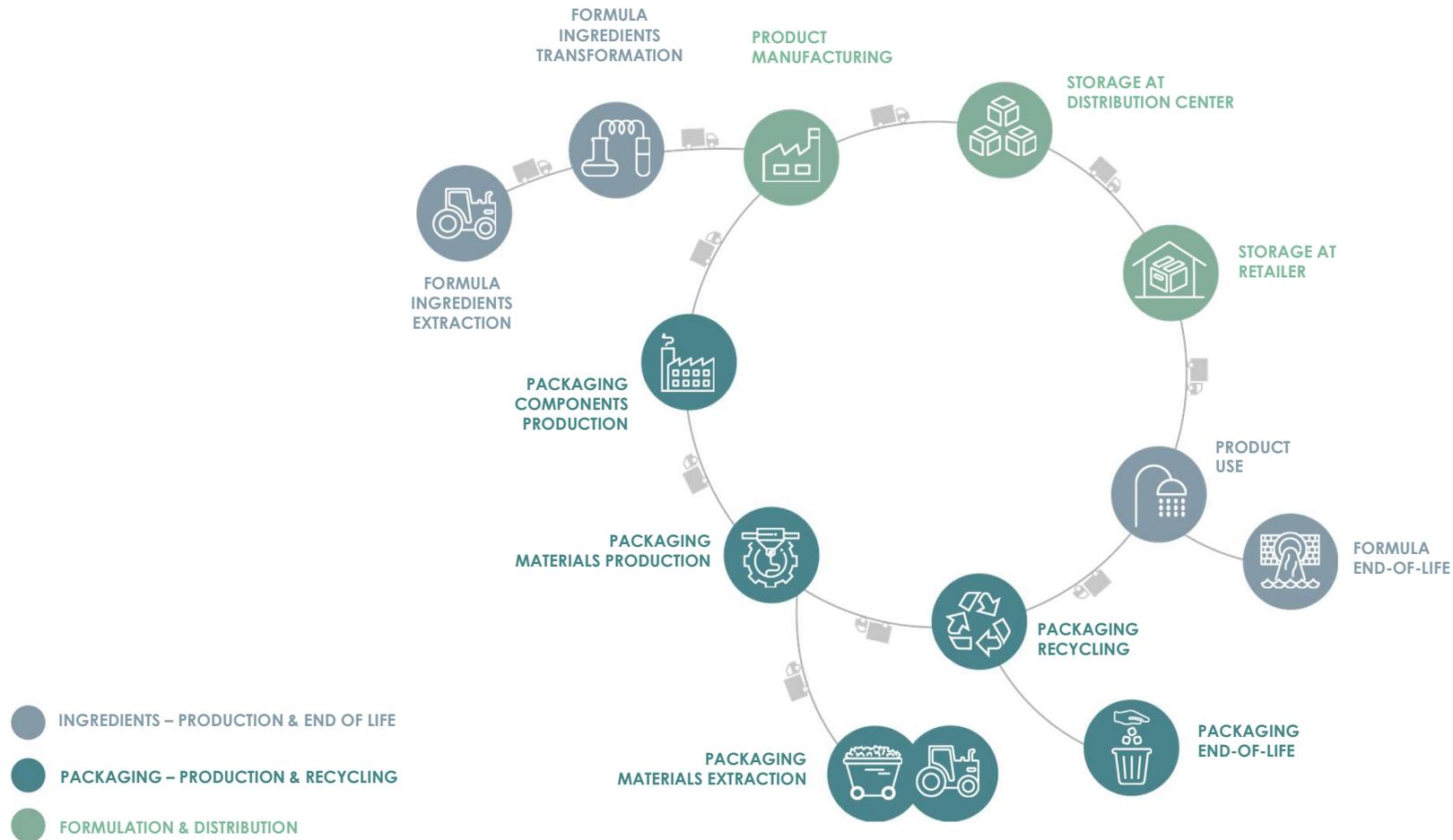


# TAKE A LIFE CYCLE-BASED APPROACH

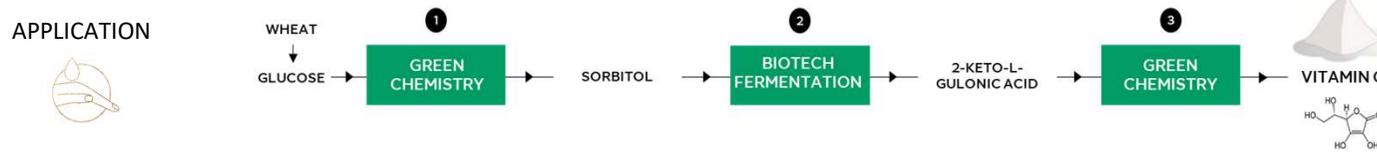


Credit: Azote for Stockholm Resilience Centre, Stockholm University. Based on Richardson et al. 2023, Steffen et al. 2015, and Rockström et al. 2009)

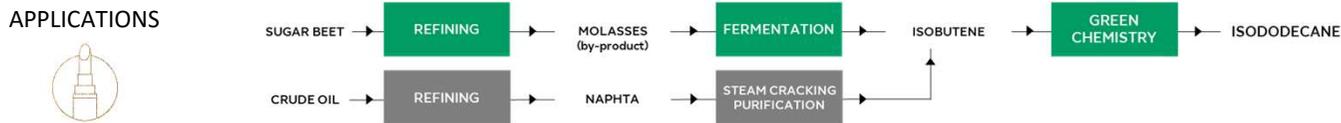
# FOSTER R&DDD COLLABORATIONS

## PARTNERS

### Partnering with long-standing suppliers



### Partnering with forward thinking start-ups



→ Cosmetics Ingredients from micro-algae



### Joining multi-partner ventures

APPLICATIONS



→ Sustainable surfactants



# UPSKILL & RESKILL

## 24.1 Increase corporate training

<ul style="list-style-type: none"><li>• Provide company-based training, and reskill workers so they are prepared for the professions of the future. Link this training to job-to-job transition plans</li></ul>	Industry	S/M
<ul style="list-style-type: none"><li>• Provide in-company training opportunities, career paths, and apprenticeships</li></ul>	Industry	S/M

## 23.2 Adapt secondary, post-secondary and university education

<ul style="list-style-type: none"><li>• Contribute to the activities of the European Year of Youth in cooperation with national associations of chemical employers</li></ul>	Industry	S
<ul style="list-style-type: none"><li>• Adapt university curricula to industry needs, by adding courses on regulation, sustainable chemistry, green chemistry and the principles of SSbD to university programmes in chemistry. Adapt apprenticeships and vocational education and training programmes to teach future-proof knowledge</li></ul>	EU/MS	S/M

# CONTINUOUSLY IMPROVE SUSTAINABILITY EVALUATION METHODOLOGIES

Green Chemistry Dynamic Article Links

Cite this: *Green Chem.*, 2012, **14**, 952  
[www.rsc.org/greenchem](http://www.rsc.org/greenchem) PAPER

**Industrial commitment to green and sustainable chemistry: using renewable materials & developing eco-friendly processes and ingredients in cosmetics**

Michel Philippe\*, Blaise DiDillon and Laurent Gilbert

Received 26th October 2011, Accepted 26th December 2011  
 DOI: 10.1039/c1gc15414a

Integrating green chemistry principles into the development of new processes or ingredients and the re-evaluation of existing processes and ingredients is a pivotal element of sustainable development. The aim of this article is to provide a brief description of how L'Oréal, a leading specialist in cosmetic products, is committed to this objective. This commitment is founded on corporate social responsibility (CSR) based on the respect for the five axes of vigilance as shown below, thus allowing analysis throughout the lifecycle of products. The approach of the group regarding the use of renewable raw materials, the development of environmentally-friendly processes and the introduction of green indicators will be presented in more detail later. To illustrate how a green process is implemented we have chosen a recent development, "C-glycoylation in water", as well as an earlier example, "aromatic synthesis from renewable raw materials" to demonstrate long-term commitment.

**1. Introduction**

Research and development chemists have always tried to develop processes using raw materials and solvents with the lowest possible toxicity levels, even avoiding the use of solvents by relying on high-safety processes. The primary objective has always been to develop ingredients industrially which present neither safety problems nor risks to human health.

The development of corporate social responsibility (CSR), the price and scarcity of oil and the propositions of the 12 green chemistry principles in 1998 by P. Anastas and J. Warner<sup>1</sup> have been key elements in establishing sustainable chemistry. Eco-friendly, straightforward processes and innovative products which lessen environmental impact are now being given top priority. This also means that green chemistry has to be based on renewable plant chemistry and less and less on petrochemicals.

To achieve these goals and to replace processes and products with strong environmental impact, it is essential to incorporate eco-design with proactive methods into new processes and products. New processes must use nontoxic materials, save energy and generate low waste. New catalytic methods (chemical catalysis and biocatalysis) developed over the last few years have fully contributed to these objectives. Reductions in the number of steps, "atom economy" and energy reduction through new synthesis routes in particular allow new processes with high efficiency, regio- and stereo-selectivity<sup>2,3</sup> to be designed.

The proposition by P. Anastas and J. Zimmerman of the 12 green process principles further amplifies these initial recommendations. In particular, this one introduced the "level of green chemistry" indicator used during any new process and/or product development with the introduction of the lifecycle analysis.<sup>4,5,6</sup> For more than ten years now, several green indicators have been proposed, notably by R. Sheldon,<sup>3,7</sup> to evaluate past and future efforts better.

For a responsible and innovative company measuring these indicators as early on as possible is essential for the eco-design of new synthesis routes and thus to be able to proceed to the final choice of reagents and technology. This green metric is fundamental to making sure only eco-friendly products are launched on the market.

**2. Commitment to green and sustainable chemistry**

**2.1 Green chemistry strategy for sustainable development**

For several years our group has been implementing action plans for sustainable innovation and reporting progress annually in the sustainable development report.<sup>8</sup>

Various research and development actions have been reported including green chemistry initiatives in particular and results achieved.

One of the key concepts is the complete integration of green chemistry within sustainable development as described in Fig. 1. Respecting the green chemistry principles as closely as possible is essential for sustainable development. The selection and evaluation of the ingredients we use are based on five axes of vigilance after and throughout the product lifecycle:

- Health and safety of people;
- Respect for the environment;
- Preservation of biodiversity;
- Fair trade practices;
- Social and societal impacts.

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Article

**SPOT: A Strategic Life-Cycle-Assessment-Based Methodology and Tool for Cosmetic Product Eco-Design**

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Article

**Mineral Resource Abundance: An Assessment Methodology for a Responsible Use of Mineral Raw Materials in Downstream Industries**

Nicolas Charles<sup>1,\*</sup>, Gaëtan Lefebvre<sup>1</sup>, Rémy Talupou<sup>2,3</sup>, Audrey Carraud<sup>2</sup>, Antoine Boubaoui<sup>1</sup>, Anne-Sophie Serand<sup>1</sup>, Maxime Picault<sup>1</sup>, Virginie Piguet<sup>2</sup>, Valéria Manzin<sup>1</sup>, Fabien Deswarte<sup>2</sup> and Julien Aujoit<sup>2</sup>

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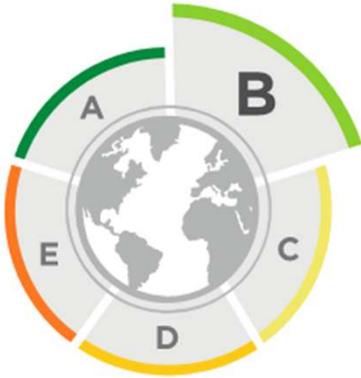
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# ENABLE CONSUMERS TO MAKE MORE SUSTAINABLE DECISIONS

## PRODUCT IMPACT LABELLING

### Overall environmental impact

Compared to other similar L'Oreal Groupe Products sold worldwide in 2020



#### Carbon footprint



94 g<sup>(1)</sup> per average amount used (91g per 10mL)

#### Water footprint



9.4<sup>(2)</sup> per average amount used (9.6 per 10mL)

