T-E2A Operation Guidebook

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1. Introduction

T-E2A stands for Toray Eco-Efficiency Analysis, an environmental analysis tool which makes into a chart the environmental loads and economic efficiency of different products to help choose a product that excels in these two conditions. T-E2A has been developed out of the idea that any eco-friendly product or technology cannot propagate on its own if it disregards economic efficiency. This analysis tool is useful in a broad range of corporate activities from the planning of new materials and products to research and development, manufacture, marketing and publicity.

The Japan Environmental Management Association for Industry (JEMAI), in a tie-up with Toray Industries, Inc., added a T-E2A environmental assessment function to its life cycle assessment (LCA) software, MiLCA, in May 2012.

This manual offers information about the T-E2A assessment operations for MiLCA.
* Regarding T-E2A, please see the 'Outline of T-E2A' guidebook, which may be available from

http://milca-milca.net/download-files/T-E2A_outline_English.pdf

* For detailed information about T-E2A including arithmetic logics, see
'Eco-efficiency Analysis by BASF-Calculation Procedure Following the Original' written by Karl-Heinz Feuerherd, Kobe Yamate University (2003), which may be available from

http://www.ecodynamicsexpert.com/docs/

2. Making a case study by MiLCA

For how to produce a case study by MiLCA, please see the 'MiLCA Guidebook' which may be available from
http://milca-milca.net/download-files/MiLCA_Guidebook.pdf

3. Environmental assessment by T-E2A

For starting environmental impact assessment by T-E2A, operate the impact assessment 'Integration' tab in the MiLCA case study function.

Make a case study by MiLCA, execute inventory analysis calculations
and then open the above-mentioned Integration tab, choose 'T-E2A' and click the 'Perform Assessment' option.
This will open the T-E2A assessment window after displaying a T-E2A logo.
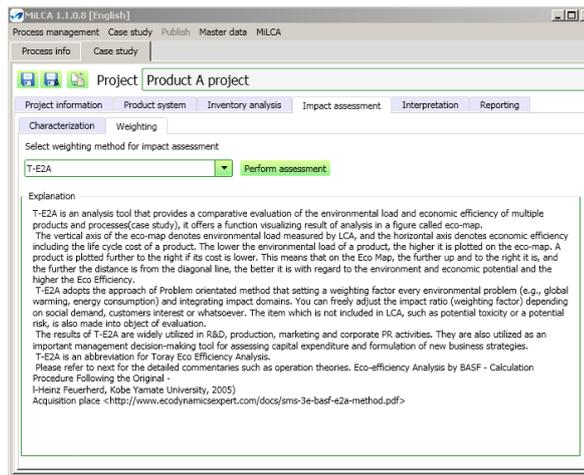
3.1. Setting a case on T-E2A

T-E2A is capable of evaluating different case studies by comparing them with each other in two aspects, environmental loads and economic efficiency.

For that purpose, choose necessary case studies in the T-E2A 'Analysis Setting' window. To add a case study, press the 'Add Case Study' key.

After choosing a case study, enter the 'Cost' and the 'Display Name' and go to the 'Characterization' tab.

T-E2A case studies may be saved by clicking 🔲 (Overwrite icon) to be read out by clicking 📂 (Open File icon).

- T-E2A Case Study Name: Entry may be reflected in the ad-hoc display area at the top of the window.

- Assessment Start Date: Type the date in this space or enter it from the calendar by clicking 📅 (Calendar icon).

- Comment: Write necessary notes, prerequisites, etc. for the relevant case study.
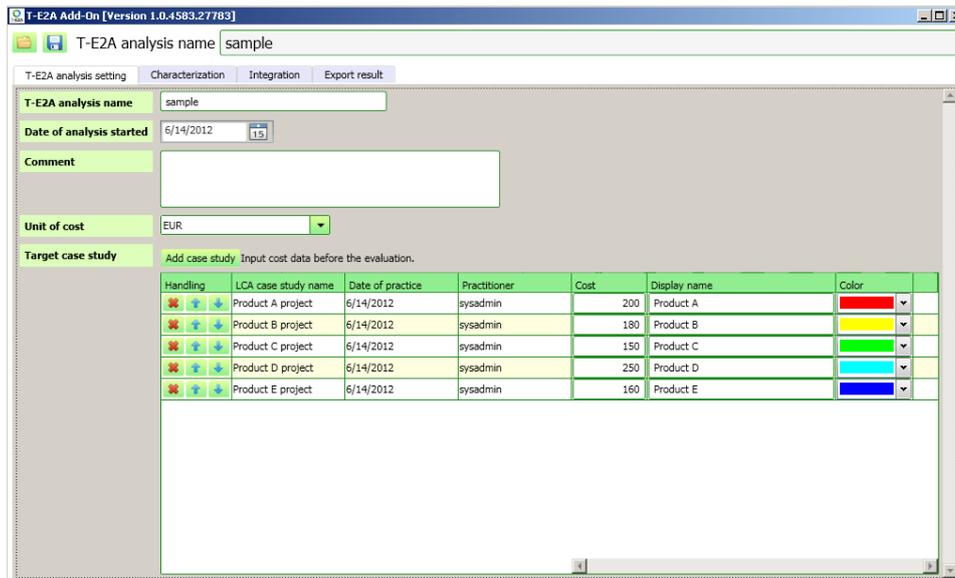
3.2. Characterizing T-E2A

The 'Characterization' tab window first displays a global warming 'Eco-Map', where the Environmental Impact categories and the Characterization Models are changeable.

The 'Eco-Map' is an analytical chart which plots environmental loads on the vertical axis and product life cycles on the horizontal axis.
A product with lower load is positioned in an upper part of the chart while a lower cost product with less economic burden is placed in the further right-hand area of the map. This means that a product plotted further into the upper right area and more apart from the diagonal line is considered highly efficient as it works at a lower load and cost.

Operating the radio buttons will alternatively switch a relative value and an absolute value of the environmental impact.
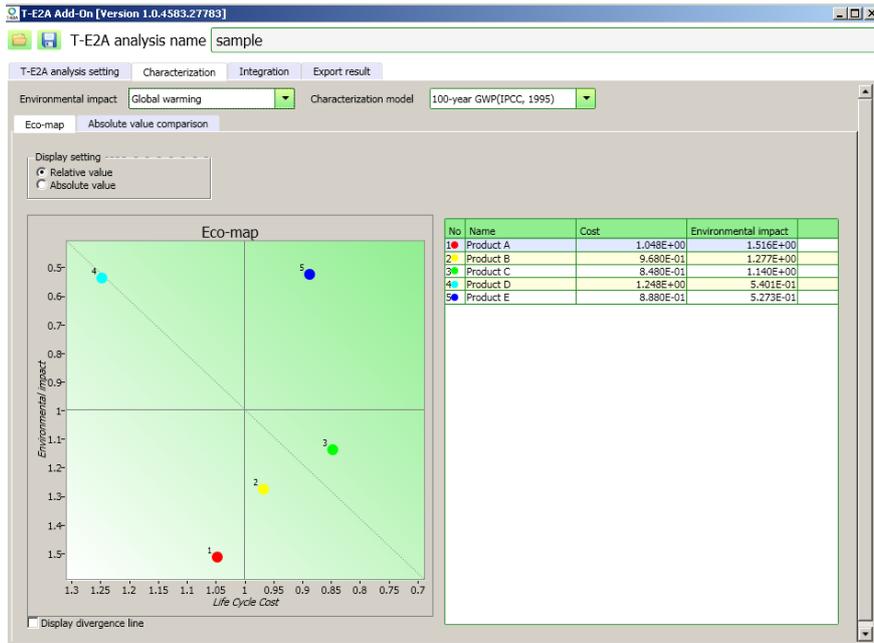
Clicking the 'Absolute Value Comparison' tab will display a bar graph showing absolute impact values for respective products regarding the chosen impact category.
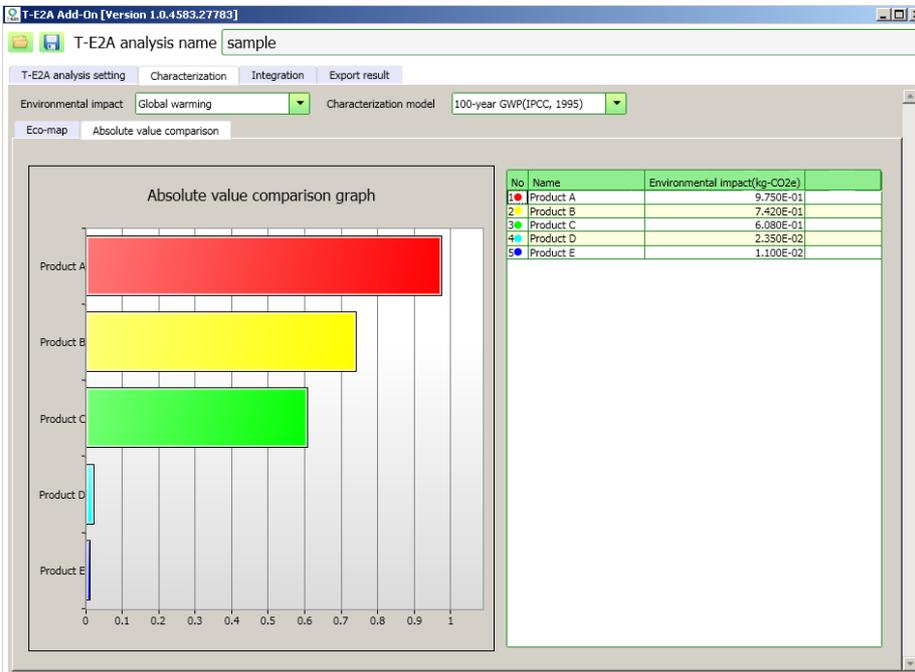
3.3. Data integration by T-E2A

T-E2A can freely change impact levels (weighting factors) of impact categories for data integration in line with any possible changes involving social requirements, customer needs, etc. Also, T-E2A covers the kinds of environmental load not included in LCA, such as potential toxicity and potential risk which should be individually evaluated in accordance with actual product or process conditions. These two sorts of load become important for chemicals manufacturers to assess their products.

3.3.1. Setting of conditions

In the 'Condition Setting' window, first of all, enter the conditions for social weighting factors and scientific weighting factors for integration

After setting social factor and scientific factor conditions, operate the Calculate Results key. As a result of integration calculation, the 'Eco-Map', 'Condition Info', and 'Eco-Fingerprints' tabs can now be operated.

- Potential toxicity and potential risk: It is possible to set the weighting of product lifecycle stages by time period factor. Since this factor is indicated in percentages, entering a number over 100 would cause an error and the entry box is framed in red. In default, the potential toxicity and potential risk values are shown as 1 and the time period factor as 100, which should be adjusted appropriately.

- Weighting factor: Entering a value in the importance level space of an environmental impact category would activate an automatic computation feature to bring the total weighting factor to 1.
  If the entry space is blank (no entry) or the total importance level is 0 (zero), it is regarded as an error, with the space framed in red.
  If the importance level is 0 while the potential toxicity and potential risk are changed, the toxicity and risk values would not be reflected in the result. The weighting factors in the attached figure are for information only. Appropriate factors should be set as the case may be.

- Scientific factor: This indicates how much the respective environmental impact categories are considered important in a certain country or region by means of standardised total consumed and emitted amounts. The default choice is Japan whereas China, Germany, U.K., South Korea, U.S.A. and EU can also be chosen.

3.3.2. 'Eco-Map'

Clicking the 'Eco-Map' tab will display an 'eco-map' for each of the preset integration models.

Operating the radio buttons will alternatively change integration models and relative/absolute values.

Clicking the 'Display Divergence Line' checkbox will show plotted products, with their distances from the diagonal line indicated by divergence lines.
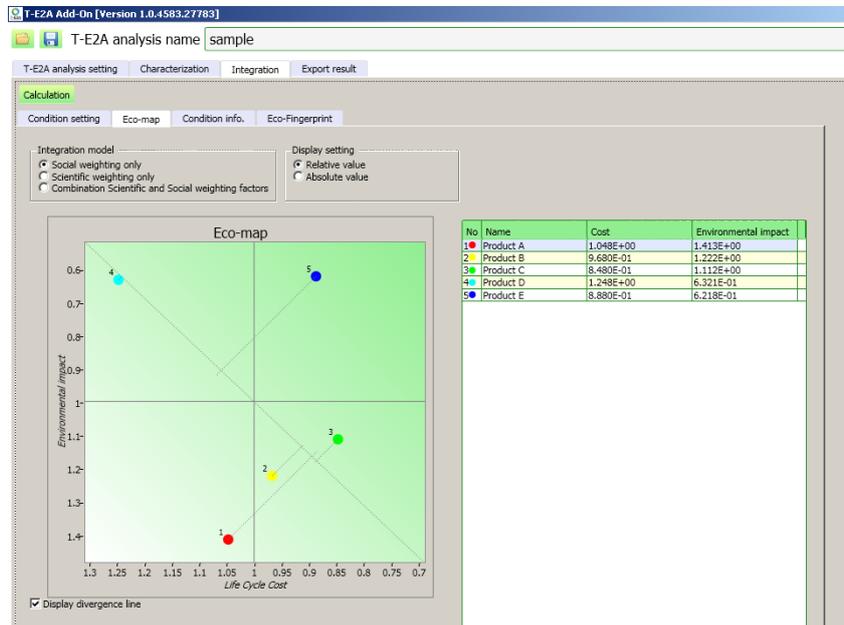
3.3.3. Factor information

Clicking the 'Condition Info.' tab will display impact percentages (breakdown) regarding the social factor, scientific factor, and combination of these factors for respective environmental impact categories.
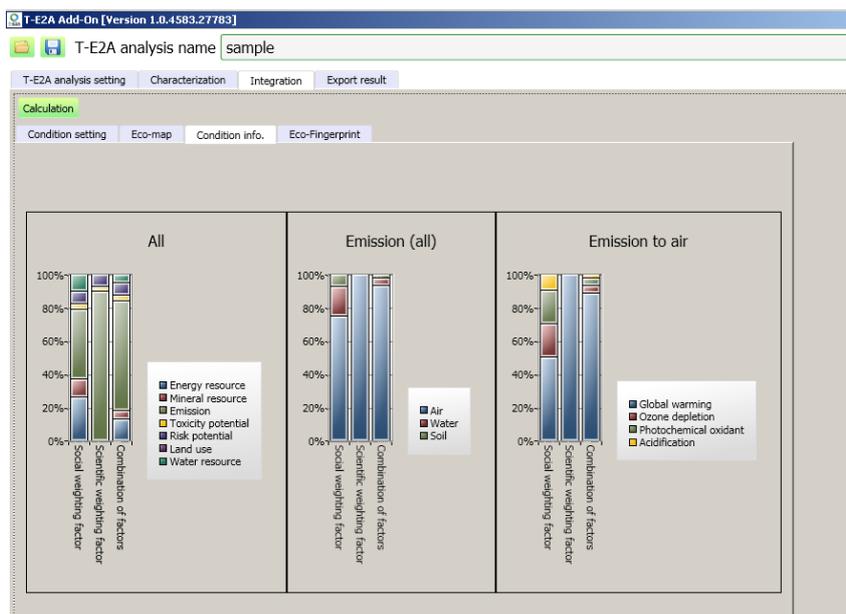
3.3.4. 'Eco-Fingerprints'

'Eco-fingerprints' represent relative environmental impact values of different products in a heptagonal radar chart resembling the shape of a fingerprint.

'Eco-fingerprints' make it possible to confirm a trade-off among the impact categories of each product.

- Relative impact values in each category are standardized and indicated in a range of 0 to 1, based on the maximum value among all evaluated products. For this reason, a product with higher evaluated values in respective categories is indicated in an outer place of the evaluation axis (in a larger radar chart).
  If all evaluated products have the same values, all would be indicated as 1.
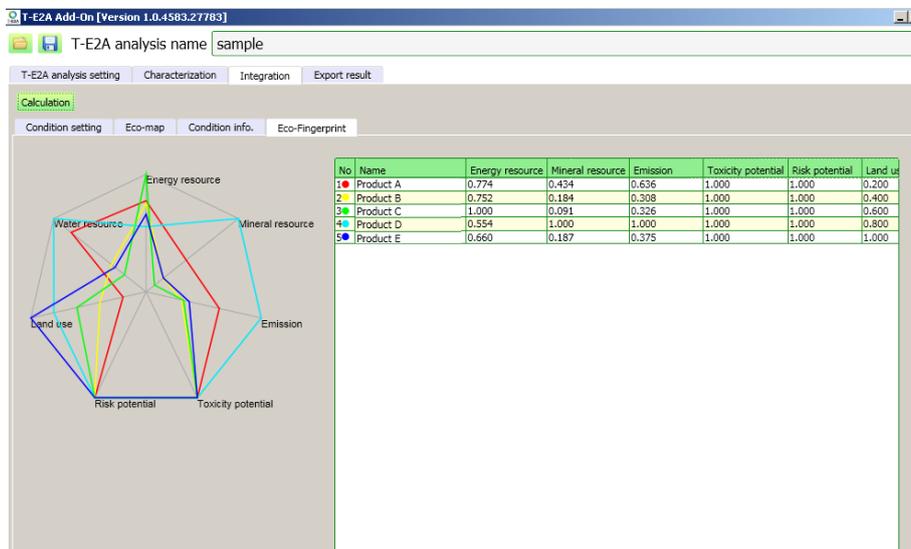
3.4. Result output

Clicking the 'Export the Result in Excel Format' key in the 'Export Result' tab will output integration prerequisites (entered by the user) and the 'eco-map' coordinates (absolute value and relative value) in the Excel format.

T-E2A Add-On [Version 1.0.4583.27783]

T-E2A analysis name sample

| T-E2A analysis setting | Characterization | Integration | Export result |

Export the result in Excel format

Integration prerequisites
(entered by the user)
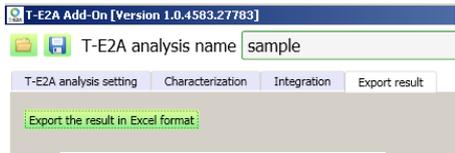
	A	B	C	D	E	F	G	H	I
1	Social weighting								
2	Potential toxicity and risk								
3	Product A								
4		Stage	Toxicity po	Risk poten	Time peric	Toxicity po	Risk potential assessment		
5	0		1	1	100	1	1		
6	Product B								
7		Stage	Toxicity po	Risk poten	Time peric	Toxicity po	Risk potential assessment		
8	0		1	1	100	1	1		
9	Product C								
10		Stage	Toxicity po	Risk poten	Time peric	Toxicity po	Risk potential assessment		
11	0		1	1	100	1	1		
12	Product D								
13		Stage	Toxicity po	Risk poten	Time peric	Toxicity po	Risk potential assessment		
14	0		1	1	100	1	1		
15	Product E								
16		Stage	Toxicity po	Risk poten	Time peric	Toxicity po	Risk potential assessment		
17	0		1	1	100	1	1		
18									
19	Weighting factor								
20				Character	Importanc	Weighting factor			
21	Mineral resource			1/R(Sb eq	10	0.1			
22	Energy resource			higher hea	25	0.25			
23	Water resource			Water use	10	0.1			
24	Land use			m2year(Li	5	0.05			
25	Emission	Air		Global wa	100-year (	15	0.15		
26				Ozone dep	ODP(WMC	6	0.06		
27				Photochen	OECF(LIME	6	0.06		
28				Acidificatic	DAP(LIME	3	0.03		
29				Emission (Air) subto	30	0.3			
30		Water			7	0.07			
31		Soil			3	0.03			
32		Emission (all) subtotal			40	0.4			
33	Toxicity potential			TE2A	3	0.03			
34	Risk potential			TE2A	7	0.07			
35									
36	Social weighting								
37	Selection	Japan							

'Eco-map' coordinates
(absolute and relative values)

	A	B	C	D	E	F	G	H	I
1		Absolute value				Relative value			
2		Social wei	Scientific	Combinat	Cost	Social wei	Scientific	Combinat	Cost
3	Product A	0.5	0.95	0.725	200	1.1406	1.17153	1.16025	1.01277
4	Product B	0.40441	0.74687	0.57564	180	1.07548	1.09209	1.08603	0.99149
5	Product C	0.34944	0.63005	0.48974	150	1.03804	1.0464	1.04335	0.95957
6	Product D	0.10964	0.12049	0.11506	250	0.87469	0.84712	0.85717	1.06596
7	Product E	0.10451	0.10959	0.10705	160	0.87119	0.84286	0.85319	0.97021
8									