



LCA in Supply Chain Decision Making

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Agenda

- Who we are – PE Americas and JohnsonDiversey
- Goal of study
- GaBi4 and i-report tools
- Model
- Example results
- GaBi i-report demo



PE Americas

PE Americas - a joint venture of Five Winds and PE, two global leaders in sustainability

- Five Winds International, a leading management consulting firm
- PE International, a premier provider of life cycle consulting, software, databases, and services



PE AMERICAS

A joint venture of Five Winds and PE



PE INTERNATIONAL





JohnsonDiversey - What do we do?

- **A leading global provider of cleaning and hygiene solutions**
 - In lodging, food service, retail, health care and food and beverage sectors as well as building service contractor.
 - Product applications include food safety, building care, fabric care, and food & beverage processing.
 - Five Regions: Europe, Middle East, Africa; North America; Japan; Asia Pacific; Latin America.



JohnsonDiversey's Sustainability Heritage

- The SC Johnson family of companies has a long history of commitment to sustainability.
- Practices embodied in company values called 'This We Believe'
 - Committed to:
 - employees
 - customers
 - environment
 - neighbors
 - world community
- Sustainable enterprise in 5th generation.



Clean is just the beginning





JohnsonDiversey's Greenhouse Gas Program

- World Wildlife Fund's Climate Savers Member
- JDI's target is to reduce carbon dioxide emissions of operations 8% below 2003 levels, by 2013.
- \$19 million investment; \$31 million return.





Environmental Impact Evaluation

- Goal: Incorporate environmental impact considerations into supply chain sourcing decisions.
- Typical “what if?” scenarios
 - Where to manufacture?
 - Location of new facilities?
 - Location of warehouse?
 - Select logistics supplier?
 - Transportation modes?



Life Cycle Software Solutions

- GaBi 4 is a leading life cycle related software system supporting sustainable product and process development worldwide
- GaBi i-report allows non-specialist users to change parameters for various scenarios and see results immediately



GaBi Software



Model Parameters

- Inputs (KPI Data):
 - Energy usage (GJ/tonne)
 - Water consumption (m³/tonne)
 - Net water (m³/tonne)
 - Waste generated (kg/tonne)
 - COD generated (kg/tonne)
- GaBi data
 - Energy profiles
 - Transportation model
- User selection:
 - Manufacturing location
 - Production volume (tonne)
 - Transportation volume (tonne)
 - Transportation method (ship, rail, truck)
 - Transportation distance (km)



GaBi Value Chain Model

JDI Value Chain (i-report)

GaBi 4 process plan: Mass [kg]

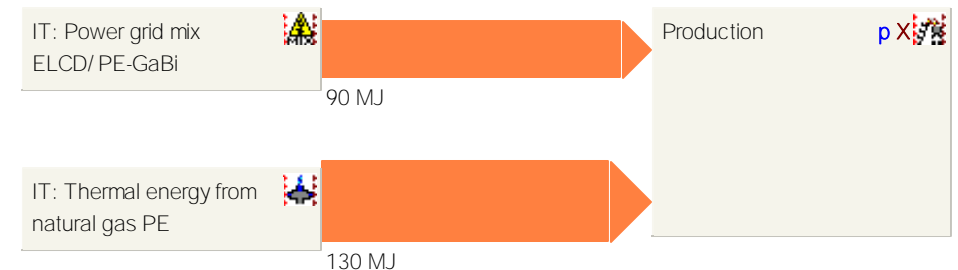
The names of the basic processes are shown.



Production (Bagnolo, Italy)

GaBi 4 process plan: Energy (net calorific value) [MJ]

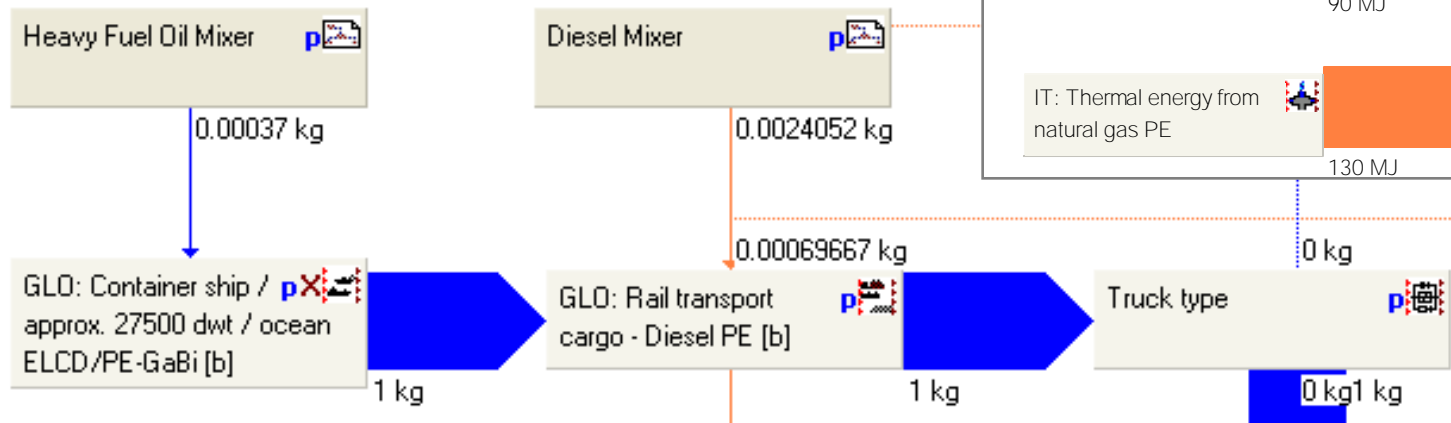
The names of the basic processes are shown.



Transportation

GaBi 4 process plan: Mass [kg]

The names of the basic processes are shown.





Model Output

- **KPI outputs**

- Energy consumed
- COD generated
- Net water generated
- Waste generated

- **Impact assessment outputs**

- Global Warming Potential
- Acidification Potential
- Eutrophication Potential
- Photochemical Ozone Creation Potential

GaBi i-report template

JDI Value Chain _i_report_ [Balances] -- Balance


Object Edit View Tools Help

Input area left 3 Environmental Impact Go to

Start calculation manually Calculate now

Scenarios Number of scenarios: 2 - +

Alias/Grouping	Scenario 1	Scenario 2	Comment
Location	Bagnolo, Italy	London, Canada	Choose the location of the production:
Manufacturing	6	7	[t] Tonnes of production volume
- Raw Material Transport			
- Raw material 1			
RM_1	6	7.5	[t] Tonnes of raw material 1 transported
Distance_rail	200	0	[km] Distance by rail
Distance_ship	0	0	[km] Distance by ship
Distance_truck	100	250	[km] Distance by truck
RM 1 truck type	17.3 tonnes payload	17.3 tonnes payload	Choose the truck type from the drop-d
Pct_load_truck	0.85	0.85	[%] Percentage of payload utilized for
+ Raw material 2			
+ Raw material 3			
+ Raw material 4			
+ Raw material 5			
- Packaging Material Transport			
- Packaging material 1			
Pkg_1	4	4	[t] Tonnes of packaging material 1 trans
Distance_rail	0	0	[km] Distance by rail
Distance_ship	0	0	[km] Distance by ship
Distance_truck	50	50	[km] Distance by truck
Pkg 1 truck type	17.3 tonnes payload	17.3 tonnes payload	Choose the truck type from the drop-d
Pct_load_truck	0.85	0.85	[%] Percentage of payload utilized for
+ Packaging material 2			
+ Packaging material 3			
+ Packaging material 4			
+ Packaging material 5			
- Finished Goods Transport			
Transport volum	10	11	[t] Tonnes transported from the produ



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3 Environmental Impact Category Results

The environmental impacts are assessed using the methodology from the Leiden University Center of Environmental Studies (CML 2001). The results include the environmental impacts associated with the generation of electricity consumed at the manufacturing facilities and diesel fuel consumed for transportation.

The environmental impact category results are shown in Table 4 for Scenario 1 and in Table 5 for Scenario 2. The environmental impact categories are further broken down into impacts from the manufacturing site and impacts from transportation of the finished goods, packaging materials, and raw materials. The global warming potential environmental impact category is also displayed graphically in Figure 1.

Table 4: Scenario 1 Impact Category Results

	Total	Mfg.	Raw Material Transport	Packaging Material Transport	Finished Goods Transport
Global Warming Potential (GWP 100 years) [kg CO ₂ -Equiv.]	434.15	162.63	69.141	13.137	189.24
Acidification Potential [kg SO ₂ -Equiv.]	2.7024	0.62365	0.6473	0.093457	1.338
Eutrophication Potential [kg P phosphate-Equiv.]	0.60444	0.24542	0.10997	0.016267	0.23279
Photochem. Ozone Creation Potential [kg Ethene-Equiv.]	0.23509	0.045807	0.065225	0.0084287	0.11563

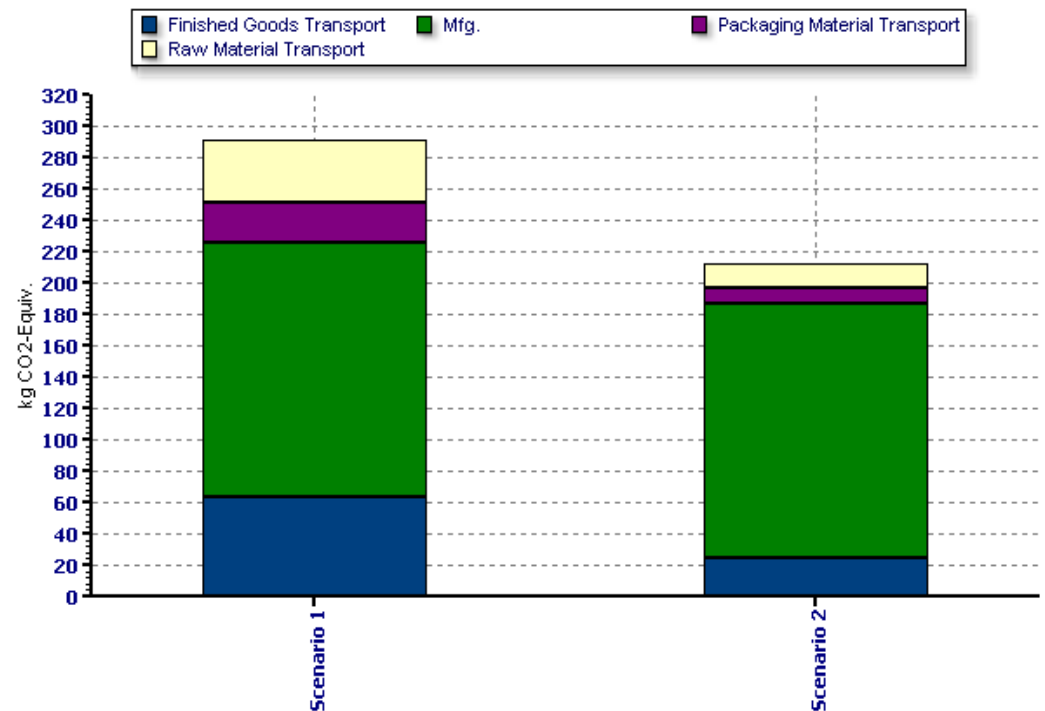


Italy Logistics Example

Moving transportation from road to rail in 2008 results in the following potential reductions:

- 27% Global Warming Potential
- 14% Acidification Potential
- 14% Eutrophication Potential
- 11% Photochemical Ozone Creation Potential

Global Warming Potential



Graph 1: Global warming potential (GWP 100 years) (kg CO2 equivalent)

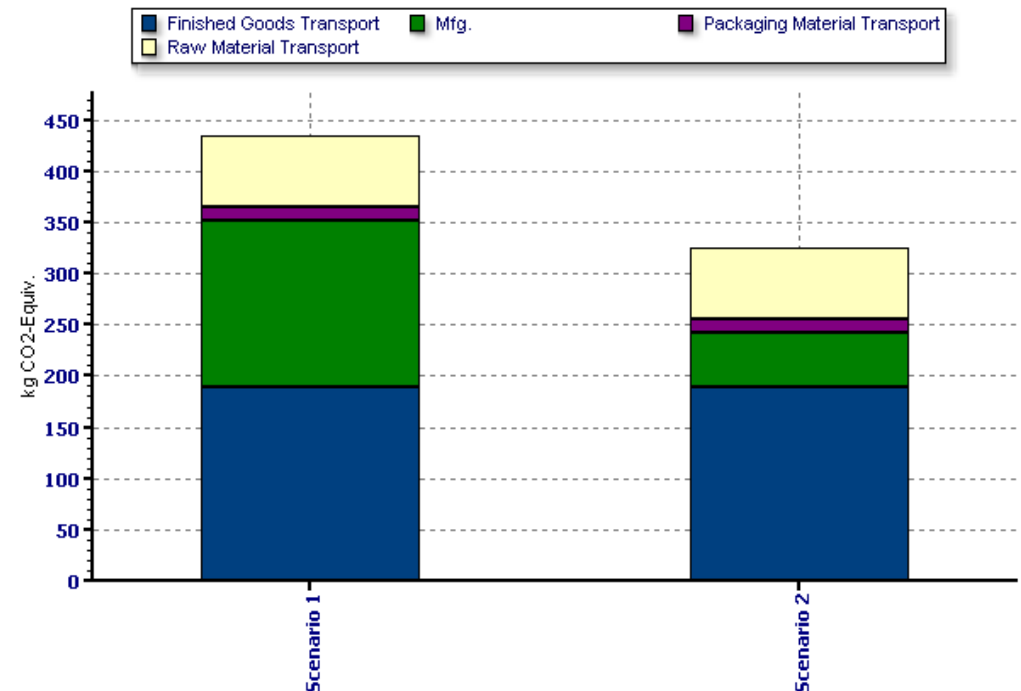


Location Example

Moving location of manufacture from Italy to Spain in 2008 results in the following potential changes:

- 25% Global Warming Potential
- 12% Acidification Potential
- **-8%** Eutrophication Potential
- 11% Photochemical Ozone Creation Potential

Global Warming Potential



Graph 1: Global warming potential (GWP 100 years) (kg CO2 equivalent)



How results are used

- Ensure that product supply decisions have been evaluated for environmental impact
- Support green house gas measurement
- Facilitate continuous environmental improvement of JDI's supply chain operations



Live example



Thank You

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