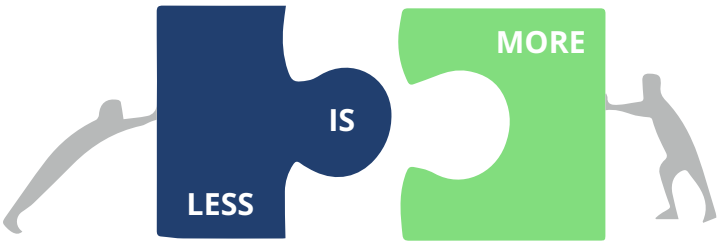
Global Greenchem
Innovation & Network Program

CHEMICAL LEASING IS
A GREEN CHEMISTRY SOLUTION - AWARDED

01 CHEMICAL LEASING AS A GREEN CHEMISTRY SOLUTION

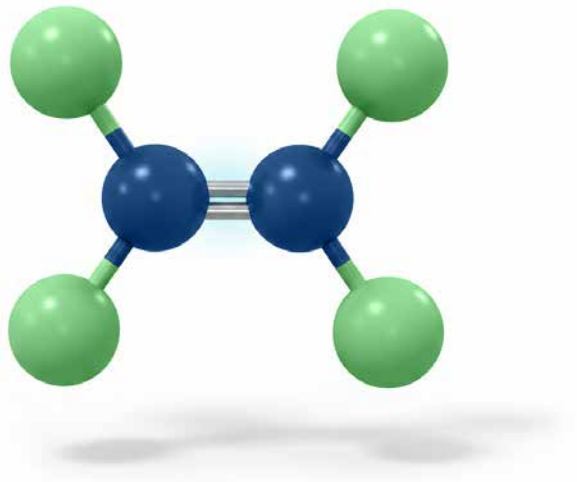
Chemical Leasing is an innovative business model that challenges the traditional way chemicals are sold and consumed. In conventional practice, suppliers earn profit by selling larger quantities of chemicals, which often leads to overconsumption, generation of larger amounts of waste, and, more importantly, significant environmental damage. Chemical Leasing, however, ***shifts the focus from the amount of chemicals purchased to the service they provide***. Under this model, suppliers are compensated based on performance indicators such as the number of items cleaned, the surface area treated, or the production output achieved. This creates a situation where ***suppliers are motivated to optimize chemical efficiency***, while ***users benefit from reduced costs, improved safety, and minimized environmental impact***. Overall, it is a win-win solution, since the suppliers also reduce per-unit production cost. Additionally, this approach fosters collaboration between suppliers and users to optimize chemical use.[1]



1 https://chemicalleasing.com/

02 PERCHLOROETHYLENE: INDUSTRIAL APPLICATIONS AND TOXIC ECOLOGICAL FOOTPRINT

Perchloroethylene (PCE), also known as tetrachloroethylene, is a colorless, non-flammable solvent with strong degreasing properties. PCE is most widely used in the dry cleaning industry, automotive maintenance, very widely in metal degreasing operations. It is found in some adhesives, inks, and cleaning formulations. These applications highlight its versatility, but also raise concerns, the most significant of which are that PCE is volatile, persistent in the environment, and can pose health risks if mismanaged.[2] [3]



03 PERCHLOROETHYLENE AND SUSTAINABLE CHEMICAL LEASING

This is precisely where Chemical Leasing offers a sustainable solution. By redefining the business relationship between chemical suppliers and users, the model encourages responsible handling of perchloroethylene. Instead of selling large volumes of solvent, suppliers provide expertise, dosing systems, recovery technologies, and training to ensure that PCE is used efficiently and safely. Payment is tied to the number of metal components cleaned or the effectiveness of degreasing, rather than liters of solvent consumed. This reduces emissions, lowers exposure risks for workers, and minimizes waste. In practice, a company implementing Chemical Leasing will experience a significant reduction in perchloroethylene consumption, while maintaining or even enhancing cleaning performance.

The broader benefits of this model are clear. Economically, companies save money by avoiding unnecessary chemical purchases. Environmentally, emissions and waste are reduced, aligning with sustainability goals and regulatory requirements. Socially, workers benefit from safer practices and reduced exposure to potentially harmful substances. In this way, Chemical Leasing transforms per-

2 https://www.cdc.gov/niosh/docs/hazardcontrol/hc16.html

3 https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/risk-management-perchloroethylene-pce#:~:text=PCE%20is%20a%20solvent%20that,processing%20aid%20at%20petroleum%20refineries.

chloroethylene from a potential liability into a managed resource that delivers value while protecting health and the environment.

By shifting the focus from chemical volume to chemical performance, Chemical Leasing ensures that PCE is applied responsibly, efficiently, and sustainably. As industries continue to balance productivity with environmental responsibility, Chemical Leasing stands out as a practical pathway toward greener and safer industrial practices.

One of the most notable worldwide examples of Chemical Leasing applied to perchloroethylene comes from SAFECHEM, a global company that pioneered solvent management services.[4] One successful project involves a perchloroethylene leasing model for industrial cleaning operations. Instead of selling drums of solvent, the company provided a comprehensive package of services: optimized dosing systems, closed-loop handling equipment, worker training, and regular monitoring of solvent quality. The customer pays a fixed monthly fee based on cleaning performance, not solvent volume.[5]

4 https://safechem.com/en/

5 https://safechem.com/en/metal-cleaning

04 CASE STUDY IN SERBIA

In 2024, the Chemical Leasing Award was presented to a partnership in Serbia involving FKL DOO Temerin, Ravago Chemicals (Vidara), and SAFECHEM. This collaboration was recognized for its approach to sustainable chemical management and its effective implementation within industrial metal cleaning operations using perchloroethylene.

FKL DOO Temerin[6] is a Serbian company producing rolling bearings and cardan shafts. It specializes in agricultural machinery, offering a wide range of solutions for equipment such as disc harrows, seeders, packer rollers, balers, combines, and other types of farm machinery.

Ravago Chemicals (Vidara)[7], supplies and develops raw materials, additives, and ingredients for diverse industries, including coatings, construction, polyurethane, asphalt, personal care, nutrition, pharmaceuticals, water treatment, material science, flavors and fragrances, polymers, elastomers, and rubber. By leveraging deep knowledge of customer requirements, the company collaborates with top specialty chemical and ingredient suppliers to deliver innovative, sustainable, and high-quality solutions worldwide. One of the companies they cooperate with is SAFECHEM, a company that specializes in solvent management services.

SAFECHEM introduced Ravago Chemicals to the Chemical Leasing business model, which Ravago Chemicals recognized as both an opportunity and an effective framework for

6 http://www.fkl-serbia.com/

7 http://www.ravagochemicals.com/

close collaboration with FKL DOO Temerin. Chemical Leasing is applied to the cleaning and degreasing of metal parts manufactured by FKL DOO Temerin, utilizing perchloroethylene. The main improvement of the process was to go for a higher-quality solvent, but with introduction of several steps that reduce its quantity, increase efficiency, and reduce the waste produced by cleaning.

A switch was made from utilizing perchloroethylene of the usual industrial to metal-cleaning grade, adjusting the stabilizers for the particular use. The whole process was redesigned with equipment that hermetically seals the vapours inside the loading and cleaning system, and includes an added solvent regeneration unit.




Ravago (in cooperation with SAFECHEM) assumed responsibility for the following aspects:

- supply of cleaning chemicals in closed-loop, state-of-the-art system for handling solvents, the SAFE-TAINER™, and reagents for solvent testing and adjustment (in cooperation with SAFECHEM)
- delivering training on the proper and safe use and testing of solvents (in cooperation with SAFECHEM),
- providing a distillation unit,
- conducting training for solvent monitoring and optimization to FKL staff (i.e., determining solvent parameters in the machines and adjusting them to optimal levels through additives, in cooperation with SAFECHEM), ensuring solvent quality maintenance in cleaning machines (in cooperation with SAFECHEM),
- taking back hazardous waste from the cleaning process.

Some selected benefits of the implementation are:

Before Implementation	After Implementation
Unit of payment	
EUR per kg of solvent	EUR per working time unit
Environmental benefits	
Consumption: 30 t of PCE per year **75 L/t of products**	Consumption: 5.9 t of PCE per year **8.4 L/t of products**
Hazardous waste from cleaning: **62.5 L/t of products** (25 t per year)	Hazardous from cleaning: **2.5 L/t or products**
Human health benefits	
Employees were exposed to the solvent emissions as they manually manipulated with the solvent.	All solvent transfers are managed via hermetical connections and employees are protected from solvent emissions.

CONCLUSION

In conclusion, it is clear that consumption of the solvent was reduced almost ten-fold, and hazardous waste reduced more than 20 times. Besides increasing safety by practically eliminating solvent evaporation, this is a huge benefit to environmental protection. It also brought about a long-standig cooperation and stable partnership of the companies involved.

This case study has been selected and prepared as part of the Global Green Chemistry Innovation & Network Programme

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