

SELVOL LIFE CYCLE ANALYSIS

An analysis of the environmental impacts of our business

SEKISUI

Selvol High Performance Polyvinyl Alcohol

Polyvinyl alcohol is a water soluble, non hazardous, non-toxic, and biodegradable polymer. Because it is water soluble, polyvinyl alcohol also reduces the need for organic solvents and it is a key ingredient in many green technologies.

Selvol polyvinyl alcohol has many applications that advance sustainability lifestyles for the world's population. It is a key ingredient in laminated glass for interlayer films. These films are designed to add sound and heat insulation to automotive glass, keeping automobiles lightweight and cooling efficient,

reducing automobile CO₂ emissions. If installed on 10 million vehicles, this interlayer film could reduce CO₂ emissions by as much as 600,000 tons!

Polyvinyl alcohol can also play a key role in the sustainable packaging industry through water-soluble unit dosing, providing an easy to use, standardized dosing solution.

It is also used in agricultural applications to make farming more efficient while leaving the delicate, growing ecosystem untouched.

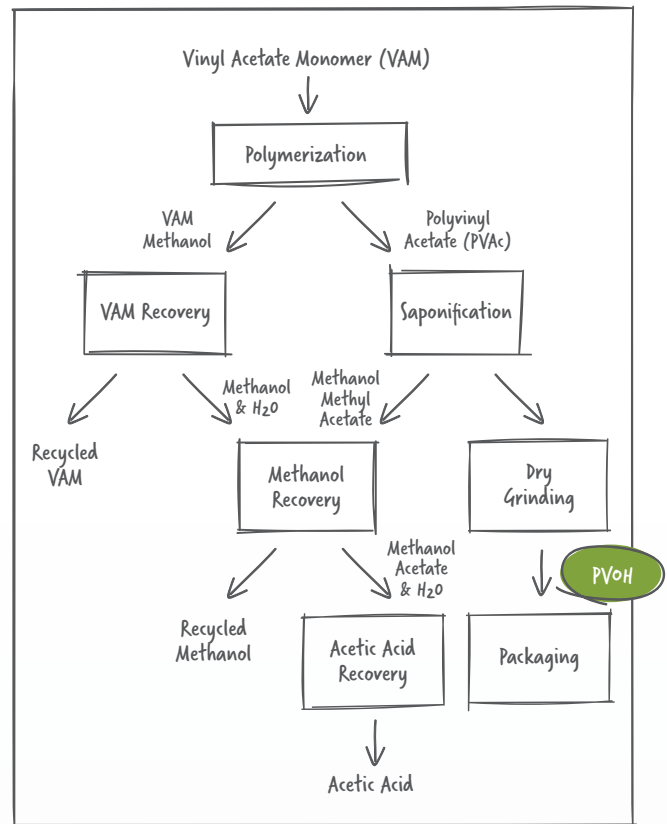


Selvol Life Cycle Analysis

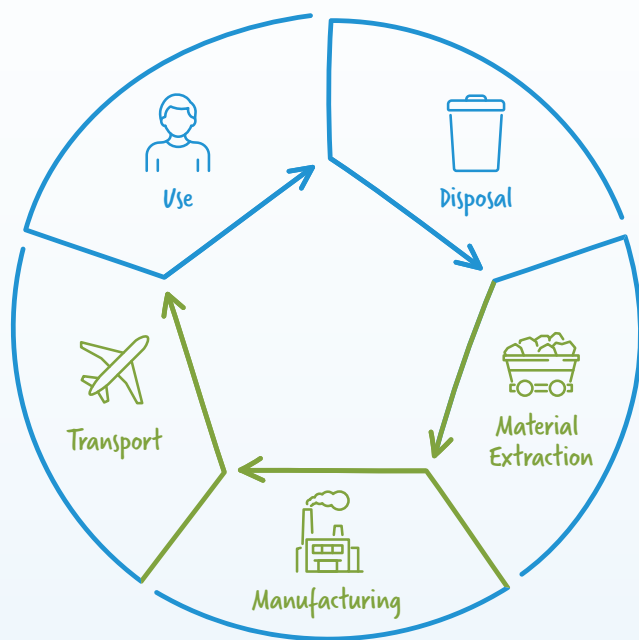
Sekisui Specialty Chemicals is strongly committed to preserving a global environment in which future generations can prosper. Sekisui Specialty Chemicals has three ISO 9001 and ISO 14001 certified manufacturing facilities located in the US and Spain, and a robust supply chain network that delivers our polymers to customers around the world. Because our operations span the planet, we take environmental responsibility very seriously. Our goal is to contribute to the survival of the planet by minimizing our impact on natural capital (i.e. soil, air, water, mineral, flora, fauna, etc), and implementing measures to combat rising greenhouse-gas emissions and overconsumption of resources. To better understand our impact on the global environment, we were one of the first in our industry to commission a Life Cycle Analysis (LCA) study in 2012. This year, we conducted a follow up LCA on our facilities to continue to understand and reduce our impact on the environment.

Here at Sekisui Specialty Chemicals, an LCA is not a one-time process. In accordance with the spirit of Kaizen (continual improvement), regular LCA assessments will allow Sekisui Specialty Chemicals to track our environmental effects over time and continually improve our sustainability practices. This LCA helps identify opportunities for resource efficiency, waste reduction, and energy savings, leading to cost savings as well as environmental benefits. Sekisui is continually looking to optimize our supply chains, reduce risks, and enhance overall sustainability.

Figure 1: our Manufacturing Process



Cradle to Grave Versus Cradle to Gate



What is an LCA?

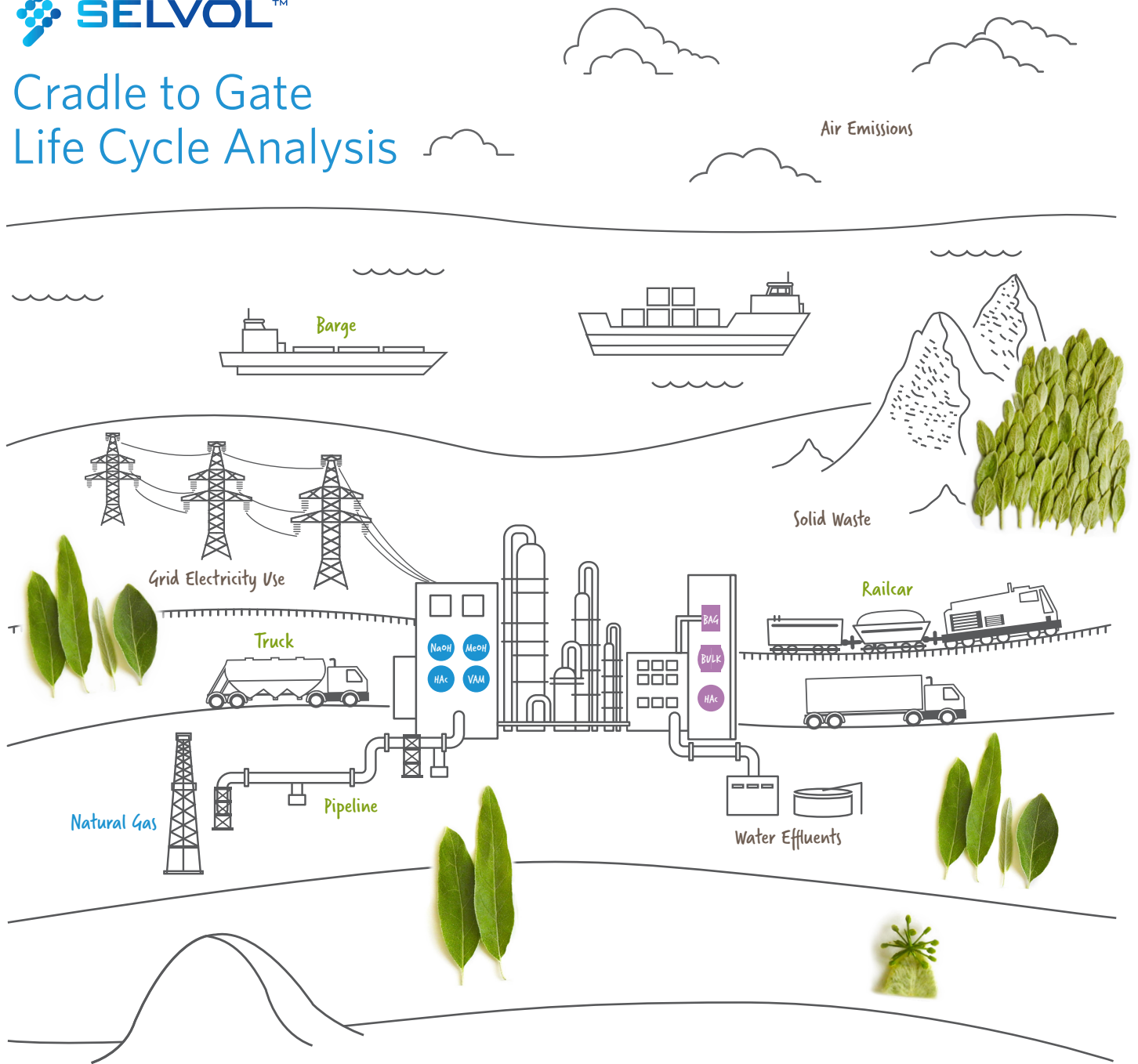
Life Cycle Assessment is a method of systematically assessing the environmental burdens associated with a product, process or activity over the whole of its life cycle. The international standard for life cycle assessment, ISO 14040, states that:

*“LCA addresses the environmental aspects and potential environmental impacts (e.g. use of resources and the environmental consequences of releases) throughout a product’s life cycle**” (ISO, 2006b).*

The assessment compiles relevant energy, material, and environmental inputs to operation and evaluates the potential environmental impacts associated with the total operation.

The results of the assessment are presented in “cradle to gate” format. They include the impacts of extraction and transportation of raw materials, production and transport of fuels, production and transport of packaging to our facilities, production of products ready for shipment to customers, and by-products.

Cradle to Gate Life Cycle Analysis



KEY: ● Transportation ● Raw Materials ● Environmental Impacts ● Process outputs

1) Inputs

The cradle to gate analysis begins with an assessment of raw materials, energy, and transportation inputs to the process. These include electricity, fuel, vinyl acetate monomer (VAM), methanol, and acetic acid as a by-product*.

2) Process

The Process of producing Selvol polyvinyl alcohol actually varies from plant to plant depending on plant capabilities. The results presented here are the average of all three plants. Our manufacturing process includes VAM polymerization, PVAc saponification, acetic acid recovery and recycling steps.

3) Results

The cradle to gate LCA analysis ends with finished bags and bulk containers of Selvol sitting at our front door waiting for shipment to customers. The impacts of our processes on terrestrial acidification, water deprivation potential, and carbon emissions are detailed in "The Results" section.

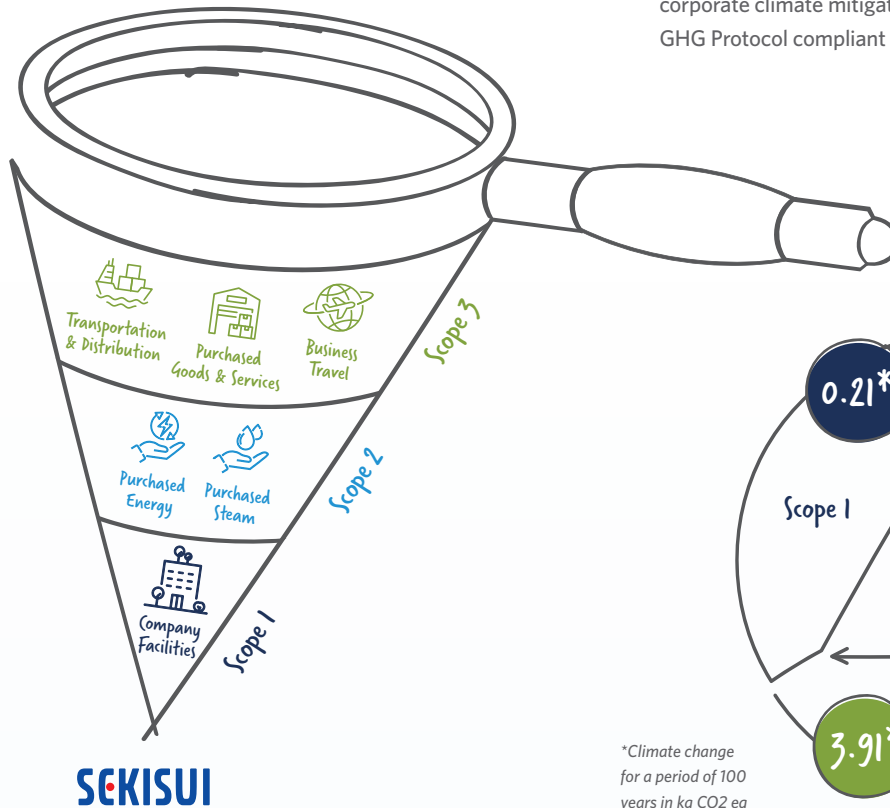
* By-products are materials of value that are produced as a residual of, or incidental to, the production process.

** The use and end-of-life phase have not been calculated in this study, since both are part of another life cycle corresponding to the consumer of this product.

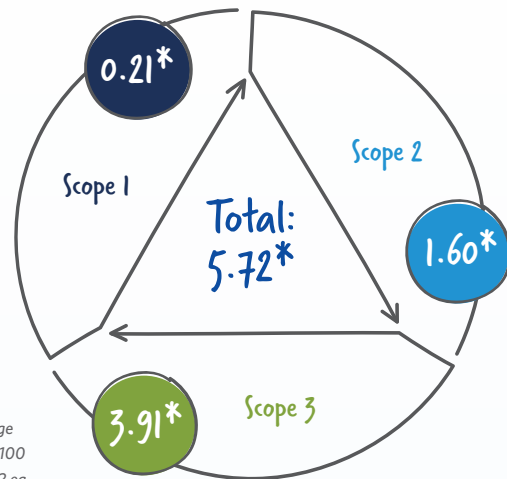
Data Discovery and Verification

The LCA was performed in accordance with ISO 14040 and ISO 14044. The first step in the LCA process was to calculate the energy and raw material inputs and air emissions, water effluents, and solid waste outputs based on polymer production. This LCA was calculated in 2023 with data from fiscal year 2021 data, and represents data collected from all three SEKISUI manufacturing plants.

The report is also aligned with the PCF (Product Carbon Footprint Guideline for the Chemical Industry) guideline created by TFS (Together for Sustainability V2.0 November, 2022) initiative. As per PCF guideline, "a major share of the industry's greenhouse gas (GHG) emissions arises from the upstream value chain (scope 3). Increasing data transparency and accuracy on the product-level is a key element to drive emission reductions along the value chain and is a strategic cornerstone of many corporate climate mitigation strategies." The results of our LCA are also GHG Protocol compliant for Scope 3.



Simapro software was used to calculate the LCA results, and the final report has been independently, 3rd party verified.



*Climate change for a period of 100 years in kg CO2 eq

The Results

We look forward to sharing the results with our customers to help them achieve their sustainability goals for future products.

The results of the analysis included the following topics: water consumption, marine eutrophication, freshwater eutrophication, terrestrial acidification, ozone formation, fine particulate matter formation, ozone formation, stratospheric ozone depletion, and global warming. For more information about specific data for the calculated impact categories, please contact your local Sekisui representative.

† when compared to the previous study in 2012

s Sekisui Chemical Company's GHG Emission Reduction Goals 2030 https://www.sekisuichemical.com/news/2022/1379611_38754.html

All provided results in this flyer are based on 1 kg of Selvol PVOH production, the average of all three plants, including the impact of by-products. [Please see the By-Product Allocated Addendum for results separated between PVOH and its by-products.](#)

Water Deprivation Potential	Terrestrial Acidification Potential	Climate Change CO2 Equivalent
0.11 m ³	0.018 kg SO ₂ eq	5.72 kg CO ₂ eq

Sekisui is proud to report a 17% CO₂ emissions reduction[†]. This is great progress towards the 2030 goal of 50% overall emissions reduction.^s

About Sekisui Chemical Company

A new frontier, a new lifestyle. Sekisui Chemical Group is a multibillion dollar, global company that delivers a wide range of products and services to enrich people's lives. Sekisui has been striving to 'produce a better world with creative technologies' since its formation in 1947. The company is comprised of core businesses and technologies in housing, social infrastructure, and chemical solutions. Minimizing environmental impact and maximizing the environmental benefit of products and solutions are core values of Sekisui's Corporate Social Responsibility philosophy.



Innovation for the Earth



Sekisui Chemical has been selected as one of the 2023 Global 100 Most Sustainable Corporations in the World for 5 years running and 8 years in total.



Sekisui has been recognized by S&P Global with a Sustainability Award in 2022.



As a part of our 'Vision 2030' mid-term plan, Sekisui Chemical Group has committed to supporting the UN's Sustainable Development Goals. We are proud to say our activities support at least 8 of the 17 goals.

THE WALL STREET JOURNAL.

Recognized as a Top 10 company in Sustainable Management by the Wall Street Journal in 2020.



Visit www.selvol.com for more information about our products.

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