



We create chemistry

Sustainability

Eco-Efficiency Analysis

The purpose of Eco-Efficiency Analysis is to harmonize economy and ecology. This involves carrying out an overall study of alternative solutions to include a total cost determination and the calculation of ecological impact over the entire life cycle.

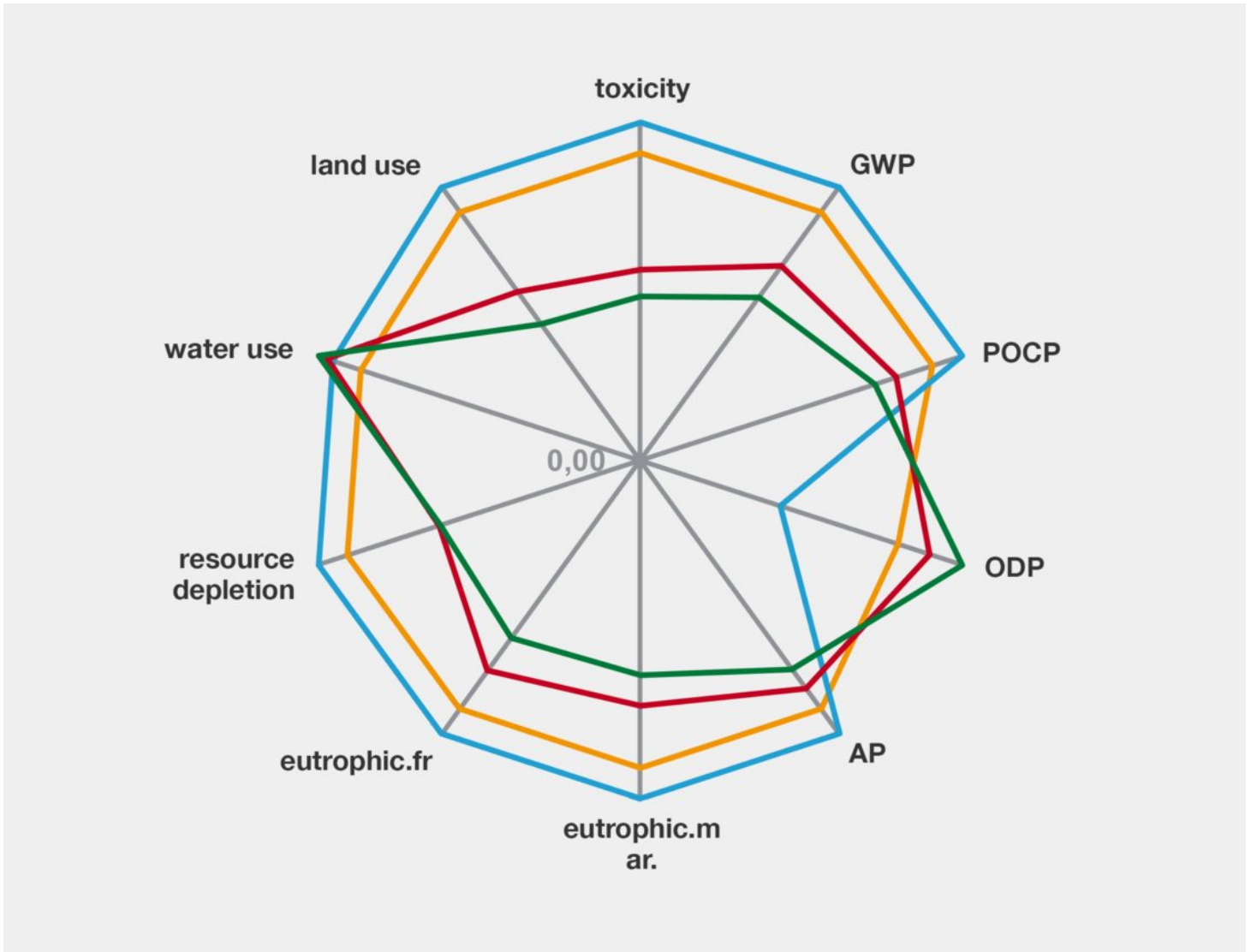
Eco-Efficiency Analysis looks at environmental impact in proportion to a product's cost-effectiveness. It helps BASF, BASF's customers, and customers' customers to decide which products are the best choice, both ecologically and economically. The Eco-Efficiency Analysis can also be used to identify ways to make improvements in terms of environmental impact and cost.

BASF established this holistic method in 1996 and was one of the first companies in the chemical industry to do so. The Eco-Efficiency Analysis was most recently validated by NSF International in 2016. The Eco-Efficiency Analysis follows ISO 14040:2006 and 14044:2006 for environmental life cycle assessments. The assessment of life cycle costs and aggregation to an overall Eco-Efficiency is based on ISO 14045:2012.

For example, Eco-Efficiency Analysis can be applied to support customers' sustainable development along the value chain by reducing energy and resources.

From the cradle to the grave

The Eco-Efficiency Analysis compares the life cycles of products or manufacturing processes from "cradle to grave", i.e. all the way from raw materials sourcing, to product manufacture and use, to disposal. For example, it includes the environmental impact of products used by BASF as well as of starting materials manufactured by others. The analysis also takes the consumption behavior of end-users into account, as well as various recycling and disposal options. In an Eco-Efficiency Analysis of indigo - the dye that makes blue jeans blue - BASF's product was compared with newly developed BASF products and with competing products. BASF wanted to know how much product the customer needs to use to dye, say, 1000 pairs of jeans. How much energy is needed to do this? What emissions and waste result? And how long does the fabric hold its color? Questions like these help to determine which product best meets customer needs and which offers the most eco-efficient solution.



Environmental footprint

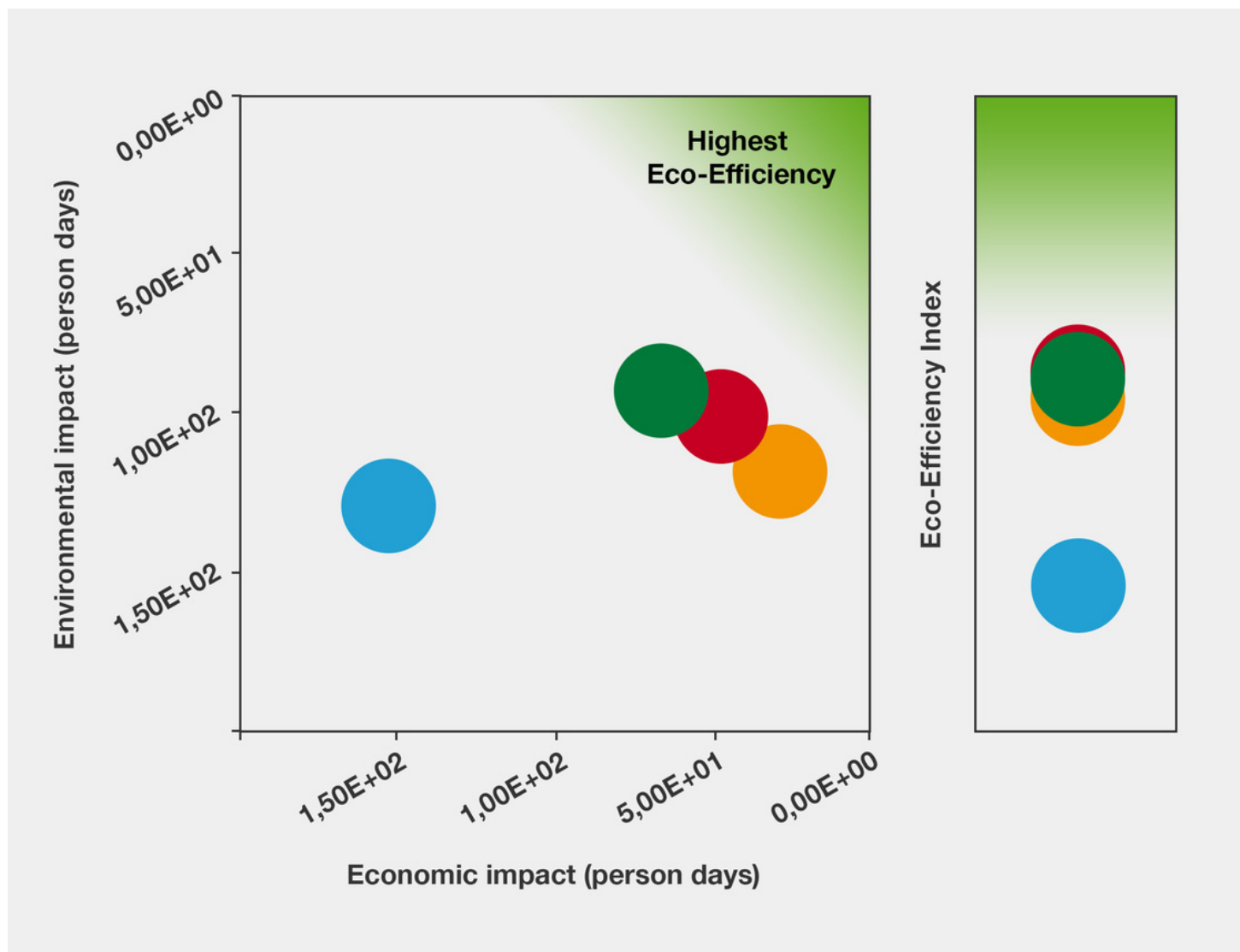
How does an Eco-Efficiency Analysis work?

First, the environmental impact is assessed based on a range of categories:

- Raw materials consumption
- Water consumption
- Land use
- Human toxicity potential
- Eutrophication
- Acidification
- Ozone depletion
- Photochemical ozone creation
- Climate change

Combining these individual data gives the total environmental impact of a product or process. Economic data are also compiled. All the various costs incurred in manufacturing or using a product are included in the calculation. The economic analysis and the overall environmental impact are used to make Eco-Efficiency comparisons.

Economic and ecological data are plotted on the Eco-Efficiency Portfolio. The costs are shown on the horizontal axis and the environmental impact is shown on the vertical axis. The graph reveals the Eco-Efficiency of a product or process compared to other products or processes. And it allows us to look into the future, since Eco-Efficiency Analysis is utilized in making strategic decisions and it also helps detect and exploit potential ecological and economic improvements.



Eco-Efficiency Portfolio and Eco-Efficiency Index

BASF's Eco-Efficiency Analysis is based on DIN EN ISO 14040 and 14044 for ecological evaluations. For economic evaluations and the resulting aggregated Eco-Efficiency Analysis ISO 14045 is the foundation since 2012.

BASF's method for Eco-Efficiency Analysis is validated by the German Association for Technical Inspection (TÜV Rheinland). The most recent validation was completed in 2016 by NSF International.

➤ **Further information is available under FAQ**