ECODESIGN AT SEPPIC : CRITERIA AND CHALLENGES – Platform Presentation Paper.

Frederick Santos[1], Marie Ollagnier[2], Corinne Nawrocki[3],

1 Seppic Singapore - No. 2 Venture Drive, #22-28 Vision Exchange, Singapore 608526
2 Seppic SA - Paris site : 50 bd National, 92257 La Garenne-Colombes, France
3 Seppic SA - Castres site : 127, chemin de la poudrerie, 81105 Castres, France

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ABSTRACT :

Conscious innovation is a cornerstone of our Seppic Corporate Social Responsibility program, called Caring. Promoting renewable and sustainable resources, reducing the carbon impact of our new ingredients, and reducing the impact on biodiversity both upstream and downstream of the value chain, are at the heart of our strategy.
Seppic ecodesign approach is aiming to help all internal teams systematically integrate environmental aspects into the design and development of ingredients and to find the best balance between environmental, social, technical, and economic requirements.
To this end, Seppic has created a tool measuring the environmental impact of an ingredient in terms of carbon emissions, water consumption, or waste throughout its life cycle — from raw materials to end of lifecycle, inclusive of production and transportation.
In the proposed presentation, Seppic will share the pillars of its sustainability program Caring, its social and environmental objectives and will give details on the ecodesign approach deployed to progress towards these goals.

1. INTRODUCTION

Ecodesign aims to systematically integrate environmental aspects from the design and development of products with the objective of reducing negative environmental impacts throughout their life cycle with equivalent or superior benefits.

This approach aims to find the best balance between environmental, social, technical and economic requirements, from the start of a design process.

At Seppic, we have prioritized the reduction of our impacts on the climate and biodiversity when they are related to our operations and our products. Our ecodesign program for the development of new ingredients is essential to act in the long term by assessing all the potential environmental impacts throughout the life cycle of this ingredient, and implementing actions to reduce the biggest impacts while maintaining equivalent or superior benefits.

To achieve this goal, a tool that makes it possible to measure the environmental impacts of an ingredient on multiple criteria (for example in terms of carbon emissions, water consumption or waste generation), and through various steps of its life cycle, has been created.

Thanks to this proprietary ecodesign tool, it is possible to simulate several possible options and to identify how to best improve the ingredient to find the best balance between its performance and its environmental impacts.

2. SEPPIC ECODESIGN PROGRAM: A MULTI-STEPS APPROACH

Seppic ecodesign tool evaluates the impacts of a specific ingredient from different steps of its life cycle, from its raw materials to end of life, including production and transport.

More specifically, the program focuses on four main steps where the impacts are assessed based on different criteria, which can be quantitative or qualitative. The details on each of the steps are described below.

In parallel with the ingredient assessment, similar information has to be collected on a benchmark product, or a control, in order to make a comparative analysis of the impacts and to identify the main improvements to target.

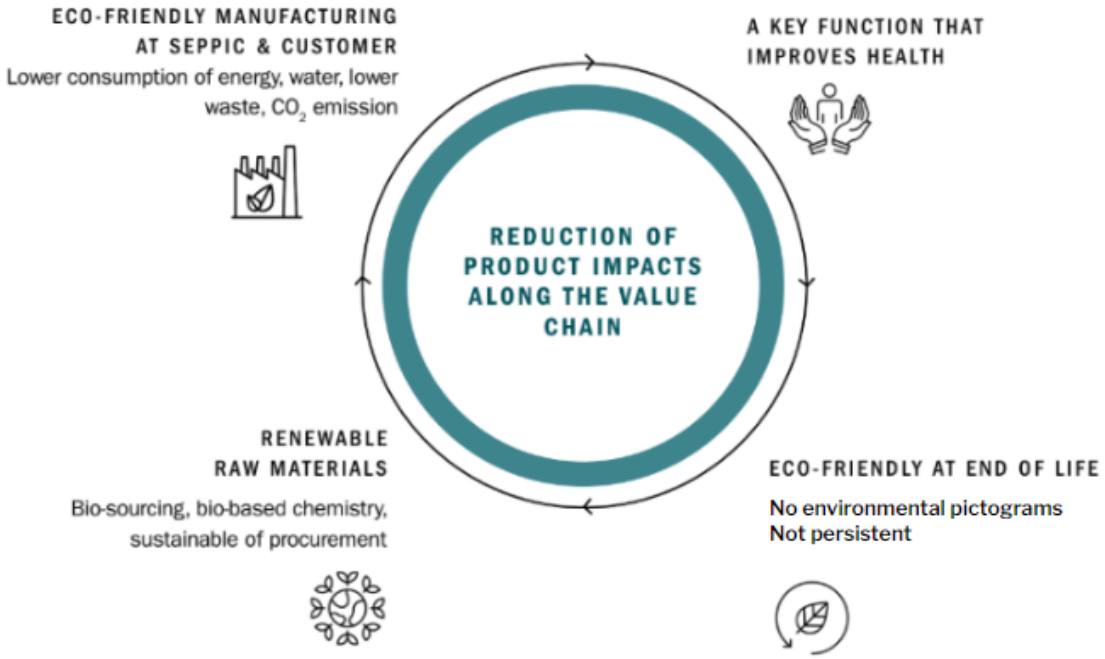

Figure 1 - Main steps of the ingredient life cycle assessed in the ecodesign program

2.1. STEP 1 - IMPACT OF THE RAW MATERIALS SOURCING

A raw materials scoring of the ingredient is performed by assessing various data collected for the raw materials used. Such data comprises the raw materials origin, their manufacturing and production processes, their transportation and their impact on biodiversity. Some bonus and malus benefits are also added for end of life and pollution impacts of the ingredients as well as the societal impact on the local communities of our supply chain.

This step aims in an ongoing systematic monitoring of the environmental impact of ingredients' sourcing and implement actions to continuously make progress in reducing negative effects and promote good practices. For instance, Seppic is continuing its program to ensure that all of its sourced palm oil will be "Mass Balance" certified by 2025. In 2022, 98% of Seppic's palm oil inputs were Mass Balance certified and the rest

were covered by the Book & Claim certificates of small, independent producers, meaning all sourced palm oil was certified. Since 2019, Seppic has been producing annual traceability reports for its procurement with the help of Transitions, followed by ASD (Action for Sustainable Derivatives). Progress continues to be made in this regard. In 2021 – for the second time – an assessment of main palm oil suppliers was conducted using the Sustainable Palm Index (SPI) methodology developed by Action for Sustainable Derivatives (ASD). Seppic's own palm oil strategy was assessed using SPI methodology and a score of 94/100 was obtained, an improvement compared to the 91/100 the year before, illustrating the significant progress made with regard to sustainable palm oil in the last years. In addition, Seppic encourages and supports planters not yet involved in the RSPO certification process by contributing to the governance and financing of a collective field project (the Keleka-led Mosaik Initiative) with five other ASD members, which aims to restore the ecosystem and stimulate economic growth in two of the most important palm producing regions in Central Kalimantan, Indonesia. Our commitment began in 2022 for a period of 5 years.

Another pathway investigated by Seppic to reduce its impact on the environment is to consider the valorisation of by-product by low cycling, recycling or upcycling approach. For instance, in 2019 a collection of algae-based waters was launched with cosmetic benefits. These by-products are obtained by a low-energy evaporation process (gentle drying) made on the residual algae engaged in an existing industrial production.

2.3. STEP 2 - IMPACT OF THE MANUFACTURING

The second step of the assessment focuses on the criteria related to the ingredients production. It consists in the collection and calculation for the quantification of inputs and outputs of the studied system. Inputs and outputs concern energy and water consumed, and other physical inputs such as solvent, waste and emissions to air, water and soil. These data are reported in a specific assessment grid designed for the ecodesign program.

The impact of the manufacturing of the ingredient during the production of the finished cosmetic product (at the customer) is taken into account with qualitative bonuses when

the ingredient has limited energy or water consumption impact (for instance if it is cold processable or if it requires low amount of water or stirring).

The objective of this assessment is to identify the environmental impact of a production process and what improvements could be made to reduce it.
For example, the process to manufacture xylitylglucoside was reworked. This polyol polyglycoside, which is a powerful moisturizing agent that acts on the skin's surface layers, and more deeply with a restructuring effect was initially obtained by solvent-based process using butyl glucoside. The historical process has been replaced by a direct approach that eliminated one intermediate step and reduced heating.

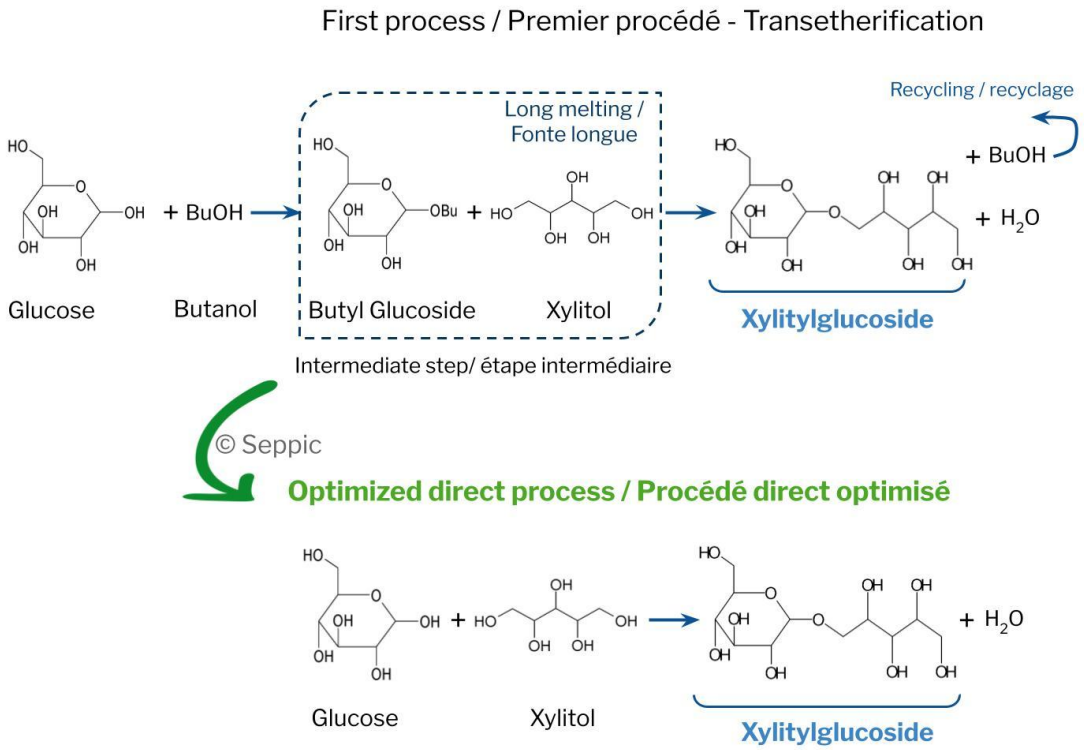

Figure 2 - Processes comparisons

The elimination of the solvent and of the intermediate step requiring heating enabled to decrease the carbon footprint of the manufacturing process by 30,6%, as it is demonstrated in the chart 1.

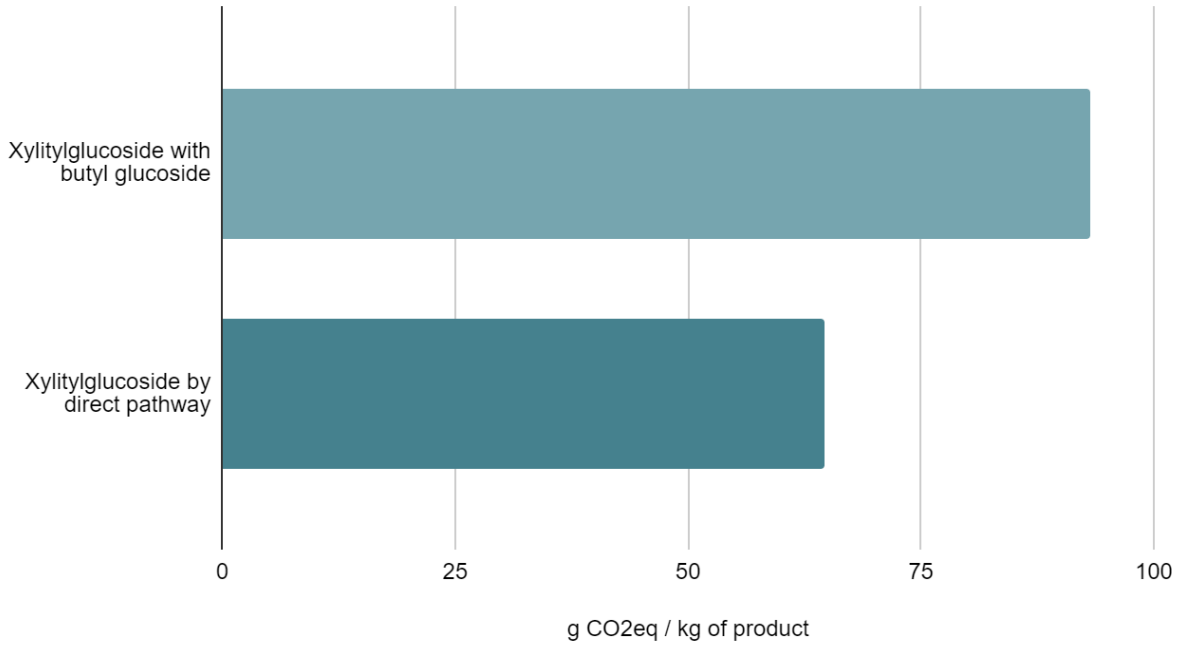

Chart 1 - Comparison of Xylitylglucoside carbon footprint from manufacturing processes with butyl glucoside or by a direct approach

Sometimes, the biggest environmental impact is not related to the manufacturing process itself, but from the water consumption, or the waste generation. Thus, it is important to reduce and improve the water footprint but also to reduce or valorize the waste that can be generated in large quantities.

For instance, alkyl polyglycosides (APG) are obtained by glycosylation of a reducing sugar with an excess of molten fatty alcohol. The reaction produces water, which is progressively eliminated, as well as APG. Excess fatty alcohol, whether of long or short chain, is either retained or evaporated depending on the properties desired for the final surfactant.

Plant biomass residues from the manufacturing process are recycled locally in farms near their manufacturing site. These residues are mixed with pig manure and then introduced into a digester to produce biogas (methane and CO2) used for electricity production. Non-volatile elements, or compost, are used as a natural fertilizer on the farm. Compared to the conventional process of destruction by incineration, this recycling process initiated in 2017 reduces the equivalent of around 100 tonnes of CO2 emissions per year.

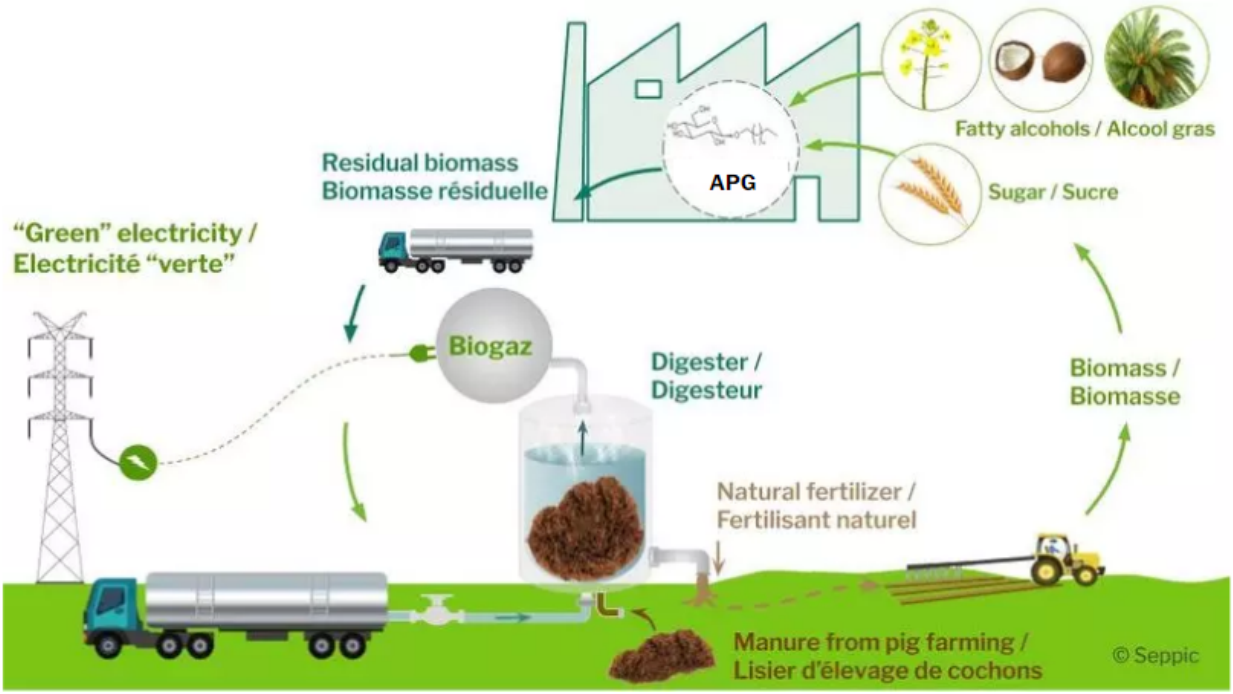

Figure 3 - Recycling of plant biomass from the APG manufacturing process

2.4. STEP 3 - USE PHASE

As it is very difficult to assess the use phase impact of an ingredient used in a large variety of applications, the Seppic ecodesign program considers only the health and well-being benefits in the use phase of the ingredient.

2.5. STEP 4 - END OF LIFE

The end-of-life stage begins when the product is discarded after its use and ends when the product is returned to nature or enters another product cycle. Seppic ingredients are used in the composition of products whose end-of-life must be taken into account from the conception of the ingredients, particularly with regard to biodegradability and ecotoxicity. In Seppic ecodesign program, the assessment of the environmental impact of an ingredient at the end of life is based on robust tests and analyses of its ecotoxicity and its persistence in the environment.

Within the framework of regulations within Europe (Registration, Evaluation, Authorisation and Restriction of Chemicals, REACH) and outside Europe, tests on biodegradability and ecotoxicity in aquatic environments should be carried out on products. Laboratory tests enable us to evaluate the environmental fate of substances via studies assessing persistence (ultimate biodegradability). Regarding biodegradability, Seppic follows the OECD 301 and 302 test guidelines and has been working on improving the biodegradability of its cosmetic ingredients.

3. SEPPIC ECODESIGN PROGRAM METHODOLOGY

The Seppic ecodesign program is divided in six different stages, based on an iterative approach, which enables continuous improvement of the environmental impact of a new ingredient during its development, from the laboratory down to the scale-up phase.

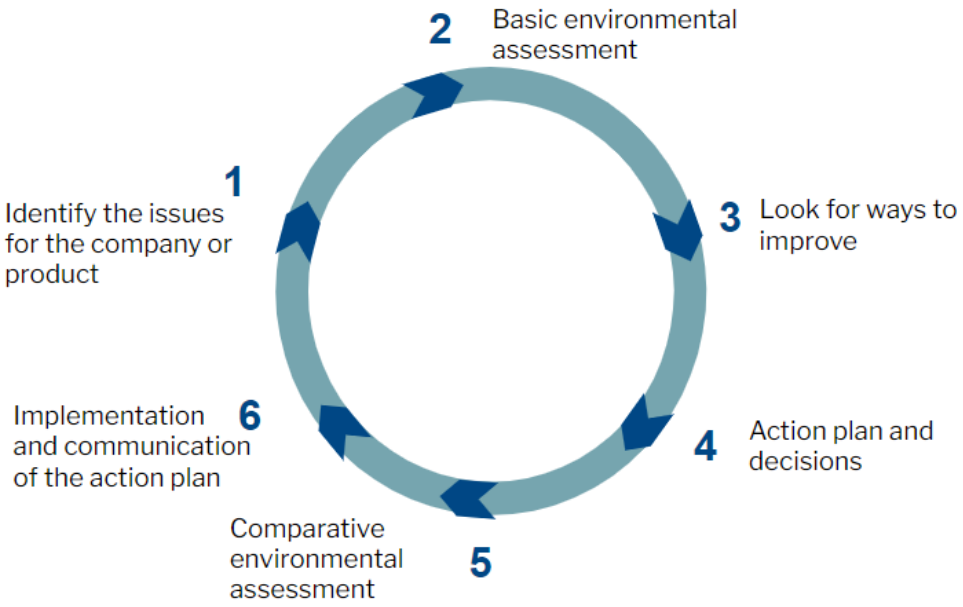

Figure 4 - The different stages of the ecodesign process

3.1. STAGE 1 - IDENTIFY SEPPIC AND INGREDIENT KEY CHALLENGES AND SPECIFICATIONS

The first step is to identify the challenges for the company and the specifications of the ingredient in order to size the eco-design project best suited to the context. In this upstream development phase, this first stage lasts until the laboratory designs a first prototype with the performances targeted in the specifications. Once a first ingredient composition and a rough process is known, the program can move to the second stage.

3.2 STAGE 2 - BASIC ENVIRONMENTAL ASSESSMENT

The initial environmental assessment identifies the environmental impacts of the ingredient using the multistep approach in order to take into account the whole

ingredient's life cycle. This assessment leads to a comparison of the ingredient impacts to a benchmark or a control.
This initial assessment serves as the basis for defining the ingredient environmental profile and for identifying key area(s) of improvement.
The deliverables of this stage are the raw materials score, the macroscopic and simplified life cycle analysis (LCA) made with the manufacturing and processes data collected, including a first estimate of the product carbon footprint.

3.3. STAGE 3 - IMPROVEMENT STAGE

The two first stages of the approach and the initial environmental assessment made it possible to identify the objectives of the project and the problems to be solved. The stage 3 is driven by idea generation and creativity in order to search eco-design potential solutions. Then, the eco-design project group proposes strategies for the steps of the ingredient life cycle which have been demonstrated in the basic assessment to be critical. The environmental impacts of different scenarii is considered, weighted with an estimate of the resources necessary for their implementation.
Throughout this stage, the assessment tools serve as a support to evaluate the interest and relevance of the proposed strategies.

3.4. STAGE 4 - ACTION PLAN AND DECISION

The action plan and decision stage is the step of prioritizing eco-design options, through scientific data and formal arguments, in order to validate the best choices balancing the environmental, social and economic aspects.

3.5 STAGE 5 - COMPARATIVE ENVIRONMENTAL ASSESSMENT

The environmental assessment stage of the final “eco-designed” solution is carried out taking into account the selected strategies. It is compared with the reference situation defined in Stage 2. This comparative analysis verifies that there has been no transfer of any environmental impact and therefore that the new solution is improved for the environment compared to the initial solution.

3.6 STAGE 6 - IMPLEMENTATION AND COMMUNICATION

In this last stage, the ecodesign project group ensures that all actions have been taken into account and deployed by the various departments considered. The final ecodesigned ingredient is launched on the market with robust data demonstrating how its environmental profile has been assessed and improved during the development process.

CONCLUSION

Seppic ecodesign program aims to develop new performing ingredients while taking into account environmental, social and economic requirements. As of 2024, 100% of the innovative new ingredients Seppic will launch will have been developed using this ecodesigned approach.

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