New Impact Assessment Method: New Decisions?

Alvarado-Ascencio, Carmen.
PRé Consultants BV
Printerweg 18, 3821AD, Amersfoort, The Netherlands
Alvarado@pre.nl

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Introduction

Increasingly more decisions at company and policy level are taken on the basis of LCA results. Often decisions on what material to use or on the feasibility of recycling are based on single score LCA results to facilitate the decision making process. Ecoindicator 99 [1] and IPCC values are commonly used to express LCA results as a single score.

The recent release of the new impact assessment ReCiPe [2] and the increasing interest of companies for limiting the analysis to climate change raise the question of how do all these single scores correlate to each other. Is the relative proportion among the single score of two different materials or life cycles calculated with Ecoindicator 99 still the same if they are calculated with Recipe?

Method

In this study more than 400 inventories of Ecoinvent 2.0 [3] were used to calculate single scores with Ecoindicator 99, Recipe and IPCC. The singles scores were grouped into different categories as plastic materials, metals, electricity, fuels and transport. (See Table 1)

Table 1: Inventories used to compare single scores

Category	# Inventories		Category	# Inventories
Agricultural products	92		Fuels and Bio-fuels	24
Plastics and biopolymers	31		Electricity Generation	7
Metals	17		Transport	27
Construction Materials	53		Packaging Materials	11

The correlation of corresponding single scores was analysed for each category. A few outliers were identified. The reasons behind the non fitting of these outliers to the correlations are discussed.
The inventories were grouped and classified as shown in Table 1

In the second part of the analysis a couple of materials which are normally recognized as competitors are analysed. To do this the relative proportion of the values of the single scores for metals and plastics, different sources of electricity and different types of fuels is evaluated for Ecoindicator 99, Recipe and IPCC.

Results

Correlation between EcoIndicator 99 and Recipe: In general a good match was found between the singles scores calculated with Ecoindicator 99 and Recipe. ReCiPe seems to give more importance to climate change than the Ecoinicator 99. This is compensated by the less importance that ReCiPe gives to Fossil Fuels Depletion in comparison to Ecoindicator 99. The correlation of the Indicators can be seen in the Figures below.

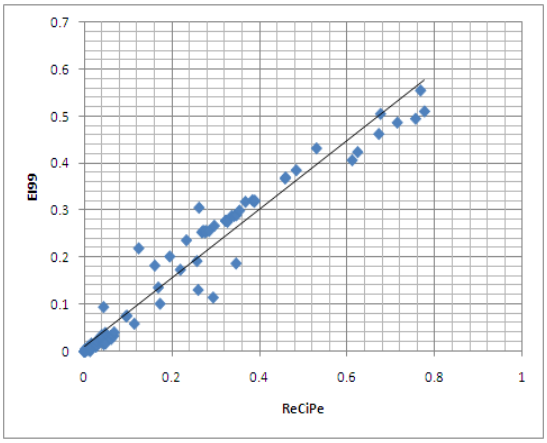

Figure 1: Correlation for Agricultural products

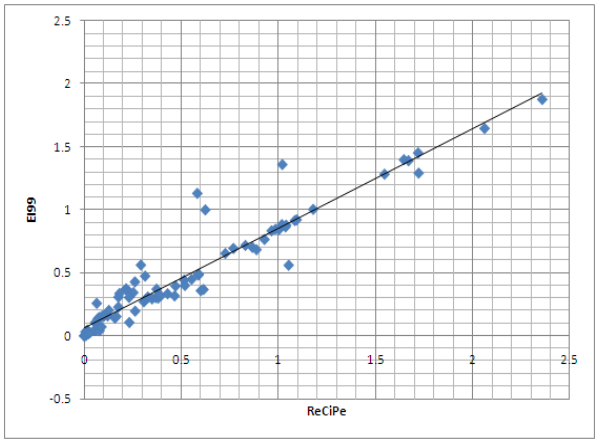

Figure 2: Correlation for Plastic, Paper and Construction materials

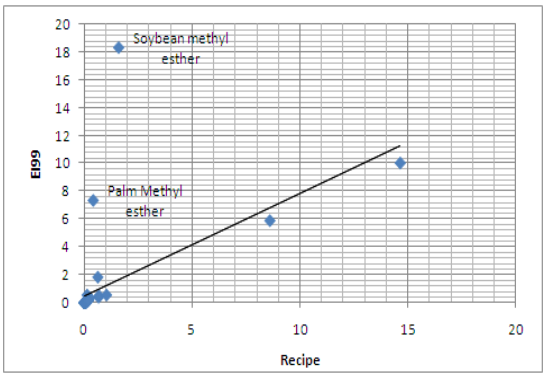

Figure 3: Correlation for Fuels and Biofulels

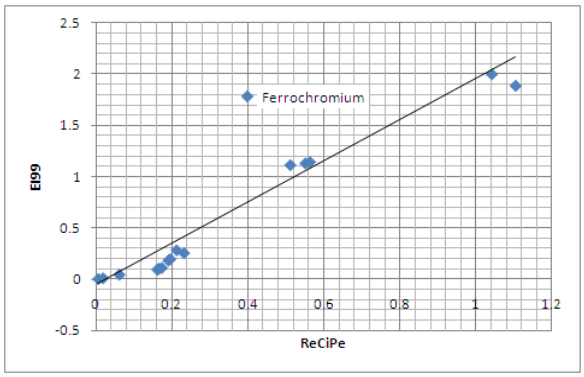

Figure 4: Correlation for Metals

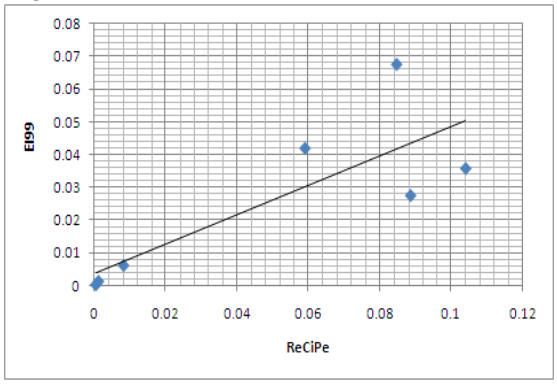

Figure 5: Correlation for Electricity Generation

In general the figures show a good correlation between EcoIndicator 99 and ReCiPe with a few exceptions. The indicator for ferrochromium and for the biofuels soybean methylester and Palm methylesther show a strong deviation from the general trend. For electricity generation de correlation is also not as good as in the indicators of metals or agricultural products.

A comparison between PET and PLA was performed with Ecoindicator 99 and ReCiPe. In this case we consider PLA produced out of corn starch. The data used for the analysis corresponds to inventories for Polylactide granulate/GLO and Polyethylene terephtalate granulate available i8n Ecoinvent 2.0. The main results regarding the aggregated environmental impact are the same for both

methodologies. The contribution of the different impact categories to the overall results is also consequent. The main impact takes place on fossil fuels depletion, climate change and emissions of inorganic/particulate matter. See figures 6 and 7.

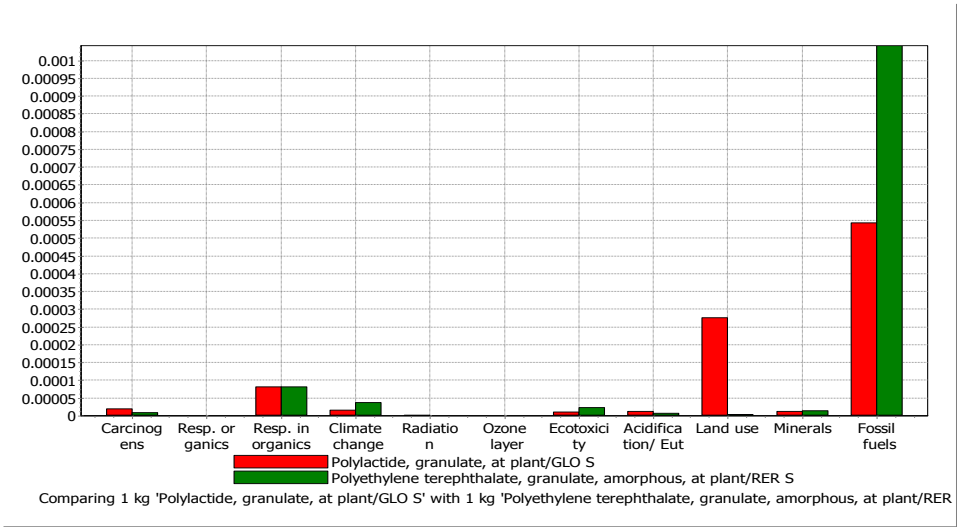

Figure 6: Comparison PET v/s PLA using Ecoindicator 99. Weighted Impact Categories

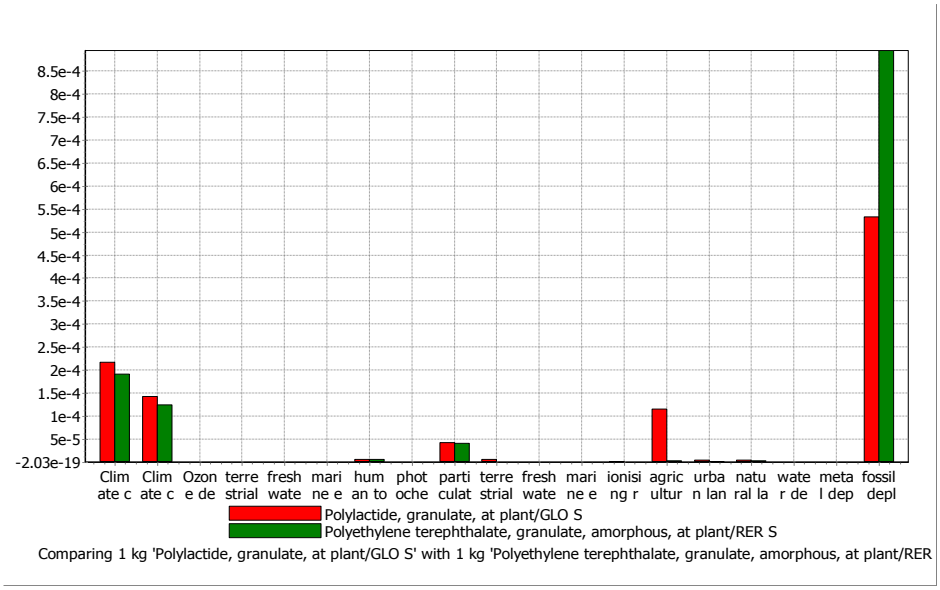

Figure 7: Correlation for Electricity Generation

On the other hand an analysis of the process contribution indicates that using Ecoindicator 99 the cultivation of corn is responsible for about 50% of the environmental impact of PLA, while using Recipe the impact of PLA seems to be almost equally divided among the cultivation of corn, the use of natural gas and the consumption of electricity.

Conclusions

We can conclude that in general the conclusions regarding the overall environmental impact drawn on the basis of Ecoindicator99 may still be valid in respect to developments of the impact assessment method. In a few cases as bio-fuels and ferrochrome this may not be the case.

Conclusions regarding the source of environmental impact, which are often used to select key performance indicators are not necessary the same for ReCiPe and Ecoindicator99.

References

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[2] Goedkoop M.J., Heijungs R, Huijbregts M., De Schryver A.;Struijs J.,; Van Zelm R, ReCiPe 2008, A life cycle impact assessment method which comprises harmonised category indicators at the midpoint and the endpoint level; First edition Report I: Characterisation; 6 January 2009. Full report available at http://www.lcia-recipe.net/Welcome

[3] Frischknecht, R., Jungbluth, N. et.al. Ecoinvent data v2.0. Commissioned by the Swiss Centre for life Cycle Inventories

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