CEL®
DEMAND SUPPLY ALIGNMENT

SCMission 2023

CIRCULAR SUPPLY CHAIN
ROUND 3 CASE

1. INTRODUCTION

"CreamWorks" has been a leading player in the Australian dairy industry for more than two decades, with a robust global presence. The company has established a reputation for producing top-quality dairy products, but recognizes the need to evolve its business practices to remain competitive in the long term. In response, "CreamWorks" is exploring the circular economy model as a means of eliminating waste, optimizing resource use, and enhancing overall efficiency.

By adopting circular practices, "CreamWorks" can reduce its environmental impact, lower costs, and create value for stakeholders. The circular supply chain model is particularly appealing given the mounting pressure from consumers, regulators, and investors to adopt sustainable practices. By implementing circularity, "CreamWorks" can not only address these concerns but also improve its reputation.

To this end, the company's leadership has tasked a cross-functional team with designing a plan to establish a circular system. The initial phase of the plan will be piloted in Australia, and your team has been charged with developing the necessary decisions to achieve circularity within the supply chain.

2. CURRENT SITUATION

Product mix:
The product portfolio of “CreamWorks” is quite solid with 36 products belonging to 5 different product subcategories:

- **Fresh Cream:** 10 products
- **Fresh White Milk:** 12 products
- **UHT Cream:** 6 products
- **UHT Flavoured Milk:** 1 product
- **UHT White Milk:** 7 products

More detailed information regarding the products can be found in the attached file under “Product Master”

Suppliers:
CreamWorks currently sources plastic bottles and cartons from two separate suppliers that also offer to recycle used products. CreamWorks receives a discount in return if it transports to-be-recycled material itself.

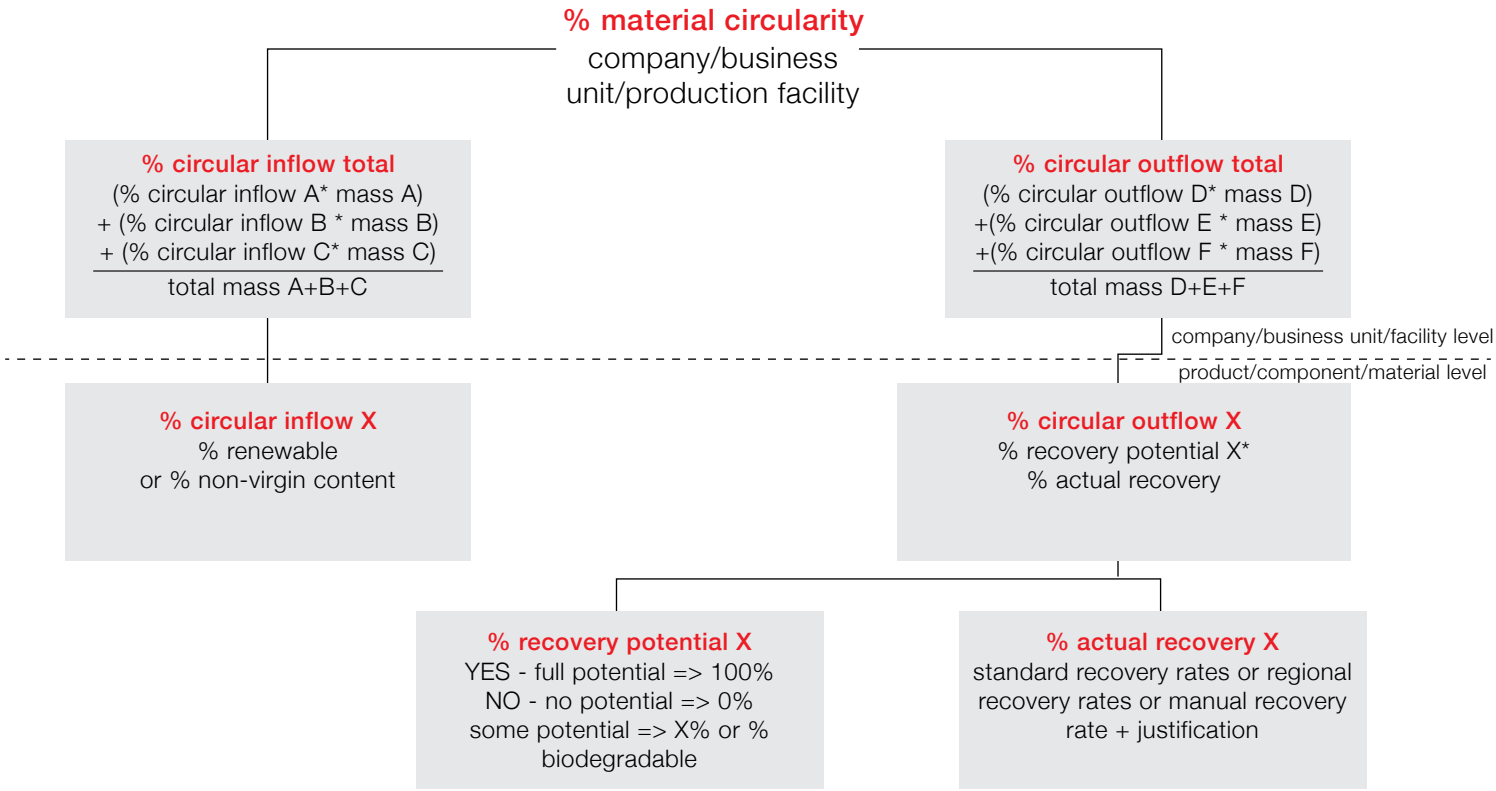
For now, each carton and plastic bottle have 5% and 10% recycled content respectively. By implementing this plan, this rate can be increased to 70%. In the attached file, you will find the weight of each packaging and the associated CO_2 for sourcing them.

Logistics Network:
To establish a circular system, "CreamWorks" plans to construct collection points throughout the country to gather empty glass and plastic bottles as well as cartons. These empty packages will be collected while dropping off shipments to retailers. The company has decided to transport the plastic bottles and cartons back to the packaging suppliers for recycling, while glass bottles will be cleaned and reused at the Plants.

To facilitate this process, "CreamWorks'' will need to carefully choose the location, capacity, and associated CO_2 and costs for each collection point. Attached to this document is a file that includes the longitude and latitude of each point, as well as the relevant information on capacity, CO_2, and costs. This data will be crucial in determining the optimal placement of collection points, as well as ensuring that the circulatory system is cost-effective and environmentally sustainable.

You and your team will analyze this data carefully and recommend the best collection points (including quantity and capacity) to be constructed to enable "CreamWorks" to achieve circularity within its supply chain.

Circular KPIs:
To have a better assessment of this implementation, the team must follow these focal KPIs, established by the World Business Council for Sustainable Development:



In which, the % material circularity equals the average percentage of circular inflow total and circular outflow total.

Alternative calculation method **% circular inflow:**

$$\% \text{ circular inflow} = \frac{(\text{mass of renewable inflow} + \text{mass of non-virgin inflow}) \times 100\%}{\text{total mass of all inflow}}$$

GHG emissions:
The impact on GHG emissions is calculated using the following formula for the absolute amount of CO_2 equivalents:

$$(M_x \times GHG_{xr}) - [(M_{xr} \times GHG_{xr}) + (M_{xv} \times GHG_{xv})]$$

Or the following formula for a percentage value:

$$\frac{(M_x \times GHG_{xr}) - [(M_{xr} \times GHG_{xr}) + (M_{xv} \times GHG_{xv})]}{(M_{xr} \times GHG_{xr}) + (M_{xv} \times GHG_{xv})}$$

M_x : Total weight material X

GHG_{xr}: GHG emission factor recycled material X

M_{xr}: Weight of recycled content material X

M_{xv}: Weight of virgin content material X

GHG_{xv}: GHG emission factor virgin material X

The result is the percentage of GHG emissions saved if the material were made of a determined percent of recycled materials as opposed to the GHG emissions resulting from its current composition.

3. FIRST TASK

Following the attached file, there are some small cleaning exercises for you and your team to do as the initial phase of doing exploratory analysis. Specifically, there are some inconsistencies in the master data that need to be consolidated or removed.

Since the customers disperse across the country, clustering emerges as a necessary task for "CreamWorks" to implement the collection points plan. This is to enhance the efficiency of routing (reduces transportation costs), and customer service (brings collection points closer to customers), and to build adequate capacity for each cluster. Therefore, the next step is to conduct the analysis to cluster customers. This can be done by using the K-means clustering method. Be aware that, for this case, the number of clusters can differ depending on how you and your team perceive what is optimal. This analysis can be done using Programming Languages, including Python or R, or even Microsoft Excel.

4. SECOND TASK

After achieving the clusters, you and your team will choose how to set up collection points (quantity and capacity measured in the number of pallets) for each cluster. This might be based on the weekly volume of each cluster since these empty packages would be transferred to plants/suppliers in a weekly manner. Then, you should propose the percentage of circular inflow, related costs, and CO_2 emissions (incurred from building collection points and how much GreenHouse Gas is reduced) if this is applied to the 2022 sales data.

Be aware that, from the retailer's side, it is predicted that if this plan is implemented, the package's return rate would be 50% of the total sales volume, and they're returned in carton boxes. The capacity of collection points in total must cover all of those returned packages.

5. THIRD TASK

Once finalized the optimization study you will have to present to the company Leadership the result of the scenario analysis.

Besides the key metrics that you use to evaluate your final proposition, don't forget to highlight business aspects that are relevant to the company's Leadership, for example:

- What other benefits come from applying the new strategy in the expected context of high uncertainty?
- What additional measures would you recommend to further increase the circularity of the business profitability?
- What strategy would you recommend moving forward?

Please, prepare a PowerPoint deck (submitted in PDF format), in English, of a maximum of 10 slides, meant to be presented in the final round. Be aware that in the short time available and with an audience that is not familiar with all details and calculations, you are concise and effective in sharing your key ideas and results.

6. HAND OVER MATERIAL

There are two attached files:

- SCMission 2023_Round 3 Data, with the inputs for the analytical problem
- Case_Answer, with the template to answer the First and Second Tasks questions

You will have to submit the “Case_Answer” file with the gray cells properly filled, without changing the tab layout, or format, or adding any information, comment, or result outside the gray cells. The “SCMission 2023_Round 3 Data” file is not meant to be edited.

You must add any necessary tab with the exercise calculations in the same “Case_Answer” file.

Furthermore, you and your team are allowed to submit any supplemental material (Jupyter Notebook, Rmarkdown report, etc.), but this would not be the focus of the scoring process*.

The material will be evaluated based on the following parameters:

- Precision (over expected answer)
- Clarity (calculation tabs to support the answers)
- Accuracy

**Any additional materials provided by the team will be reviewed at the discretion of the jury and due to a large amount of documentation provided, might not be reviewed at all.*

DEMAND SUPPLY ALIGNMENT

www.cel-consulting.com