

Recovery and utilization of nutrients for low impact fertilizer



Deliverable 5.1: Risk and sustainability assessment

What is the deliverable about?

Run4Life embraces the approach of circular economy by demonstrating the recovery of nutrients and water from decentralised wastewater treatment technologies. With the intention of radically changing the outdated “end-of-pipe” concept, Run4Life aims at developing smart and innovative technologies to improve the recovery of nutrients from domestic wastewater with a decentralised approach.

This factsheet

This factsheet summarises the main outputs of deliverable 5.1 which can be downloaded from the Run4Life project website.

It is essential to ensure that the technologies developed by Run4Life, as well as the products obtained, are **safe** and **reliable** to use, **environmentally** friendly, **socially accepted** and **techno-economically viable**.

The risk and sustainability assessment of the different technologies and approaches in Run4Life are carried out in an integrated manner, taking into account the entire life cycle of Run4Life. These assessments are reported in the Sustainability Management Roadmap (SMR) with the aim to map all the criteria needed to deliver a safe and reliable product to the market. It describes the different risk and sustainability assessment criteria: **environmental** indicators and risks, **socio-economic** indicators, and **health** risks (see below). In this way, the SMR defines the pathways for Run4Life to achieve the project objectives.



Environmental

- Reduce emissions
- Minimize water consumption
- Decrease chemicals used
- Produce energy



Socio-economic

- Create new business opportunities
- Contribute to EU innovative solutions



Human health

- Evaluate risks related to obtained products
- Minimise adverse effects to human health





Data Collection

- Data from process monitoring
- Mass and energy balances



Data Evaluation

- Data quality
- Estimation of environmental indicators



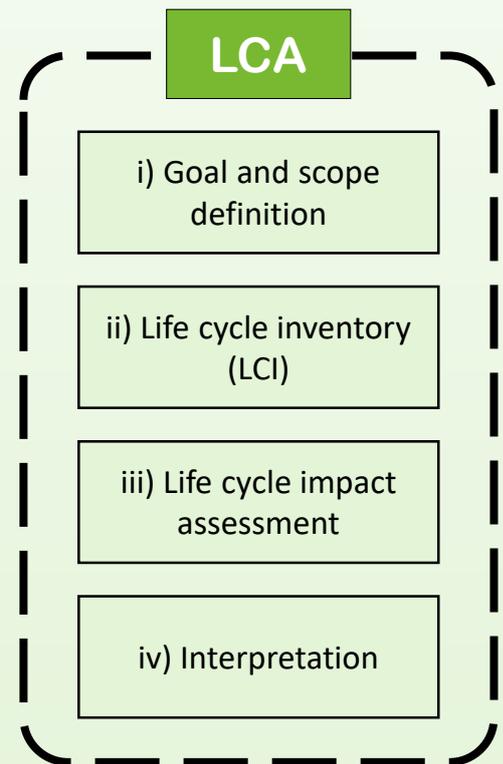
Future improvement

- Identification of key processes
- Specific improvement options

The environmental indicators, used to monitor the sustainability of the treatment schemes proposed in the project, can be divided into:

- indicators that explain the environmental aspects that should be considered, and
- Impact categories of the LCA methodology that show the environmental performance of the project.

The quantitative value of these environmental indicators will be expressed in terms of a functional unit (FU). This FU will be selected during the environmental assessment, but may be, for example, the volume of wastewater managed (m³ of wastewater managed) or the amount of nutrients recovered (kg of fertilizers recovered).



Environmental Indicators

Environmental aspects

- Direct and indirect energy flows
- Resource consumption and recovery
- Solid waste production and management
- Water use
- Direct and indirect GHG
- Quality of final products
- Nutrient discharge

Midpoint impact categories

- Climate Change
- Ozone depletion
- Photochemical oxidant formation
- Fossil fuel depletion
- Terrestrial acidification
- Aquatic eutrophication
- Water depletion
- Toxicity

Endpoint impact categories

- Damage to human health
- Damage to ecosystem
- Damage to natural resources

Socio-economic assessment

Resource recovery from wastewater provide certain socio-economic effects that can contribute to the overall impact of the treatment systems. These socio-economic effects can happen directly, indirectly, or through induced effects over the long term. These different levels of socio-economic effects, and the indicators that identify them are important to take into consideration, to be able to implement the Run4Life technologies as efficiently as possible and to create the desired socio-economic impact. Therefore, each indicator will have an associated proposed target to be achieved, which will vary between location, type of system and available information. The socio-economic effects will help provide an overview of the benefits and impacts towards implementing a resource recovery system.

Run4Life goes beyond technical implementation to promote market and social uptake:

- i) minimizing the risks through proactive mitigation,
- ii) implementing new Business Models;
- iii) boosting social and organizational innovation and
- iv) including the end-user perspective to achieve real use of the obtained products.

Socio-economic factors	Indicators	Proposed targets for Run4Life
Economic conditions	Food production	Increase agricultural productivity using high nutrient low impact fertilisers
	Household water expenses	Change household water bills
	Fertiliser production costs	Generation of 0.1 % of N and 0.2% of P of the total EU's demand of organic-based fertilisers in the next ten years reducing treatment and energy costs
Business	Revenue generation for SME nutrient fertiliser companies	Increase revenue generation for SME nutrient fertiliser companies
Social conditions	Training on nutrient recovery technology and water reuse	Local workers trained on nutrient recovery technology and water reuse practices
	Research and Development activities	Change in research and development activities in local companies and universities
	Participation in the Run4Life community meetings	Better informed public on nutrient recovery and water reuse in relation to current understanding
Environmental	Noise	Perceived improvement at the demo site area
	Odour	Perceived improvement at the demo site area
	Aesthetics	Perceived improvement with regard to wastewater treatment in the demo site area
Governance	Circular economy and/or nutrient recovery policies	Policy recommendations on water and nutrient reuse delivered to government or discussion initiated on including this in current governance structures.

Human health risk assessment

Risk assessment is one part of risk analysis and provides information on whether and how to manage risks within society to protect human health and the environment. Microbial risk assessment estimates the microbial risk, i.e. risks from infectious agents to human health. The health risk assessment of the complex wastewater valorisation systems that are included in the Run4Life project will involve several routes of transmissions and population subgroups at potential risk. Aspects of the Run4Life concepts for which the microbial risks should be assessed include the end consumers of produce fertilised or irrigated with Run4Life products. Furthermore, it should also assess the whole process and handling chain so occupational hazards can be assessed/minimized so that as a risk management control, points for the process can be established.

The assessment will be based on the analytical data on the levels of residual contaminants and microorganisms using Quantitative Microbial Risk Assessment (QMRA) to quantify microbial risk. Finally, in order to control and manage the risk a Hazard Analysis Critical Control Points (HACCP) will be used.

