



ISC3 Sustainable Chemistry Toolbox

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Introduction

to the ISC3 Sustainable Chemistry Toolbox

Dear Changemakers,

Welcome to the exciting world of [Sustainable Chemistry](#) – where innovation meets responsibility, and creativity helps shape a better future!

This toolbox is for [anyone who believes that chemistry has a key role to play in building a more sustainable world](#) – whether you are just starting to explore the topic or are already working to drive change in your field, organisation, or community.

To support you on your journey towards truly sustainable impact we have created this comprehensive toolbox – your personal guide, compass, and [catalyst for action](#). This toolbox is more than just a collection of resources. It is designed to connect you with the characteristics of Sustainable Chemistry and show that [true impact means applying these principles at every step – from design to end of life](#).

Inside our toolbox, you'll discover:

- [The Key Characteristics of Sustainable Chemistry](#) brought to life through clear explanations and vivid illustrations to inspire your thinking and guide decision-making at your work.
- [Powerful open-access tools & sources](#) including databases, workshops and free software to help you integrate sustainability into every stage of products, processes, innovations or project's life cycle.
- [Sustainable Chemistry in Others' Words](#) featuring voices of renowned leaders whose insights reflect the transformative potential of sustainability in action.

We hope that this collection will [empower and accelerate your Sustainable Chemistry efforts towards true, lasting impact](#) – whether you are shaping policy, driving research, enabling or pursuing education, building business solutions, investing in change, or engaging as a citizen.

We wish you lots of fun and inspiring insights as you explore your role in shaping a more sustainable future.

Your ISC3 Team

Simplified ISC3 Sustainable Chemistry

Key Characteristics for Innovators

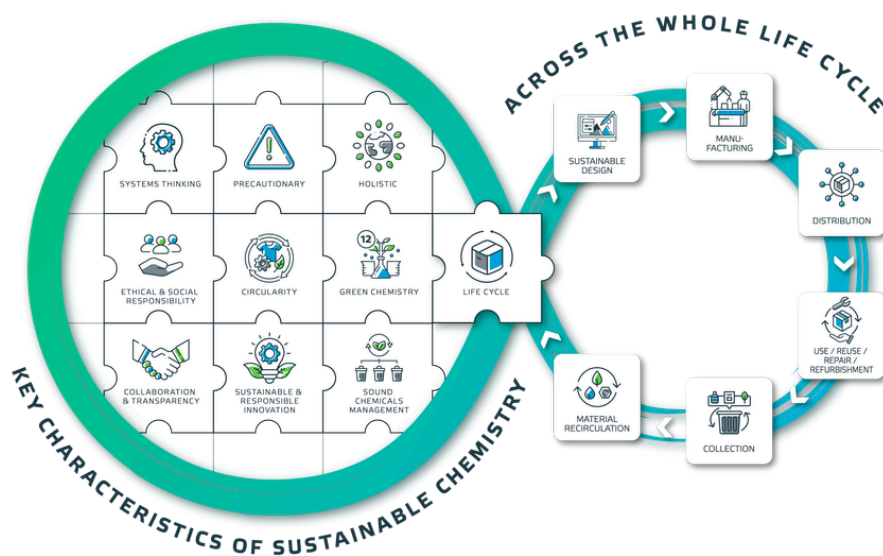


Why Sustainable Chemistry?

Sustainable Chemistry should be seen as a guiding principle for innovators to design their innovation in the way, that it contributes to sustainable development and provides economic and social benefits.

Sustainable Chemistry is more than being "eco-friendly"— it's a powerful innovation strategy.

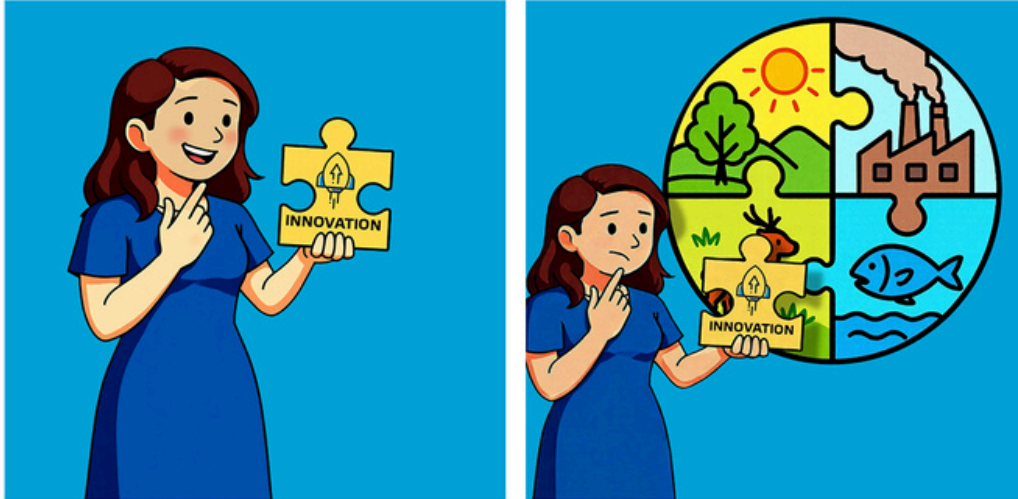
It helps you design solutions that support sustainable development and create economic and social value. Whether you're a start-up, established enterprise, non-profit organisation, or public institution, it means shifting from simply scaling products to building trust, creating long-term value, and solving real-world problems. It's about designing for people, the planet, and future generations.



"We do not inherit the Earth from our ancestors, we borrow it from our children."
Native American Proverb

1. Think HOLISTICALLY

Look at the big picture. How does your innovation affect people, animals, and ecosystems —today and tomorrow, for generations to come? Consider every stage of its life cycle and the resources it consumes.



Ask yourself: What hidden consequences might this have?

2. Apply the PRECAUTIONARY Principle

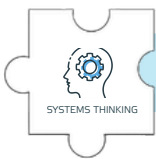
Don't fix one problem by creating another. Avoid shifting environmental, economic, or social burdens to other sectors, regions, or future generations.



Design with foresight. Think long-term.

3. Use SYSTEMS THINKING

Your innovation doesn't exist in a vacuum. It's part of a broader system — interconnected and constantly changing. Understand how it fits into that system and what ripple effects it might cause.



Zoom out: Who and what does this impact?

4. Uphold ETHICAL and SOCIAL RESPONSIBILITY

Innovation should be fair and inclusive. Respect human rights and consider how your work affects vulnerable groups. Design with transparency and justice in mind.



Create with purpose, centered on people and the protection of our planet.

5. COLLABORATE and Be TRANSPARENT

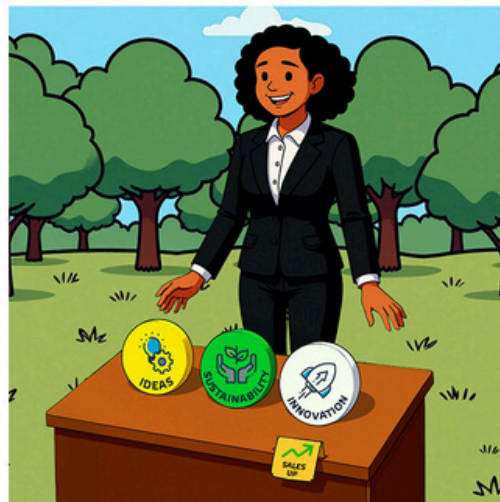
Bring in all voices — customers, communities, suppliers, regulators — from the very beginning, across the entire value chain. Openness builds trust, improves your innovation, and enhances long-term success.



Trust grows when knowledge is shared. Go far, together.

6. Innovate SUSTAINABLY and RESPONSIBLY

Don't aim to just sell more (new) chemicals — create smarter business models. Think services over substances. Focus on value, not volume.



Think solutions, not quantities. Explore win-win-win solutions: planet, people, profit.

7. Manage CHEMICALS and WASTE SOUNDLY

Design products that are safe, degrade harmlessly, and don't accumulate in nature — while also considering end-of-life waste management. This is especially important if your product enters water, soil, or the human body.



Design for harmlessness. Prevent pollution and waste before they occur.

8. Design for CIRCULARITY

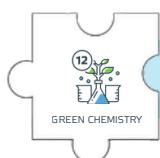
Resources are finite—even renewable ones. Design with end-of-life in mind. Recycling requires energy and chemicals, so make the initial design count.



Design smarter. Start with the end in mind.

9. Use and Go Beyond GREEN CHEMISTRY

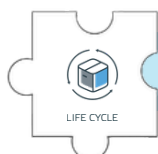
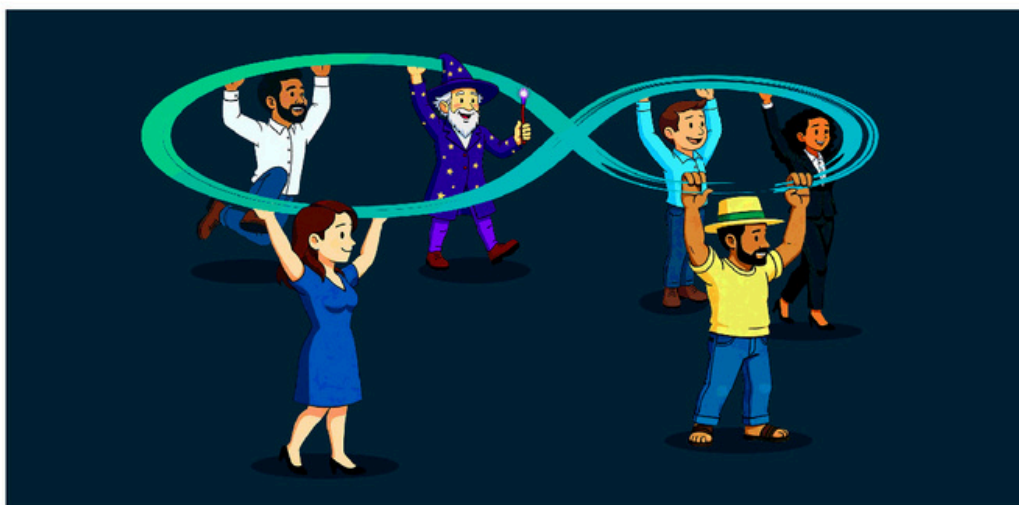
Apply the 12 Principles of Green Chemistry—and go further. Green Chemistry is a strong foundation, but Sustainable Chemistry demands a broader approach.



Greener is a start. Sustainable goes all the way.

10. Apply Sustainable Chemistry Across the WHOLE LIFE CYCLE

From raw materials to disposal—embed these key principles of Sustainable Chemistry throughout the product, process, and service life cycles. Be proactive, not reactive. Don't wait for regulations — lead the way.



Sustainability is a journey, not a checkpoint. Commit to it continuously.

Recommended freely available external tools & sources



ChemSelect

ChemSelect is a free online tool developed by the German Environment Agency to help companies assess the sustainability of chemicals and mixtures. It enables users to quickly generate sustainability profiles and compare substances based on environmental, health, and safety criteria. The tool uses automated evaluations, integrates regulatory data, and presents results through an intuitive traffic-light system. Designed especially for businesses—including SMEs—it supports manufacturers, mixture producers, and service providers in choosing safer and more sustainable chemicals. ChemSelect aligns with the EU's "Safe and Sustainable by Design" framework.



Safe and Sustainable by Design (SSbD) Toolbox

The Safe and Sustainable by Design (SSbD) Toolbox is an EU initiative developed under the Partnership for the Assessment of Risks from Chemicals (PARC) to operationalise the European Commission's SSbD Framework. It provides a structured collection of digital tools, models, methods, and databases to support designers, researchers, and industry in integrating safety, environmental sustainability, and functionality from the earliest stages of chemical and material innovation.



UNEP Green Chemistry Toolkit for SMEs

The UNEP Green Chemistry Toolkit for SMEs is a practical guidance package developed by the United Nations Environment Programme (UNEP) to help small and medium-sized enterprises apply green chemistry principles in their operations. It introduces core concepts such as safer chemical synthesis, reduced waste generation, efficient resource use, and life-cycle thinking. The toolkit offers step-by-step instructions, case studies, and self-assessment tools designed to enable SMEs—especially in developing economies—to identify improvement opportunities with limited resources or technical expertise.

For links click on the tool icon!



ChemSpider is a free online chemical structure database provided by the Royal Society of Chemistry (RSC). It offers access to over 100 million chemical structures, properties, and related information collected from more than 270 data sources. Users can search by chemical name, molecular formula, structure, or even by spectral data to find comprehensive information about specific compounds. ChemSpider serves researchers, students, and industry professionals, helping them quickly verify structures, explore physical and chemical properties, and connect to literature references.

PubChem, hosted by the U.S. National Institutes of Health (NIH), is one of the world's largest open chemical databases. It provides free access to detailed information on over 120 million substances, including chemical structures, physical properties, biological activities, safety data, and associated scientific literature. Users can search by structure, name, formula, or bioassay results, making it a go-to resource for researchers, innovators, and education.



QSAR Toolbox is a free software application developed by the OECD and the European Chemicals Agency (ECHA) to support chemical hazard assessment using Quantitative Structure–Activity Relationship (QSAR) and other computational methods. It enables users to predict toxicological, ecotoxicological, and physicochemical properties of chemicals based on structural similarities, experimental data, and mechanistic information. The Toolbox helps regulators, scientists, and industry professionals fill data gaps, reduce animal testing, and comply with safety assessment requirements under frameworks like REACH.

OpenLCA is a free, open-source software for conducting Life Cycle Assessment (LCA) studies—developed by GreenDelta GmbH. It allows users to quantify environmental impacts across a product's full life cycle, from raw material extraction to disposal or recycling. The software supports major datasets (e.g. ecoinvent, Agrifootprint, ELC D) and multiple sustainability indicators such as carbon footprint, resource depletion, and toxicity potential.

Sustainable Chemistry in Other(s) Words

**"Price is what you pay.
Value is what you get."**

Warren Buffet

**"There is no such thing as 'away'.
When we throw anything away,
it must go somewhere."**

Annie Leonhard

**"Circularity is not just about recycling,
it's about rethinking the system."**

Ellen MacArthur

**"You cannot escape the responsibility
of tomorrow by evading it today."**

Abraham Lincoln

**"The whole is more than
the sum of its parts."**

Aristoteles

**"If you want to go fast, go alone.
If you want to go far, go together."**

African Proverb

**"Green Chemistry focuses on how to
do chemistry. Sustainable Chemistry
asks why and if chemistry should be
done at all."**

Dr. Klaus Kümmerer

**"An ounce of prevention
is worth a pound of cure."**

Benjamin Franklin

**"We can't solve problems by using
the same kind of thinking
we used when we created them."**

Albert Einstein

**"Sustainability is no longer
about doing less harm.
It's about doing more good."**

Jochen Zeitz





Contact

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