

## 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)
    - 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.

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#### 6. Analyze container.



Restice Container | Cut-Off | 100% Virgin, 100% recycled at EQL Polystyrene, high impact (GLO)| market for | Cut-off, S Injection moulding (GLO)|

#### 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.

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- 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.

Martin Canadalana I C. A. C.	e: Products and co-products					Amount		Uni	Quantity	Allocation %	Waste typ	NE (	ategory		Comment	
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#### 3. Analyze



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



Method: Ra(CIPe 2016 Endpoint (H) V1.04 / World (2010) H/A / Damage assessment Comparing 1 kg 'Plastic Container | Cut-Off | 100% Virgin, 100% recycled at EOL' with 1 kg 'Plastic Container | Cut-Off | 50% recycled content, 100% landfilled);

LTS Training Modeling Recycling in LCA Exercises Plastic Container

#### 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

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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.

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- 4. Go back to the Plastic Container | Avoided Burden | 100% virgin, 100% recycled process and add:
- σ × #× 65 Ele Edit Calculate Jools We Input/output Parameters System description Documentation hnosphere: Products and co-products nar | Avoided Burden | 100% virgin, 100% recycled at EOL SD2 or 2SD Min inputs from nature Distribution SD2 or 25D 1.6 Add oution SD2 or 25D Min Inputs from technosphere: materials,fuels Polystyrene, high impact (GLO)| market for | APOS, S kg nputs from technosphere: electricity/heat njection moulding (GLO)] market for J APOS, S 5D2 or 25D Outputs Emissions to air Distrit Emissions to wat ons to sol Add puts to technosphere: Waste and SD2 or 2SD 9.1.0.7 Develope TC 1
- Outputs (Waste)
  - Recycled Polystyrene | Avoided Burden; 1 kg

#### 5. Analyze



📕 Rastic Container | Avoided Burden | 100% virgin, 100% recycled at EOL 🔲 Polystyrene, high impact (GLO]| market for | APOS, S 📒 Injection moulding (GLO]| market for | APOS, S 📒 Injection moulding (GLO]| market for | APOS, S

Method: ReCiPe 2016 Endpoint (H) V1.04 / World (2010) H/A / Damage assessment Analyzing 1 kg 'Plastic Container | Avoided Burden | 100% virgin, 100% recycled at EOL';

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

- 1. Create new material process
  - 1. Output (Product)
    - 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)
    - Waste polystyrene, mixture {RoW}| treatment of, sanitary landfill | APOS, S; 1 kg

				Products									
Outputs to technosphe	ere: Products and co-products					Amount		Unit	Quantity	Allocation %	Waste type	Category	Comment
Plastic Container   Avo	ided Burden   50% recycled conte	ent, 100% landfilled				1		kg	Mass	100 %	not defined	"Recycling Course Avoided Burden	
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puts from technosph	ere: materials/fuels					Amount		Unit	Distribution	SD2 or 25D	Min	Max Comment	
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olystyrene, high impa	ect (GLO)  market for   APOS, S					0.5		kg	Undefined	1		50% recycled content. With avoided	d burden, you have to
									<ul> <li>Constraint for</li> </ul>			take virgin material when using recy	icled content.
1.0		Add											
vputs from technosph	ere: electricity/heat					Amount		Unit	Distribution	SD2 or 25D	Min	Ma Comment	
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#### 2. Analyze



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



Method: ReCIPe 2016 Endpoint (H) V1.04 / World (2010) H/// / Damage assessment Comparing 1 kg 'Plastic Container | Avoided Burden | 100% virgin, 100% recycled at EOL' with 1 kg 'Plastic Container | Avoided Burden | 50% recycled content, 100% landfilled';

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Ecosystems	species.yr	1.02E-8	×	1.49E-8	7.34E-9	-1.2E-8					
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Analyze Plantic Container (Cate Off ) MO Network: Characterization [Damage Assess Gip categories [Never Charage category Human health Ecosystems Resources	Norgin 100% recycled at EOL (1) Tree Normalization / Unit DALY speciesyr USD2013	Impact assessment           Weighting         Single score           △         =         9/4         1%         1%           Total         927E-6         21E-8         0.862         1%	Inventory Filendard Plandic Control Plandic Container ICut-Off I 100% X X X	Process contri Default until Exclude long-term Per (mpact catego Polystyrene, high impact (GLO)) 6.15E-6 1.49E-8 0.756	ibution in emissions hyperson in the second	Setup PS (waste treatment) X X X X	Checks (547)	1	Product overview	1	