Training workshop

Serbia – Chemicals and Waste Management

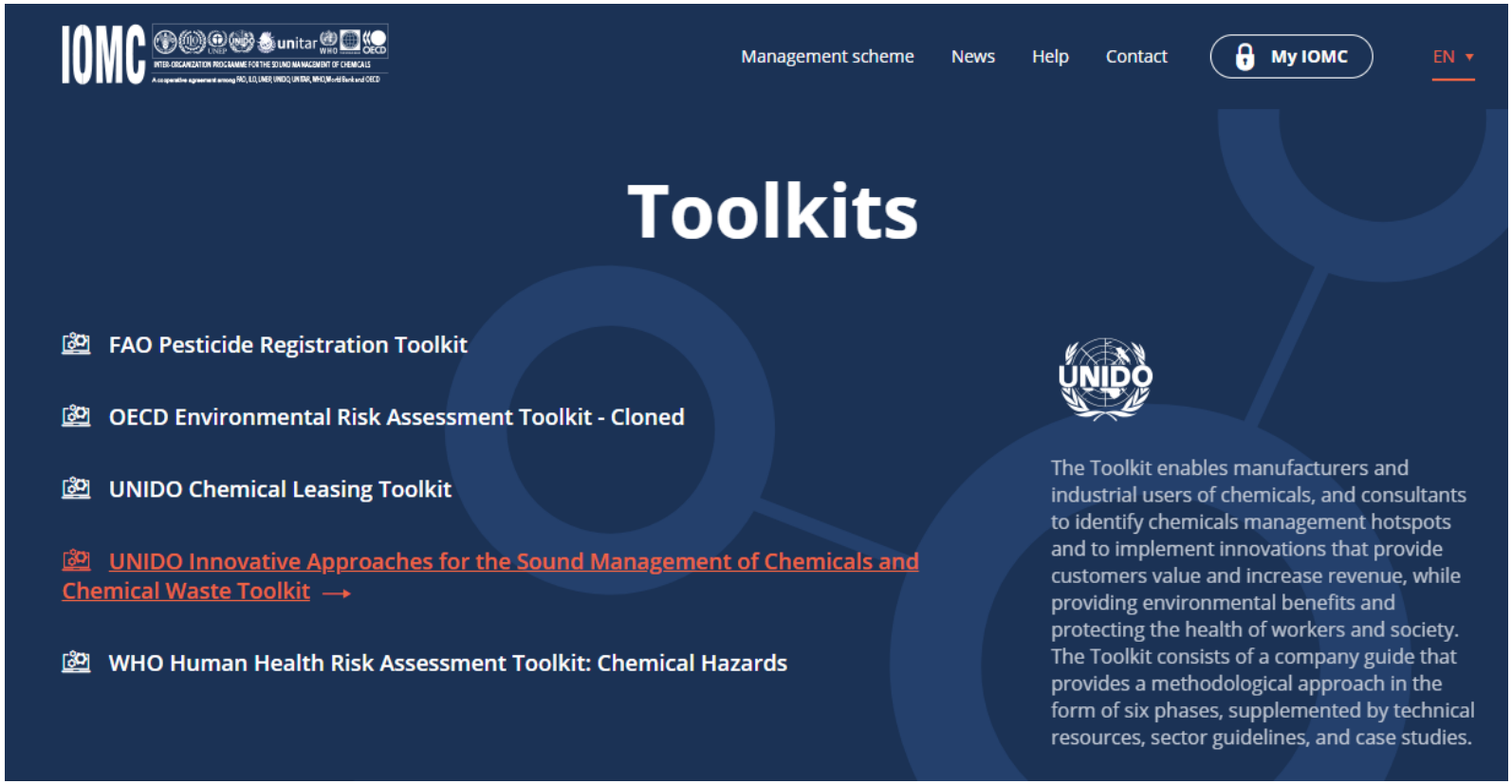
Geneva, Switzerland (11 – 15 September 2023)

UNIDO Innovative Approaches for the Sound Management of Chemicals and Chemical Waste Toolkit

UNIDO Green Chemistry Toolkit

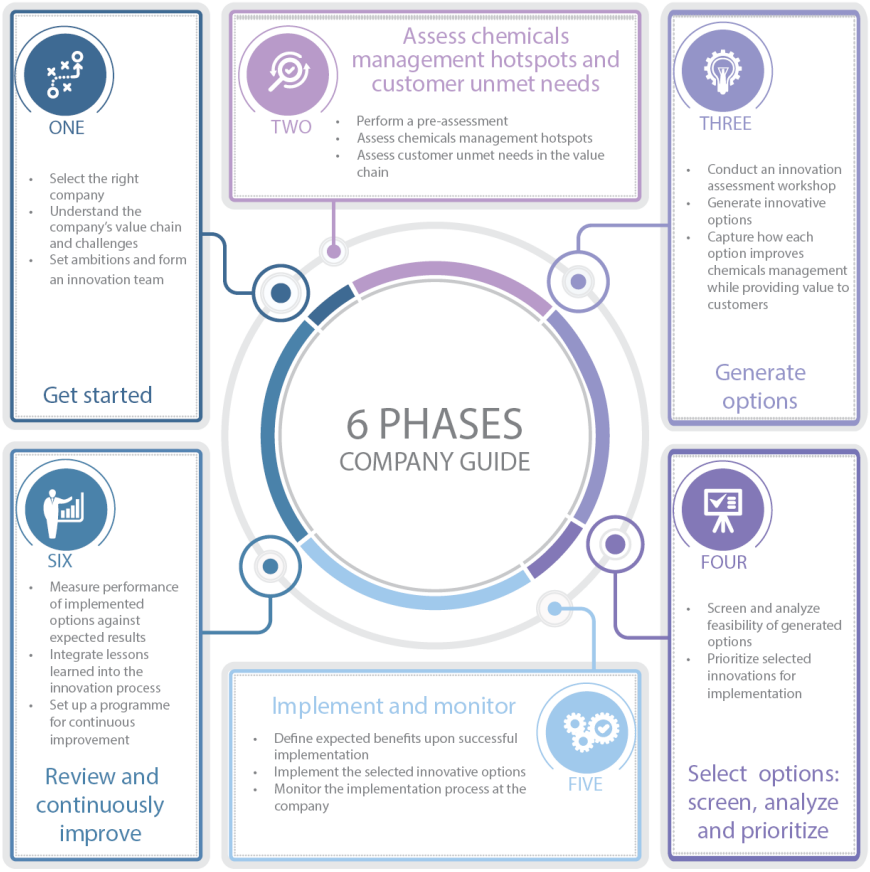
Global Greenchem Innovation and Network Programme (GGINP)

The IAMC toolkit is part of the IOMC toolbox



toolbox https://ocde-iomc-toolbox.preprod.agence-modedemploi.fr/

What is IAMC?



"Innovative Chemical Approaches – environmentally sound management of chemicals and chemical wastes" is to achieve a reduction of chemicals consumption, both in production and in application of chemicals.

IAMC falls under the umbrella of the global joint UNIDO-UNEP Programme on Resource Efficiency and Cleaner Production (RECP) in Developing and Transition Countries, and is financed SECO.

IAMC Objectives

- Provide the chemical industry and consultants of the chemical industry with a practical toolkit (methodology & technical resources) to improve the *Sound Management of Chemicals (SMOC)* across their company's products' value chain while increasing business performance through innovation.
- In particular, the Toolkit aims at…
  - Improving (chemical) resource productivity
  - Reducing pollution intensity, especially chemical waste
  - Improving health and safety of society and the environment and reducing risk of accidents
  - Eliminating hazardous chemicals/processes or substituting them with safer ones
  - Improving business productivity and generating value for customers
  - Providing a framework for sustainable innovation

IAMC Toolkit

https://iamc-toolkit.org/

https://iamc-toolkit.org/

IAMC Toolkit Target Audience

- **Producers** of chemicals (synthesis of chemicals)
  e.g. acid and dyestuff production

- **Formulators** of chemical products
  e.g. printing inks, paints, fertilizers

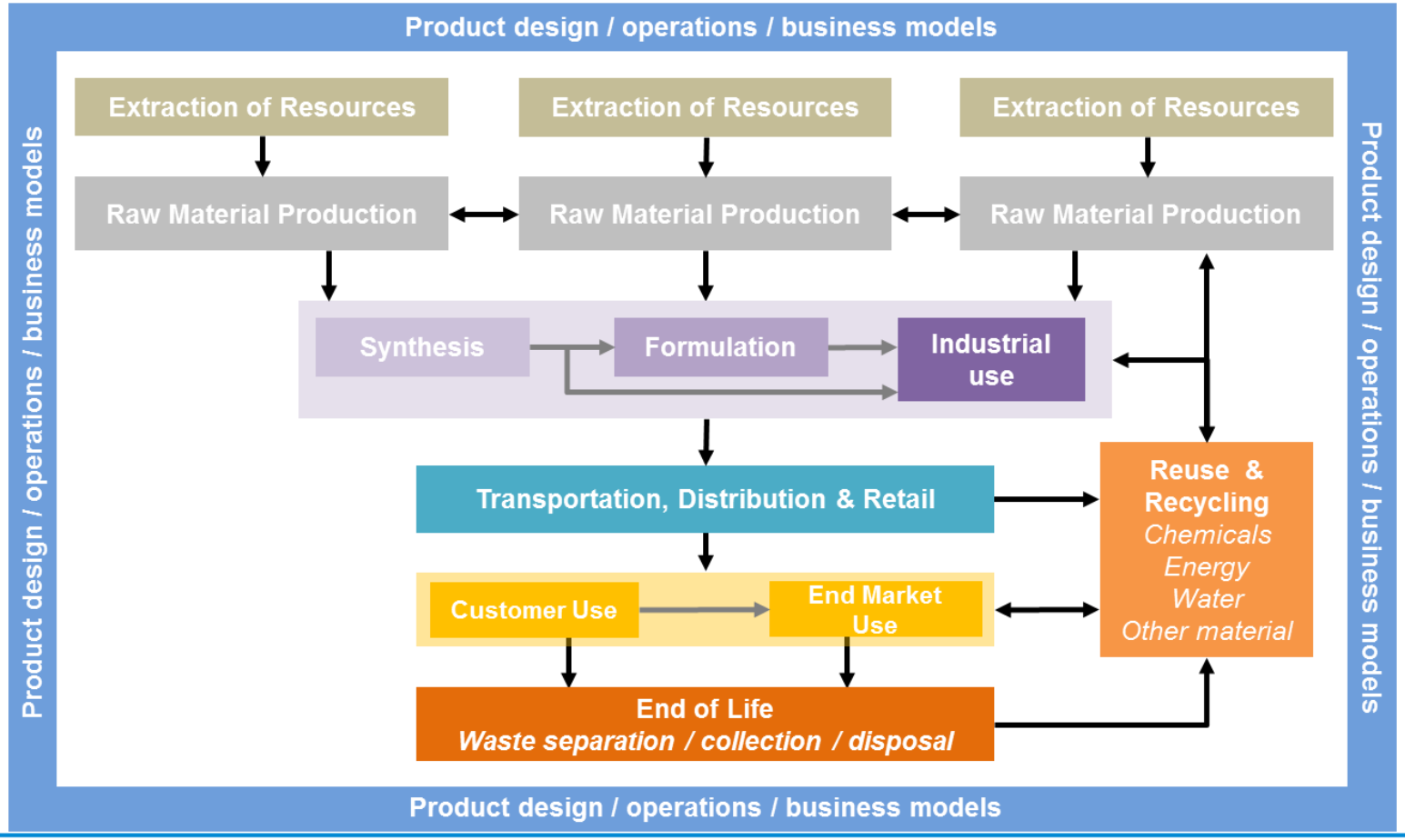
- **Industrial users** of chemical products
  e.g. metal finishing, surface coating, production of furniture, plastic and foam products

IAMC Toolkit - Structure

- The Toolkit consists of a Methodology package supplemented by three Technical Resource Packages (TRP), Sector Guidelines and Case Studies.

- The Toolkit user can select a Topic of interest by reviewing the content of the technical resources or following recommendations in each Methodology phase.

Toolkit Methodology - Life Cycle Approach



Raw material extraction and processing

Synthesis
Commodity
Specialty
Fine

Formulation
Commodity
Specialty

Industrial use
Surface cleaning, coatings, textile processing, construction…

Life science
Personal care
Agriculture

End market use & disposal

Chemical products' value chain

Customer unmet needs

- Secondary customer jobs
- Primary customer jobs
- Desired outcomes (gains)
- Undesired outcomes (pains)

Innovations improving *chemicals management* & *business performance*

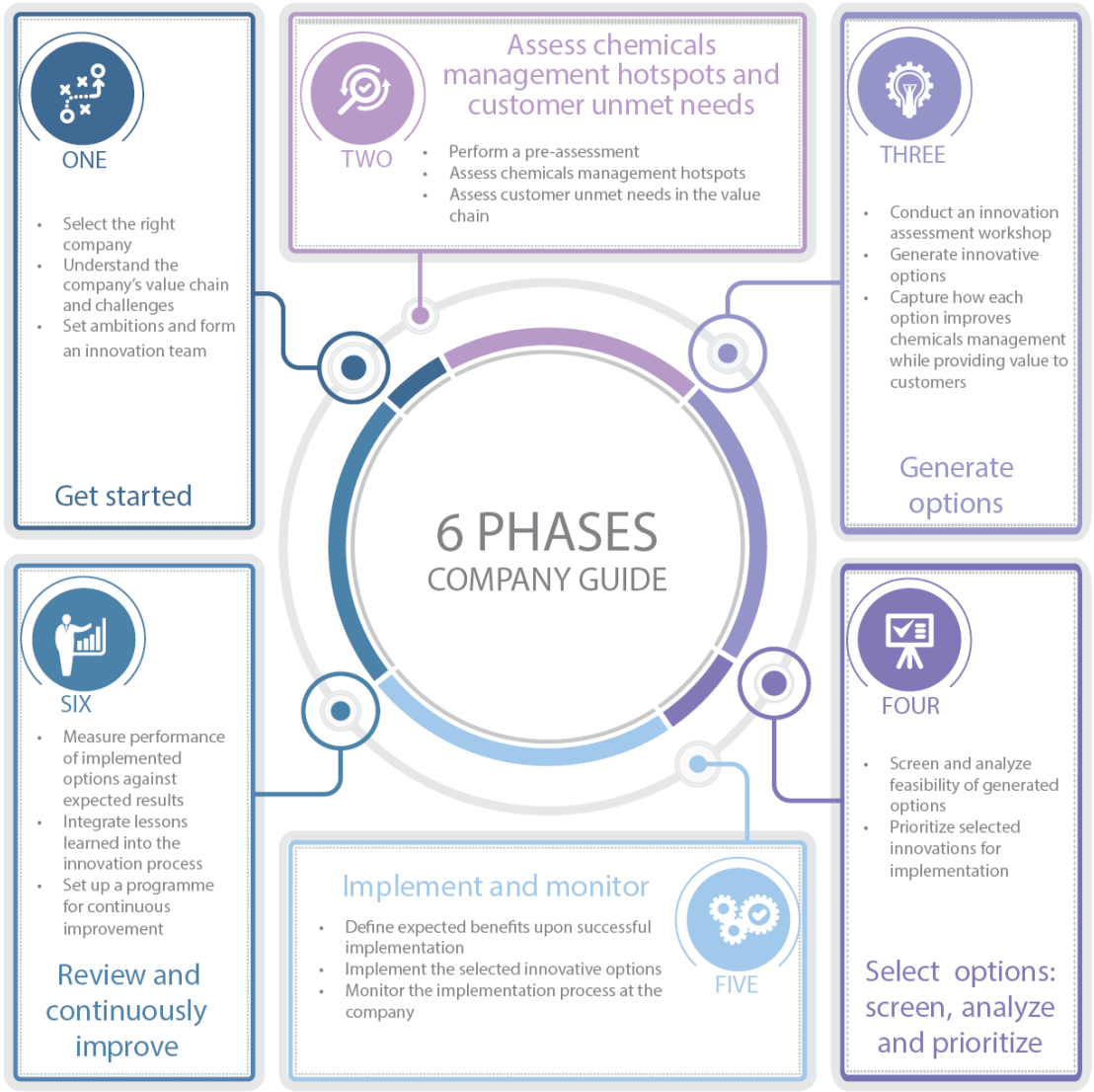
Products	*What is offered to customers*
Production techniques	*How the products are made*
Management practices	*How effectively the organization achieves its objectives*
Business models	*How value is created, delivered and captured*



Chemicals management hotspots

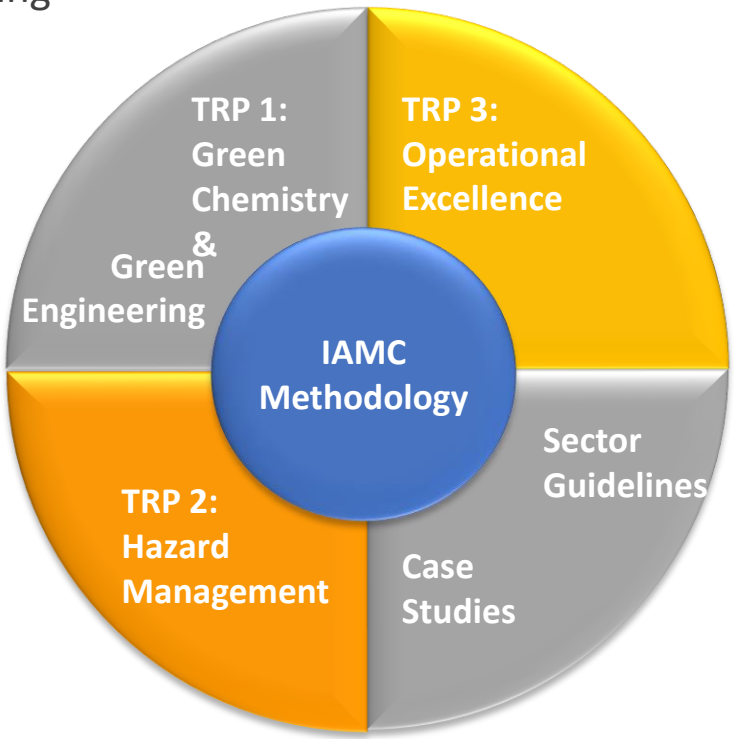
- Resource use & renewability
- Pollution & ecosystem impacts
- Health & safety
- Economic

The IAMC Toolkit 6 phases company guide for implementing innovative chemicals management



IAMC Toolkit – Technical Resources

- Technical Resource Packages (TRP)
  - TRP1: Green Chemistry and Green Engineering
  - TRP 2: Hazard Management
  - TRP 3: Operational Excellence
- Sector Guidelines
  - Textile,
  - Paints and Varnishes,
  - Polymers, Rubber,
  - Tourism,
  - Contaminated sites, Maintenance
- Case Studies
  - Colombia, Egypt, El Salvador, Guatemala, Sri Lanka



Source: ISSPPRO

Technical Resource Package 1: Green Chemistry & Green Engineering

C1 Green Chemistry

C11 Introduction to green chemistry techniques

C12 Substitution of chemicals

C13 Secondary raw materials

C2 Green Engineering

C21 Resource efficiency potential

C22 Cleaning of process equipment and products

Technical Resource Package 2: Hazard Management

D1 Risk Identification/Safety

D11 Chemical classification and labelling

D12 Risk identification

D13 Safety rules

D14 Personal protective equipment

D15 Skin protection

D16 Emergency escape ways

D17 Solvents, acids, bases handling

D18 Safety in gas tank handling

D2 Transport and Storage

D21 Internal transport of chemicals

D22 Internal pedestrian routes

D23 Storage

D3 Fire/Explosion Protection

D31 Fire protection

D32 Fire protection in welding and cutting operations

D33 Explosion protection

D34 Container cleaning

D4 Emergency Response

Technical Resource Package 3: Operational Excellence

E0 Overview

E1 Introduction to Operational Excellence

E2 Value Stream Mapping in the Chemical Industry

E3 Production Planning & Optimization

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and GREEN ENGINEERING *at* YALE

The Global Green Chemistry Initiative

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and GREEN ENGINEERING *at* YALE

The Project's goal and partners

To increase global awareness and technical capacities on deployable Green Chemistry approaches for the design of products and processes that advance global environmental benefits throughout their life cycles.

Funded by:

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Partners:

CENTER *for* GREEN CHEMISTRY
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SENAI Brazil
NCPC Colombia
NCPC Egypt
NCPC Serbia
NCPC Sri Lanka
NCPC South Africa

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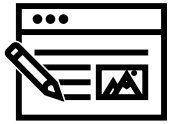
Project's components

1. Guidance document, training and awareness-raising

2. Green chemistry case study documentation



3. Monitoring and Evaluation

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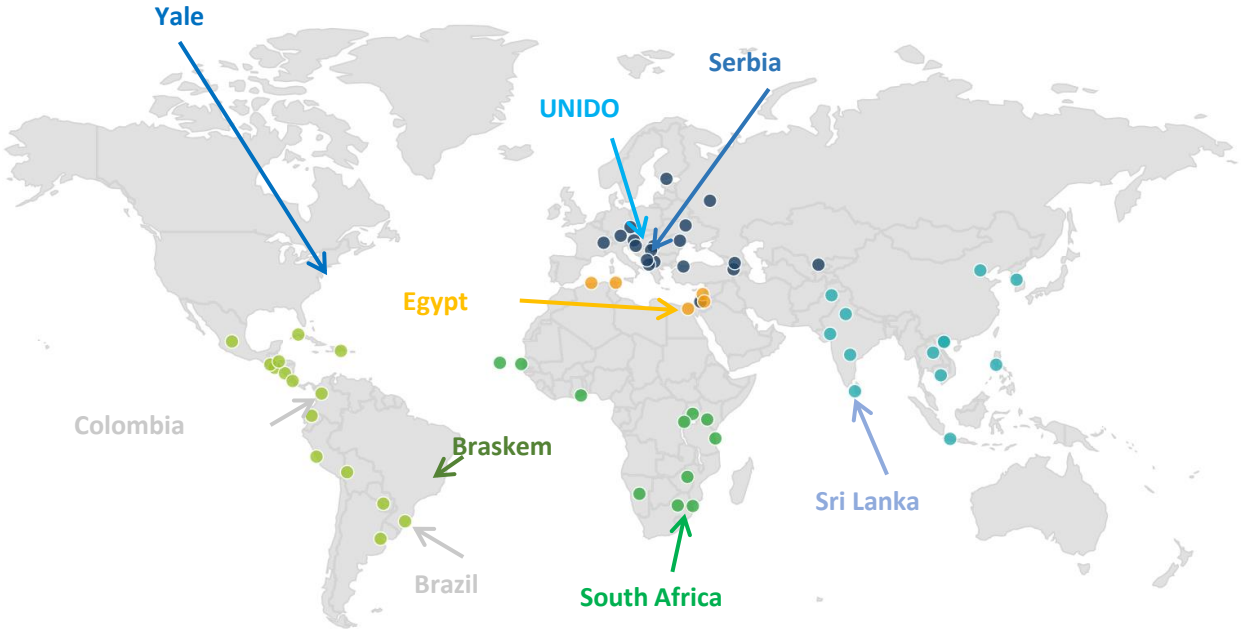
The countries



Inclusive and sustainable Industrial development

www.global-green-chemistry-initiative.com

www.unido.org


UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION
GREEN CHEMISTRY
TOOLKIT
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ABOUT
THE TRAINING
CASE STUDIES
VIDEOS
USEFUL MATERIALS
Search for ...

The Green Chemistry Toolkit is developed under the Global Green Chemistry Initiative – a project lead by the United Nations Industrial Development Organization (UNIDO) in partnership with the Center for Green Chemistry and Green Engineering at Yale University.

The partners aim to increase the general global awareness and capacities on deployable Green Chemistry approaches for the design of products and processes that advance global environmental benefits throughout their life cycles.

This Initiative strives to support inclusive and sustainable industrial development and contribute to the achievement of the Sustainable Development Goals (SDGs).

- The toolkit on this website explains Green Chemistry and its applicability in the industry in an interactive manner.

ASK

WHAT IS GREEN CHEMISTRY?
WHY TO USE THE GREEN CHEMISTRY TOOLKIT?
WHO CAN USE THE GREEN CHEMISTRY TOOLKIT?
HOW TO USE THE GREEN CHEMISTRY TOOLKIT?

LEARN KEY TOPICS

GC IN THE SOCIETY
SUSTAINABILITY
GREEN CHEMISTRY DEFINITION AND PRINCIPLES
DISASTERS AND UNINTENDED CONSEQUENCES
RENEWABLE FEEDSTOCKS
CATALYSIS
SOLVENTS
WASTE PREVENTION
METRICS
HAZARD MINIMIZATION
FROM THEORY TO PRACTICE
INNOVATION

FIND MORE

CASE STUDIES
VIDEOS
USEFUL LINKS
ABOUT UNIDO
LIST OF GREEN CHEMISTRY TECHNOLOGIES
1-DAY GREEN CHEMISTRY TRAINING
4-DAYS GREEN CHEMISTRY TRAINING

INTRODUCTION TO THE GREEN CHEMISTRY TOOLKIT TRAININGS

The training part of the toolkit has presentations, exercises and additional readings. The users should follow the presentations and put into practice what is learned in the exercises.

The additional readings will strengthen and expand the concepts learned in the main presentations.

"The Essential Green Chemistry Training": this 1-day training has two sessions: one on the fundamentals of Green Chemistry and the other one in the area of research and innovations of Green Chemistry.

The training has a QUIZ that will help the user determine how well the knowledge was absorbed.

"Expert training on Green Chemistry": this 4-day training has four long sessions that include the definition of sustainability, the role of chemicals in the society, economy and environment, the Twelve Principles of Green Chemistry, the benefits of Green Chemistry in the society, economy and environment, the different approaches to chemical design, advantages and disadvantages of various process feedstocks, the transformational role of catalysis on industry, the impacts of solvent usage and Green Chemistry alternatives, the role of Green Chemistry in innovation, and successful case studies or examples of green chemistry in industry and small businesses.

LIST OF GREEN CHEMISTRY TECHNOLOGIES

Here one can find a worldwide snapshot of Green Chemistry and green engineering technologies (available only in English) across a broad range of sectors and industries that include innovations to date that are currently commercially available or are in the process of becoming commercially available.

This tool allows companies, government agencies, non-government agencies, and academia to seek for Green Chemistry and green engineering solutions that are relevant to current projects or concerns in the area.

It is meant to be a compendium of Green Chemistry and green engineering technologies divided by sectors. Each entry includes the name of a technology and a short description of its applications.

The entry then lists the human health and environmental benefits of the technology, which explains how it is advantageous to the processes and technologies that are currently commonly used.

References are included with links, providing further information about the technologies and potential contact information for companies and agencies to pursue further information and potentially incorporate the technologies into their products and practices.

Global Greenchem Innovation and Network Programme

September 2023

Background information

- Green chemistry is the design of chemical products and processes to reduce or eliminate the generation and use of hazardous substances.
- The concept applies to all stages of the chemical product life cycle, from design through end-of-life and it is guided by 12 principles:

1. Waste Prevention
2. Atom Economy
3. Less hazardous chemical synthesis
4. Designing safer chemicals
5. Safer solvents and auxiliaries
6. Design for energy efficiency
7. Use of renewable feedstocks
8. Reduce derivatives
9. Catalysis
10. Design for degradation
11. Real time pollution prevention
12. Safer chemistry for accident prevention

Global Greenchem Innovation and Network Programme

Built on the GGCI, *the GGINP aims to scale up green chemistry for POPs, mercury and microplastics replacement through capacity building and innovation, and creation of a global unifying green chemistry network for implementation and uptake.*

Executing Agency:

Yale University as executing agency who will take the lead in the development of the activities of the project (Awareness and training, global coordination of the accelerator programmes and demonstrations.

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and GREEN ENGINEERING *at* YALE

Project duration:

6 years project

Project Components:

Component 1: Green Chemistry Inclusion Network for Capacity Building

Component 2: Green Chemistry Accelerator Programme

Component 3: Green Chemistry alternatives for POPs, mercury and micro-plastics for replication and up-scale

Global Greenchem Innovation and Network Programme

Component 1 - Green Chemistry Inclusion Network for Capacity Building

A Green Chemistry Inclusion Network for Capacity Building ("Network") will be established that goes beyond awareness raising and training within developing countries.

Component 2 - Green Chemistry Accelerator Programme

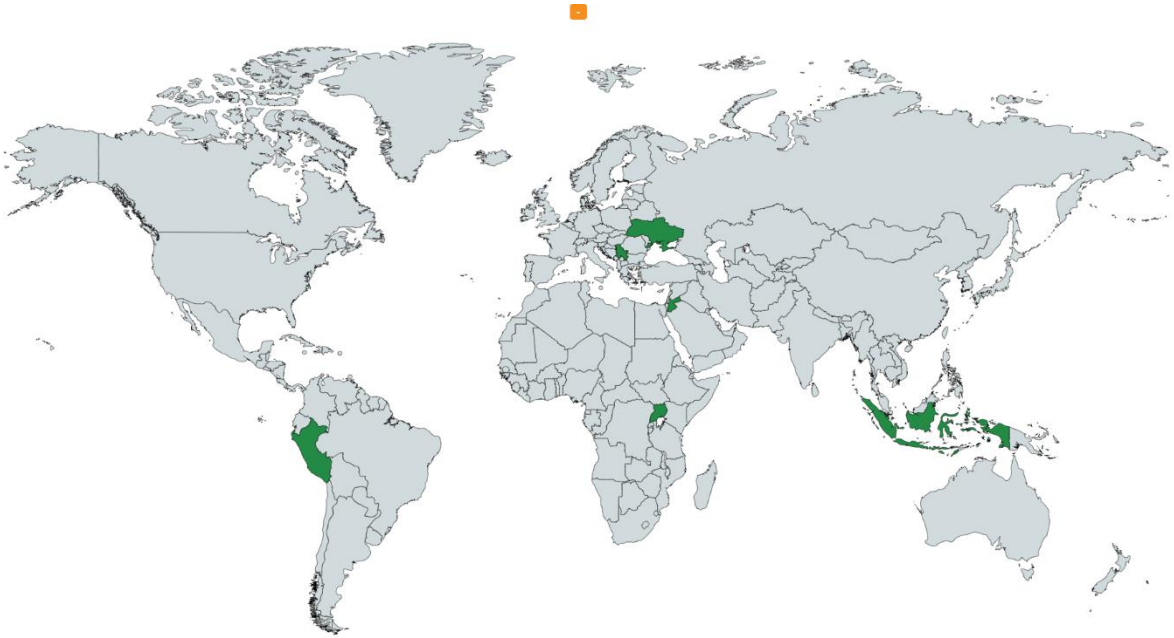
An accelerator programme to nurture Green Chemistry entrepreneurs and will support the development of demand-driven solutions by supporting bench-scale Green Chemistry and green engineering solutions that show promise to be scaled-up as commercialized technology.

Component 3 -
Green Chemistry alternatives for POPs, mercury and micro-plastics for replication and up-scale

Scaled-up GC alternatives to POPs, Mercury and microplastics at minimum five demonstration project locations with replication mechanisms of GC alternatives for national, regional and global level up-take.

Global Greenchem Innovation and Network Programme

- The national level activities of the components 2 and 3 of GGINP will take place in Indonesia, Jordan, Peru, Serbia, Uganda and Ukraine with the regional accelerator programmes covering Africa, Latin America, Easter Europe and South East Asia.



Thank you!

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