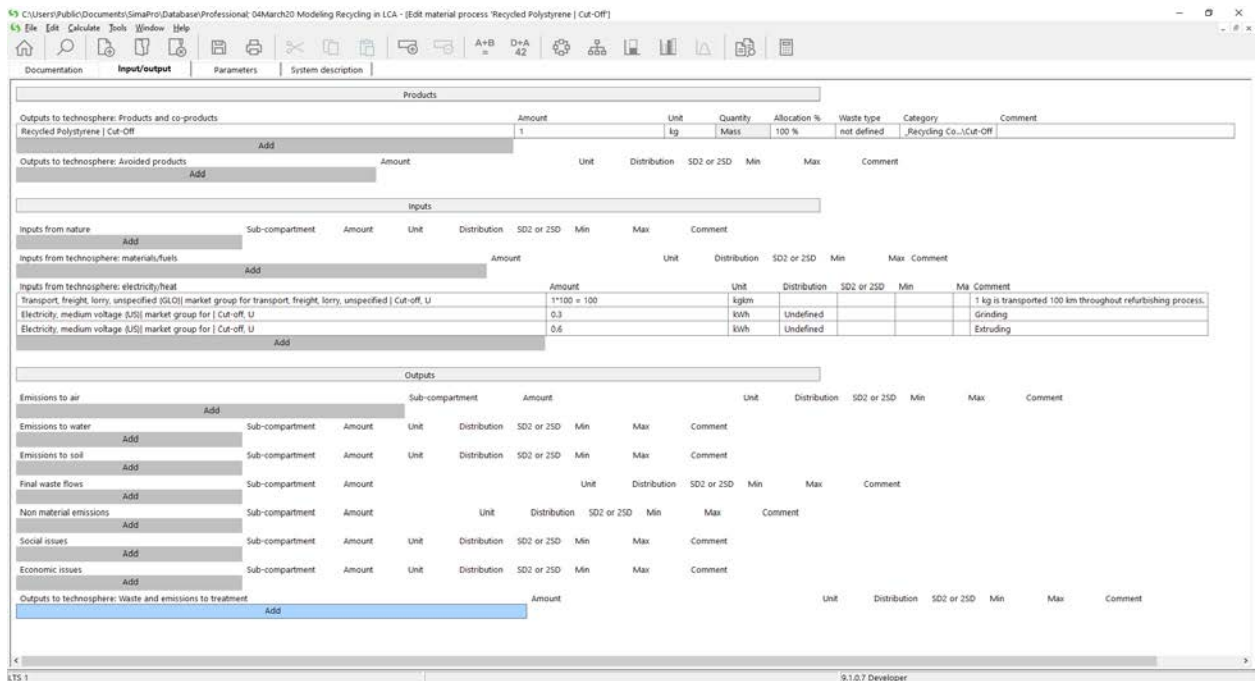
■ Plastic Container | Cut-Off | 100% Virgin, 100% recycled at EOL.
 ■ Polystyrene, high impact (GLO) market for | Cut-off: 5
 ■ Injection moulding (GLO) market for | Cut-off: 5
 ■ PS (waste treatment) (GLO) recycling of PS | Cut-off: 5

Method: ReCiPe 2016 Endpoint (H) V1.04 / World (2010) H/A / Damage assessment
 Analyzing 1 kg Plastic Container | Cut-Off | 100% Virgin, 100% recycled at EOL:

Exercise 2: Cut-Off | 50% recycled content, 100% landfilled

1. Create new material

- Output (Product)
 - Name: Recycled Polystyrene | Cut-Off; Amount: 1 kg; Waste type: PS.
- Inputs
 - Transport, freight, lorry, unspecified {GLO}| market group for transport, freight, lorry, unspecified | Cut-off, S; 100 kgkm; 1 kg is transported 100 km throughout refurbishing process.
 - Electricity, medium voltage {US}| market group for | Cut-off, S; 0.3 kWh; Electricity for grinding.
 - Electricity, medium voltage {US}| market group for | Cut-off, S; 0.6 kWh; Electricity for extruding.

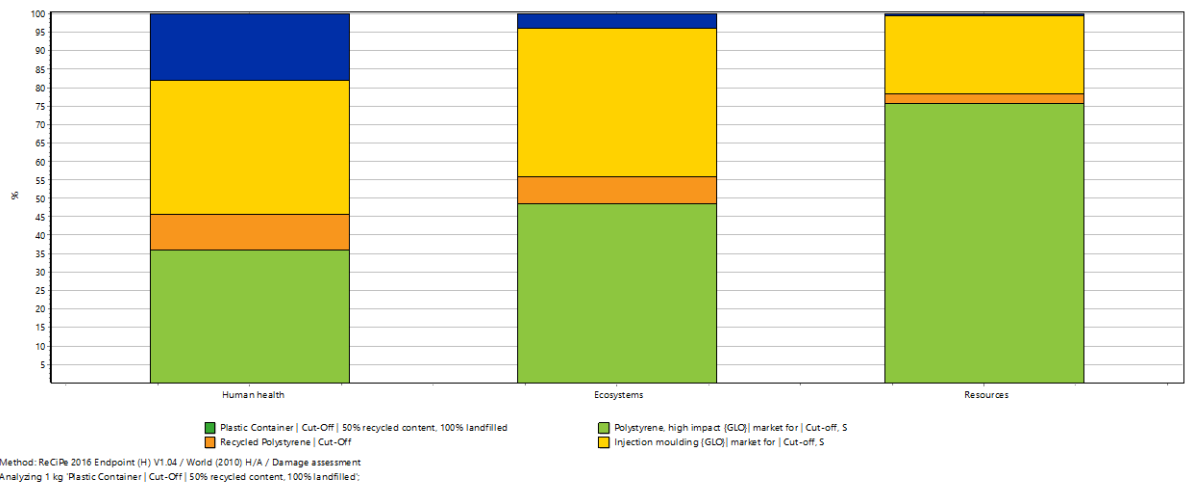


2. Create new material

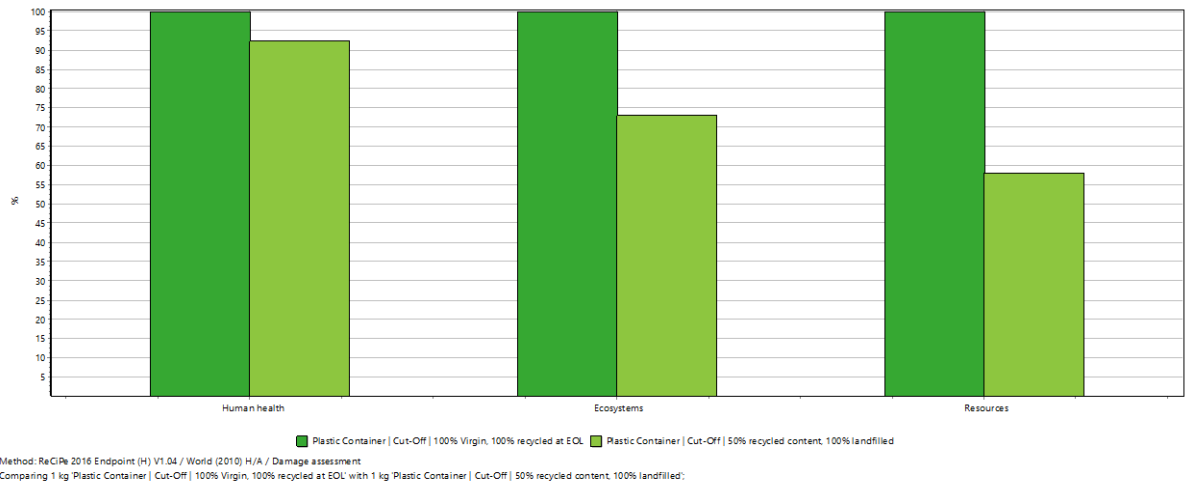
- Output (Product)
 - Name: Plastic Container | Cut-Off | 50% recycled content, 100% landfilled;
Waste type: PS; Amount: 1 kg
- Inputs
 - Polystyrene, high impact {GLO}| market for | Cut-off, S; 0.5 kg; Comment: 50% virgin content.
 - Recycled Polystyrene | Cut-Off; 0.5 kg; Comment: 50% recycled content.
 - Injection moulding {GLO}| market for | Cut-off, S; 1 kg
- Output (Waste)
 - Waste polystyrene {RoW}| treatment of, sanitary landfill | Cut-off, S; 1 kg;
Comment: 100% landfilled.

Section	Sub-compartment	Amount	Unit	Distribution	SD2 or 2SD	Min	Max	Comment	
Outputs to technosphere: Products and co-products	Plastic Container Cut-Off 50% recycled content, 100% landfilled	1	kg						
	Add								
Outputs to technosphere: Avoided products	Add								
	Add								
Inputs									
Inputs from nature									
Add									
Inputs from technosphere: materials/fuels									
Add									
Polystyrene, high impact {GLO} market for Cut-off, S									
		0.5	kg	Undefined					
Recycled Polystyrene Cut-Off									
		0.5	kg	Undefined					
Inputs from technosphere: electricity/heat									
Add									
Injection moulding {GLO} market for Cut-off, S									
		1	kg	Undefined					
Add									
Outputs									
Emissions to air									
Add									
Emissions to water									
Add									
Emissions to soil									
Add									
Final waste flows									
Add									
Non material emissions									
Add									
Social issues									
Add									
Economic issues									
Add									
Outputs to technosphere: waste and emissions to treatment									
Add									
Waste polystyrene {RoW} treatment of, sanitary landfill Cut-off, S									
		1	kg	Undefined					
Add									

3. Analyze

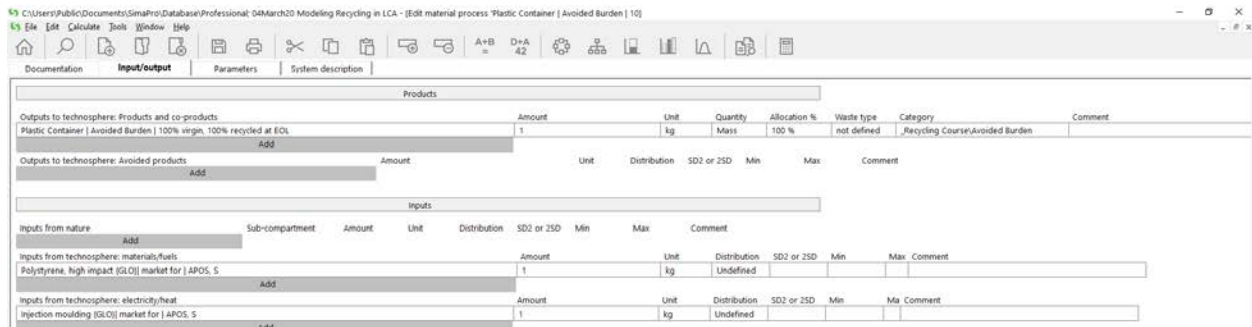


4. Compare to Plastic Container | Cut-Off | 100% virgin, 100% recycled vs. Plastic Container | Cut-Off | 50% recycled content, 100% landfilled



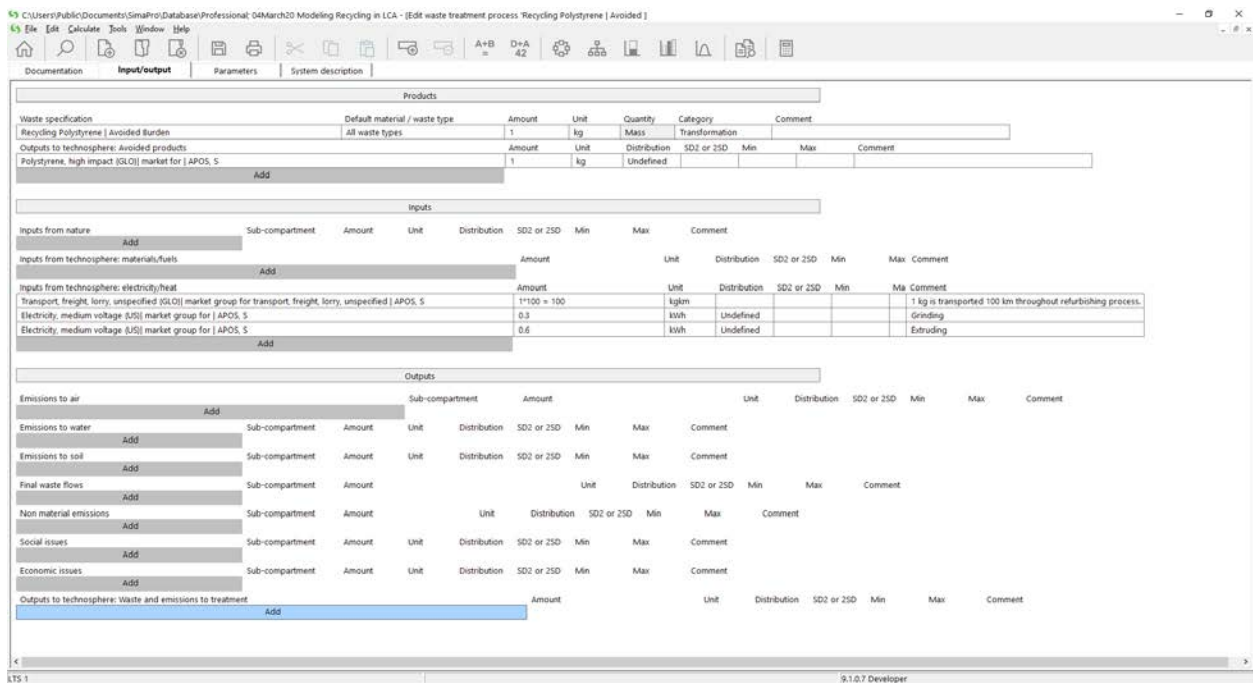
Exercise 3: Avoided Burden | 100% Virgin, 100% recycled

1. Under *Goal and scope*, deselect the *Ecoinvent 3 – allocation, cut-off by classification – system* library. Select the *Ecoinvent 3 –at the point of substitution– system*.
1. Create new material category “Avoided Burden” under “_Recycling Course.”
2. Create new material process
 - Output (Product)
 - Name: Plastic Container | Avoided Burden | 100% virgin, 100% recycled at EOL; 1 kg
 - Inputs
 - Polystyrene, high impact {GLO}| market for | APOS, S; 1 kg
 - Injection moulding {GLO}| market for | APOS, S; 1 kg



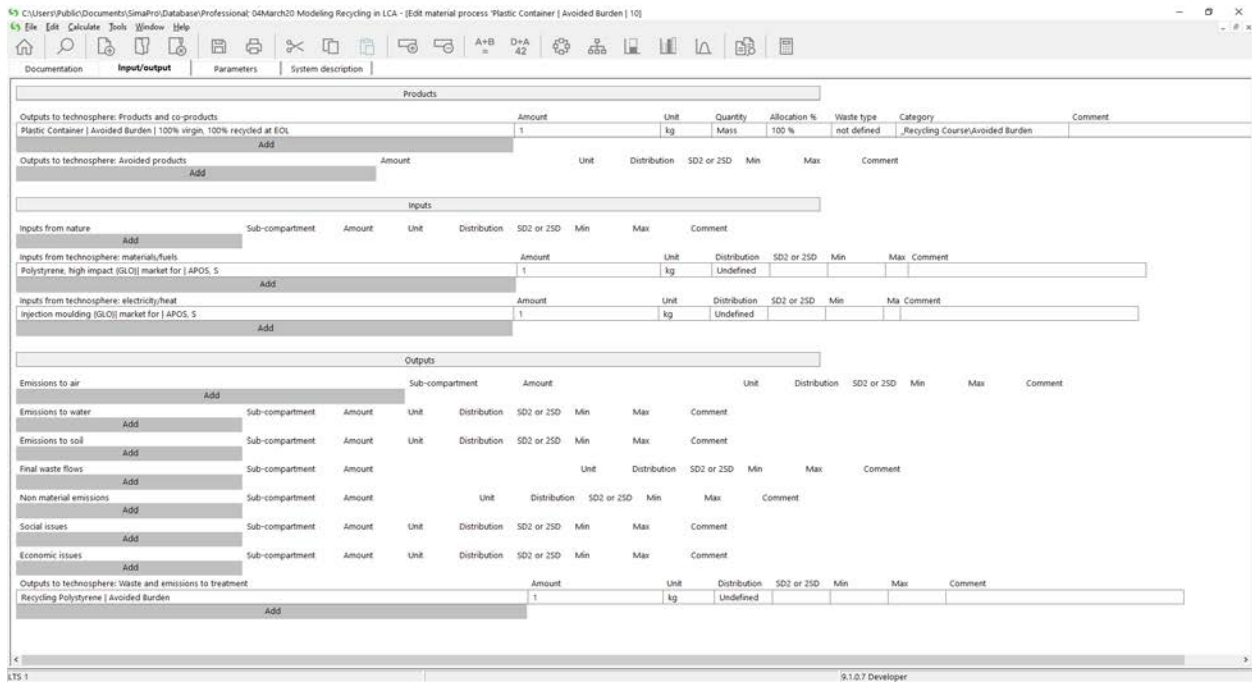
3. Save, then create new waste treatment

- Output (Product)
 - Name: Recycling Polystyrene | Avoided Burden; Amount: 1 kg
- Avoided Product
 - Polystyrene, high impact {GLO}| market for | APOS, S; 1 kg
- Inputs
 - Transport, freight, lorry, unspecified {GLO}| market group for transport, freight, lorry, unspecified | APOS, S; 100 kgkm; 1 kg is transported 100 km throughout refurbishing process.
 - Electricity, medium voltage {US}| market group for | APOS, S; 0.3 kWh; Electricity for grinding.
 - Electricity, medium voltage {US}| market group for | APOS, S; 0.6 kWh; Electricity for extruding.

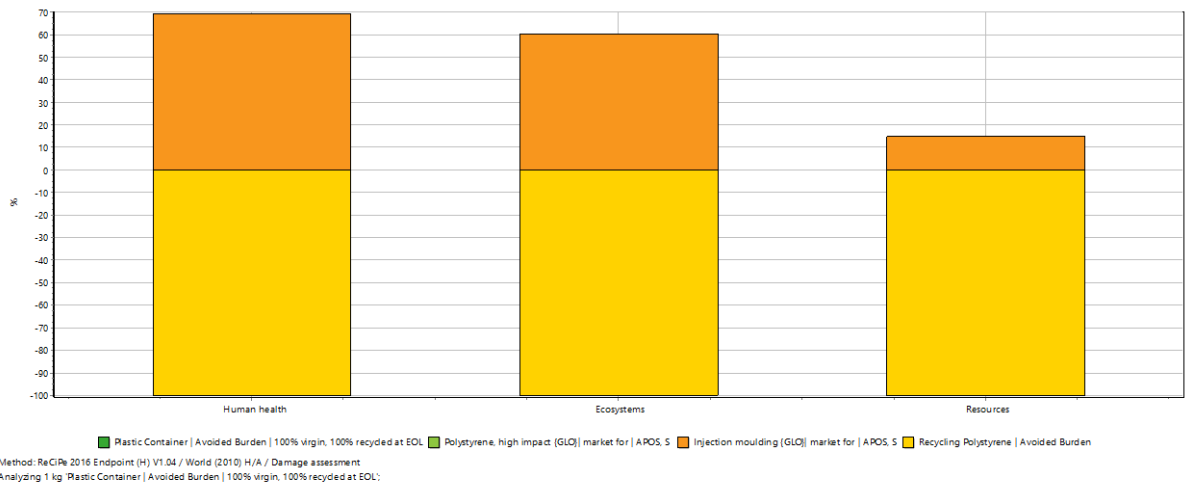


4. Go back to the Plastic Container | Avoided Burden | 100% virgin, 100% recycled process and add:

- Outputs (Waste)
 - Recycled Polystyrene | Avoided Burden; 1 kg



5. Analyze



Exercise 4: Avoided Burden | 50% recycled content, 100% landfilled

1. Create new material process

1. Output (Product)

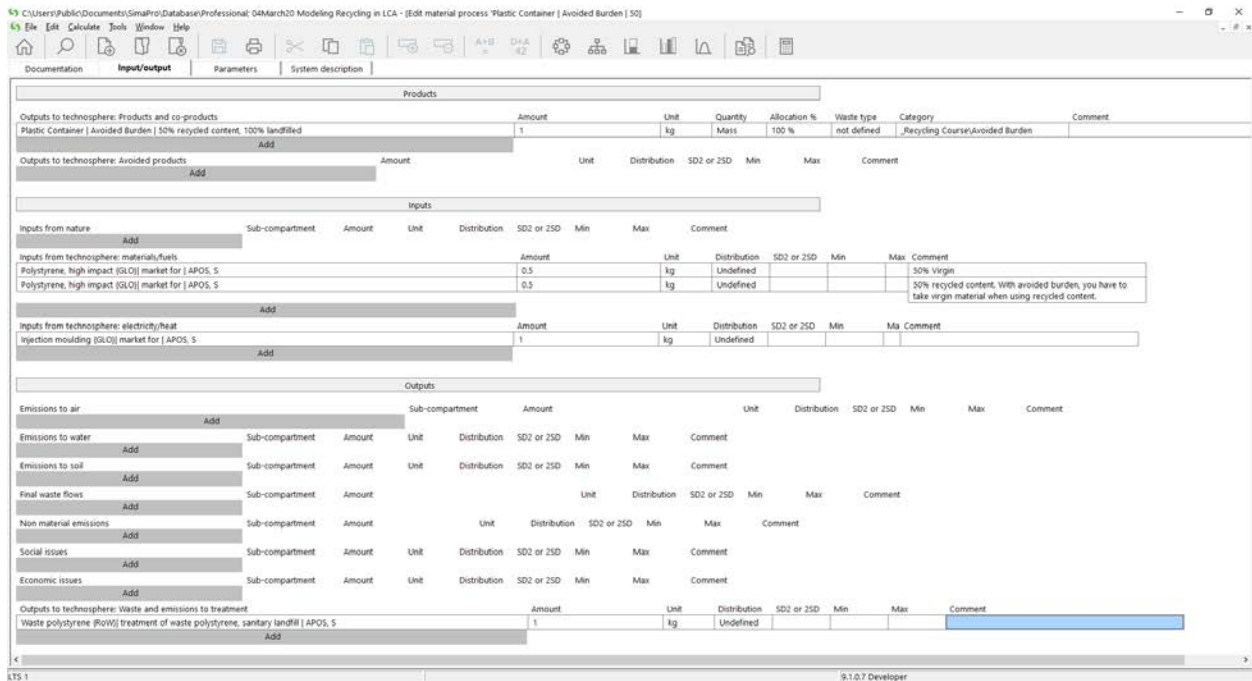
- 1. Plastic Container | Avoided Burden | 50% recycled content, 100% landfilled; 1 kg

2. Input

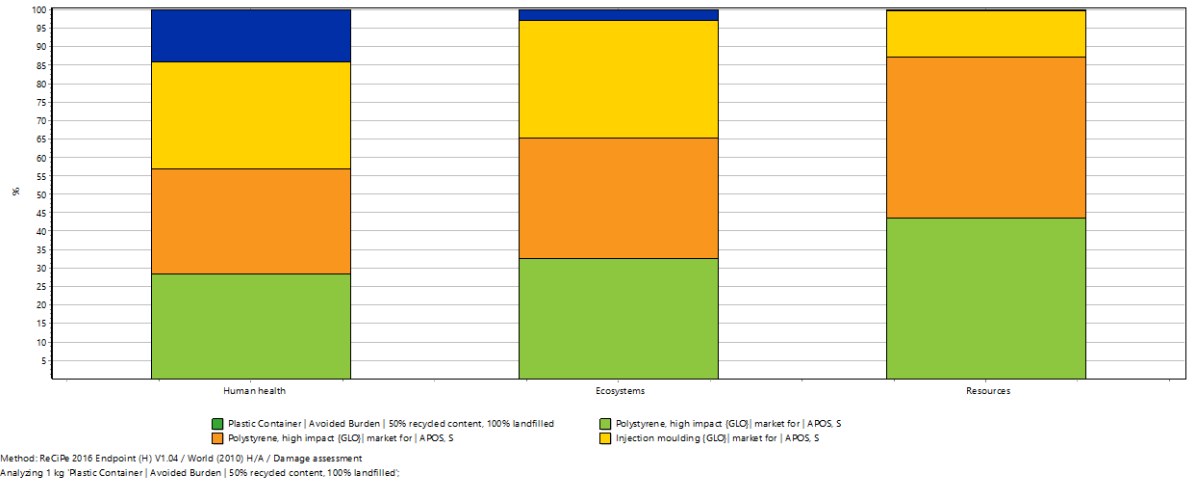
- 1. Polystyrene, high impact {GLO}| market for | APOS, S; 0.5 kg; Comment: 50% virgin content
- 2. Polystyrene, high impact {GLO}| market for | APOS, S; 0.5 kg; Comment: 50% recycled content
- 3. Injection moulding {GLO}| market for | APOS, S; 1 kg

3. Outputs (Waste)

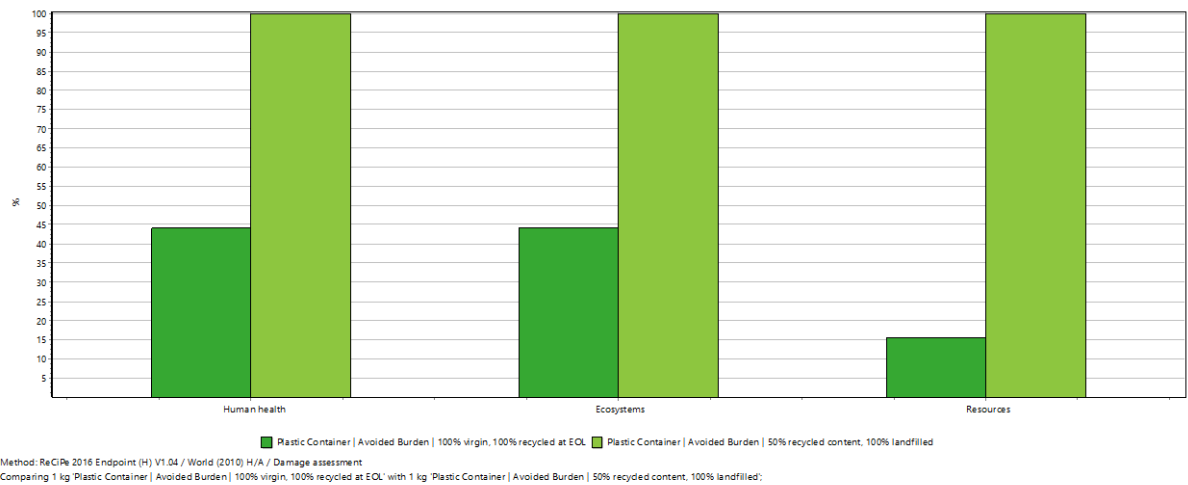
- 1. Waste polystyrene, mixture {RoW}| treatment of, sanitary landfill | APOS, S; 1 kg



2. Analyze



3. Compare Plastic Container | Avoided Burden | 100% virgin, 100% recycled vs. Plastic Container | Avoided Burden | 50% recycled content, 100% landfilled



Exercise 5: Sensitivity to Recycling Method – using Library Switch Function

