Annex A. Overview of Relevant Methods, Tools and Metrics

This is a non-exhaustive compilation of various methods, tools, and metrics specific to the chemicals perspective on sustainable plastics that could further help in the selection process. Further recommendations or guidance on the use of these tools is not within the scope of this report. These tools are listed here as examples and additional information on tools can also be found in Technical Tools and Approaches in the Design of Sustainable Plastics (OECD 2018b).

Measuring sustainability

Assessing Chemical Process Sustainability with Gauging Reaction Effectiveness for the Environmental Sustainability of Chemistries with a Multi-Objective Process Evaluator (GREENSCOPE) | US EPA – tool for the sustainability assessment of chemical processes

GaBi– Life cycle assessment (LCA) Software

LCIA: the ReCiPe model | RIVM - Methodology for the Impact Assessment in an LCA

SimaPro - LCA Software

The Economic Input-Output LCA tool | Carnegie Mellon University – Online tool to perform an Economic Input-Output LCA

Measuring circularity

Circle Scan | Circle Economy – Method to identify opportunities for companies, governments, and organisations to become more circular

Circular assessment | Circle Economy – Online tool to help businesses understand the different operational and organisational aspects of the Circular Economy

Circular IQ – Platform that helps optimise circularity of purchasing processes through data collection, reporting and analysis

Circular Transition Indicators Tool | WBCSD – Online software tool to measure a company's circular performance based on the Circular Transition Indicators

Circularity Calculator | IDEAL&CO – Tool to measure, communicate and improve the circularity of products.

Circularity check | Ecopreneur – Online tool determining the circularity of a product and/or service based on a questionnaire

Circulytics | Ellen MacArthur Foundation – Tool to measure circularity of companies

Cradle-to-Cradle certification – measure of safe and sustainable products based on the certification scheme of the Cradle to Cradle Products Innovation Institute

IMPACT (TNO) – Scientific method for establishing the circularity of products

Madaster Circularity indicator | Madaster & EPEA – Tool to determine the circularity of a building

Metabolism analysis | Metabolic – Method considering the material, energy, water and waste flows of cities, companies, and organisations.

Optimal SCANS – System for sustainable and circular purchasing and monitoring of organisations, products, and services

ReNtry | Rendemint – Part of the PRP circular E-procurement tool that ensures optimal preservation of resources

Recyclability assessment

APR Design ® Guide | The Association of Plastics Recyclers – guide for packaging designers to measure each aspect of a package design against recycling compatibility criteria per frequently used plastics

Design Guidelines | European PET Bottle Platform – General design guidelines for PET bottles

Recyclability By Design | RECOUP Recycling – Guidelines to help industry understand the full technicalities of plastic packaging recyclability.

RecyClass Tool | Plastics Recyclers Europe – Online tool that helps check the recyclability of packaging and gives advice on improvement

Chemical Hazard Assessment (CHA)

California Safe Consumer Products Alternatives Analysis Guide | Department of Toxic Substances Control – Comprehensive list of CHA methods and databases

CHA database | IC2 – Database to search for Greenscreen and Quick Chemical Assessment Tool assessments

Food Contact Chemicals database (FCCdb) | Food Packaging Forum - inventory on hazardous chemicals in plastic packaging with a priority list of chemicals to avoid

Groh, K. et al. (2020) "Overview of intentionally used food contact chemicals and their hazards." *Environment International,* Vol. 150.

Groh, K., et al. (2018). "Overview of known plastic packaging-associated chemicals and their hazards." *Science of The Total Environment,* Vol. 651, No. 2.

Globally Harmonised System (GHS) of Classification and Labelling of Chemicals United Nations Economic Commission for Europe (2021) (9th Revised Edition), New York and Geneva

GreenScreen® – Tool identifying hazardous chemicals and safer alternatives based on GHS and the US EPA Design for the Environment methods and including an overall chemical benchmark score

Plastics Scorecard Version 1.0 | BizNGO - scores polymeric materials by evaluating individual chemicals and aggregating their associated GreenScreen Benchmark scores

Quick Chemical Assessment Tool – developed by the Washington State Department of Ecology for small and medium enterprises with limited toxicological expertise and resources

Restricted Substances List | Cradle-to-Cradle Products Innovation Institute, - Restrictions to all products seeking Cradle to Cradle certification

Safer Chemical Ingredients List | US EPA – List of chemical ingredients organised by functional-use class based on the Safer Choice Program

Safer Choice Standard and Criteria | Safer Choice | US EPA – Standard that identifies the requirements that products and their ingredients must meet to earn the Safer Choice label

SIN list from ChemSec – List of chemicals identified for substitution based on their properties

Sustainable Futures | US EPA – Program that gives chemical developers the same risk-screening models that EPA uses

Toxicity Forecasting | US EPA - Toxicity Forecaster (ToxCast) includes data and predictive models on thousands of chemicals

Scivera Lens – Chemical Hazard Assessment tool with a system with 23 toxicological endpoints

Exposure Assessment

Exposure Map: Greggs, W. et al. (2019) "Qualitative Approach to Comparative Exposure in Alternatives Assessment", *Integrated Environmental Assessment and Management*, Vol.15, No.6.

Hierarchy of controls | NIOSH – Hierarchy of methods to control exposures to occupational hazards

Rapid Chemical Exposure and Dose Research | US EPA – Tools, models, databases, and other resources to estimate exposure for thousands of chemicals

Total Exposure Assessment Methodology (TEAM) | US EPA – Study that measured exposure to Volatile Organic Compounds in the air, drinking water and exhaled breath

Alternatives assessment

Design for the Environment Alternatives Assessments | Safer Choice | US EPA – Assessment that characterises chemical hazards based on a full range of human health and environmental information.

Online training on analysis of alternatives | ECHA – Introductory online training on analysis of alternatives to hazardous substances

Substitution and alternatives assessment tool selector | OECD – Tool selector provides information on online resources and software that can be used in conducting chemical substitutions or alternatives assessments

Databases, Life Cycle Inventory (LCI) datasets and Environmental Product Declarations (EPD)

CompTox Chemistry Dashboard | US EPA – Database of chemicals

CPCat Database | US EPA - Chemical and Product Database categorizing chemicals to usage or function

eChemPortal | OECD – Global Portal to Information on Chemical Substances

Eco-profiles | Plastics Europe – LCI datasets and Environmental Product Declarations (EPD) for plastics

EcoInvent database – LCI dataset

ECOTOXicology knowledgebase | US EPA – publicly available knowledgebase with toxicity data on aquatic life, terrestrial plants and wildlife

Information on Chemicals | ECHA– Source of information on the chemicals manufactured and imported in Europe

PubChem Compound database | US NLM - Database of chemicals

QSAR toolbox | OECD – Software application intended to fill gaps in (eco)toxicity data to assess the hazards of chemicals

Regulatory check

EUCLEF tool | ECHA - explains duties linked to chemicals under various pieces of EU legislation.

References

OECD (2018b), "Technical Tools and Approaches in the Design of Sustainable Plastics: Background paper 2. OECD Global Forum on Environment: Plastics in a Circular Economy", *Series on Risk Management*, No. 52, OECD, Paris, https://www.oecd.org/chemicalsafety/risk-management/technical-tools-and-approaches-in-the-design-of-sustainable-plastics.pdf