



## Biorenewable Insights: Green Solvents

Green Solvents is one in a series of reports published as part of NexantECA's 2022 Biorenewable Insights program.

### Overview

Solvents are used in a wide variety of applications, from coatings and painting, pharmaceuticals, personal care, adhesives, agriculture to cleaning industries. They are key ingredients in a number of processes and products.

Solvent choice can have a significant impact on the perceived "greenness" of a process, as well as having impacts on the emissions of CO<sub>2</sub> or VOCs. In order to provide a roadmap for parties trying to understand the shifting sector, NexantECA reviewed the major existing industrial solvent assessment frameworks, solvent selection parameters and solvent selection guides.

In this report, NexantECA profiled the criteria of the green solvents towards the latest chemical industry concerns and corresponding weightings of each factor in the "NexantECA Solvent Sustainability Index (NESSI)". The NESSI methodology provides a guide to the relative greenness of solvent. NexantECA combined guidance on products with similar solubility parameters (solvent power) with the overall greenness rating, thereby advising on suitable alternative green solvent products for consumers. Solvents covered in this report are major solvents used in the industry, running the span from water (the greenest solvent in the analysis) to toluene (the least green by this analysis).

### NESSI Analysis Parameters

WEIGHTING	PARAMETER	KEY OBJECTIVES
12.5%	Feedstock	Bio-renewable or recycled sources preferred over petrochemical source
20%	Toxicity	Measure hazard potential for both human and environment
10%	Biodegradability	Assess ease with which product biodegrades and its potential to bio-accumulate
12.5%	VOC/Vapor Pressure	Determine the ease of the solvent enters the atmosphere and the VOC regulatory status
15%	Storage & Handling/ Odor	Assess special requirements of storage facilities, precautions of handling hazardous solvents and whether odor is unpleasant
10%	Fire Hazard	Measure flashpoint and fire safety regulations for process and consumer safety
10%	Stability/Reactivity	Measure chemical reactivity considering risk of ozone formation and explosion
10%	Production Complexity	Measure complexity of synthesis or production procedures and associated energy requirement

### Solvents Profiled

This report provides reviews on a wide range of solvents on the physical properties, environmental impact and handling, applications as well as providing the NESSI and SWOT analysis for 30 chemicals. The categories of solvents include:

- Acids
- Alcohols
- Esters
- Ethers
- Ketones
- Natural Solvents
- Proprietary Solvents
- Neoteric Solvents

The NESSI highlights the sustainability and renewability of the solvents with parameters and weightings, emphasizing the impact on the health and safety, production procedure and environmental impacts. Renewable feedstocks were also embraced to secure the sustainability of the chemical industry.

### Commercial Impact

The chemical industry, as an important component of modern world economy, was and will continue to be impacted by global general development trends and regulations. This report provides an analysis of the developments and potential for green solvents for use across a range of industrial applications, processes, and products. Green solvents demand will continue to increase, driven by several industry megatrends connected to sustainability: carbon intensity reduction ("net zero"), VOC reduction, increased focus on recycling/reuse/reduction of consumables, air quality improvement, resource management/security of supply, increased focus on "zero waste", as well as increased health and safety concerns. These megatrends are supported by a "regulatory spaghetti" that is difficult to understand and unstandardized across regions as of yet. Industry players that are geared to address these megatrends are expected to cope better in the coming years of industry change.

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## Biorenewable Insights: Green Solvents

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