LIFE RENDER - Promoting the implementation of Product Environmental Footprint Methodology in the European Dairy Sector

LIFE16 ENV/ES/000173

TECHNICAL SHOWCASE FOR THE APPLICATION OF THE PRODUCT ENVIRONMENTAL FOOTPRINT METHOD IN THE DAIRY SECTOR

Main environmental and socio-economic results from the project demonstration

PEF program: What is this?

COMMISSION RECOMMENDATION of 9 April 2013 on the use of common methods for measuring and communicating the environmental impact of products and organizations throughout their life cycle.

Product Environmental Footprint (PEF) is a multi-criterion measure of the environmental impact of a good or service throughout its lifecycle. It establishes standard criteria that give consistency and reproducibility so that companies can evaluate the environmental performance of their products with homogeneous criteria and give comparable results.

Product Environmental Footprint Category Rules (PEFCR) - Establish methodological requirements for specific product categories in order to achieve comparability, reproducibility and consistency of PEF studies.

PEFCR pilots

- 25 pilots to **develop** and **test** sectorial Product Environmental Footprint Category Rules (PEFCR)

- 1st wave:
  - Batteries and accumulators, Decorative paints, Hot and cold water supply pipes, Household detergents, Intermediate paper product, IT equipment, Leather, Metal sheets, Non-leather shoes, Photovoltaic electricity generation, Stationery, Thermal insulation, T-shirts, Uninterruptible Power Supply

- 2nd wave on food products
  - Beer
  - Coffee
  - **Dairy**
  - Feed for food producing animals
  - Fish for human consumption
  - Meat (bovine, pigs and sheep)
  - Pasta
  - Packed water
  - Pet food (cats & dogs)
  - Olive oil
  - Wine

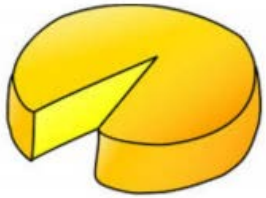
- Final Version – March 2018.
- Final Conference of the Pilot Phase of the Environmental Footprint (23-25 April 2018).

F = Final product
I = Intermediate product

1. Liquid milk (skimmed, semi-skimmed, whole milk) F

2. Dried whey products (whey prowder, whey protein powder, lactose powder) I

3. Cheeses (ripened and unripened cheese) F

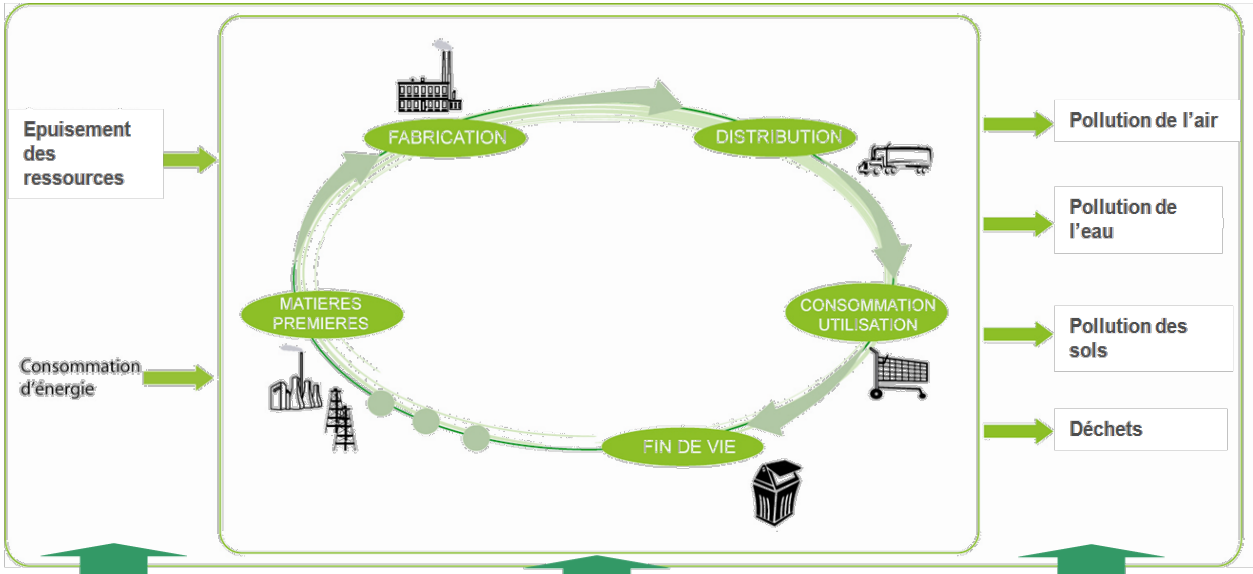


4. Fermented milk products (spoonable yoghurt, fermented milk drinks) F

5. Butterfat products (butter, spreadable dairy fats) F

Only cow's milk and its derived products considered within the scope of The Dairy PEFCR

Life Cycle Assessment in a nutshell



1 Multi-critères

2 Multi-étapes

Multi-critères 1

3 Standardised

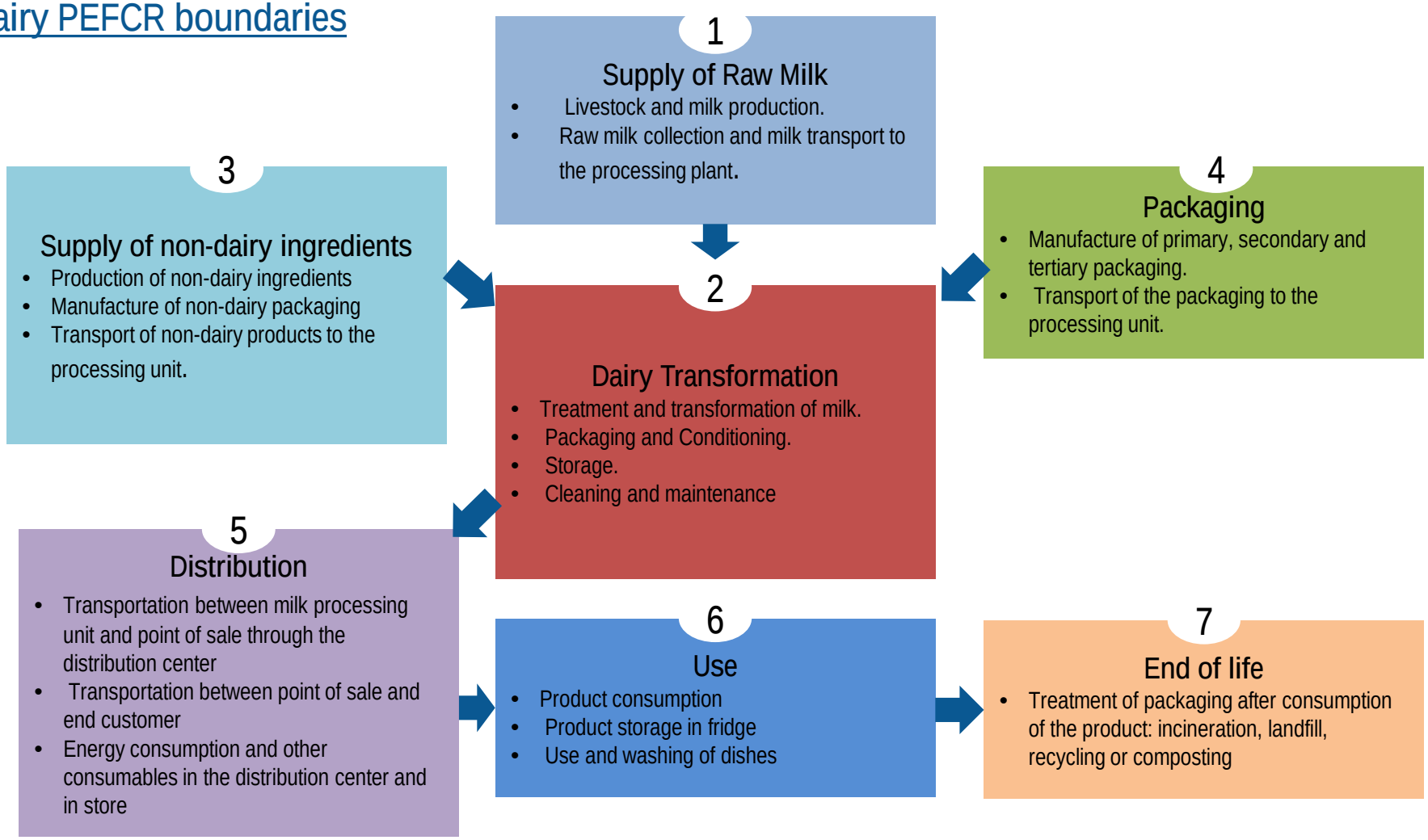
4 Translation of material /energy flow into potential impacts

5 Take into consideration the functionality of a product

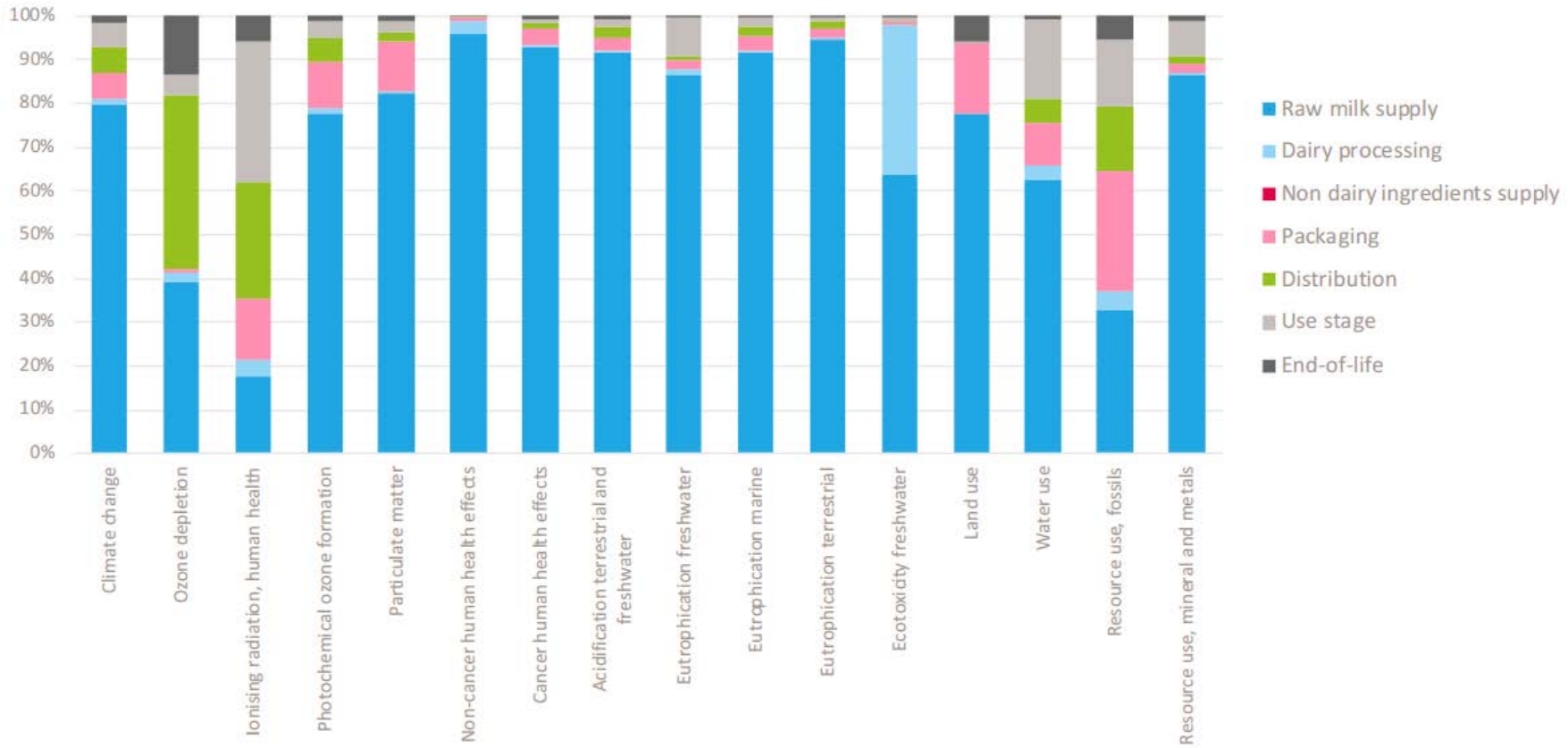
ISO 14040 Approved Life Cycle Assessment

European Commission

Dairy PEFCR boundaries

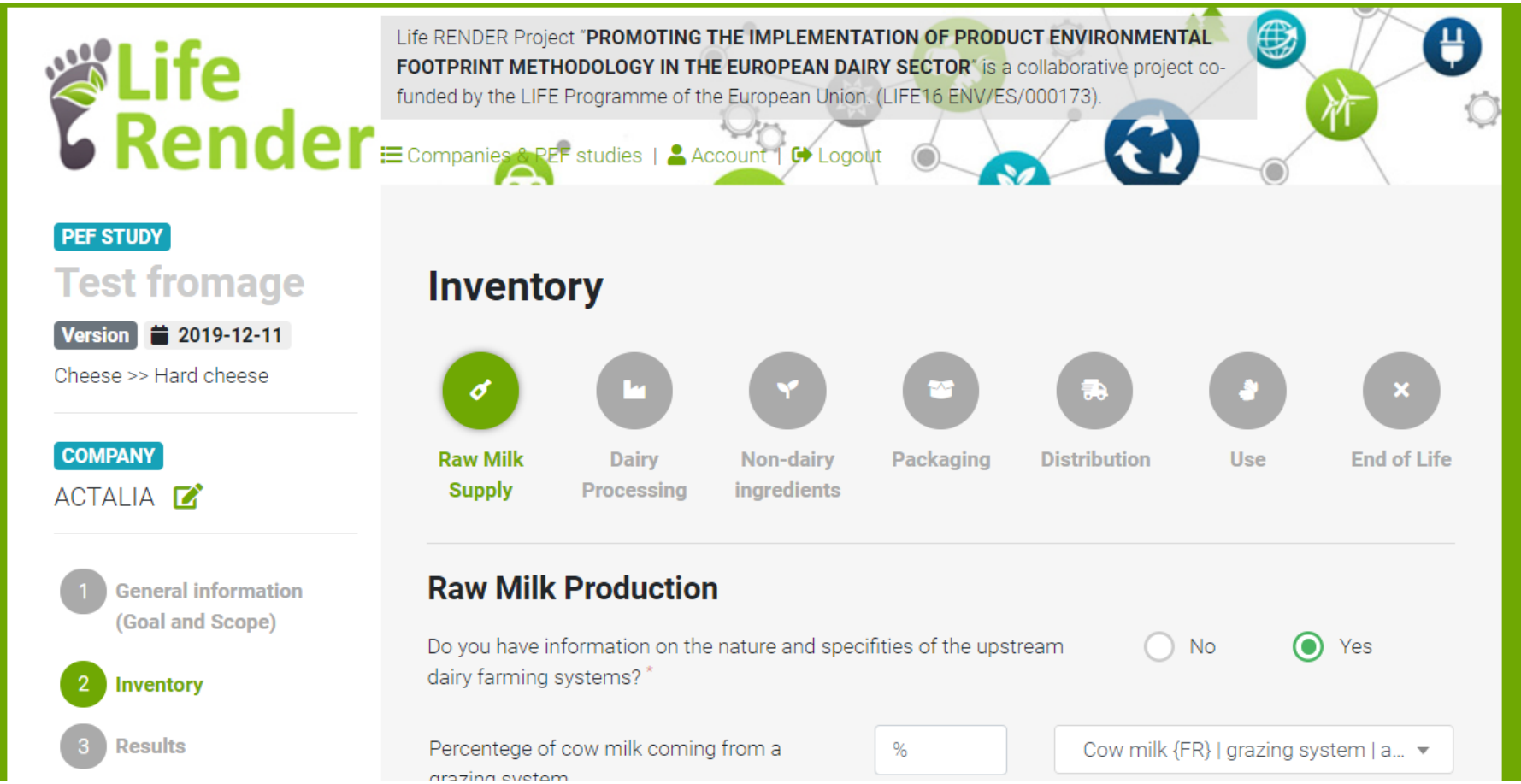


Example of PEF characterised results: 1L of liquid milk

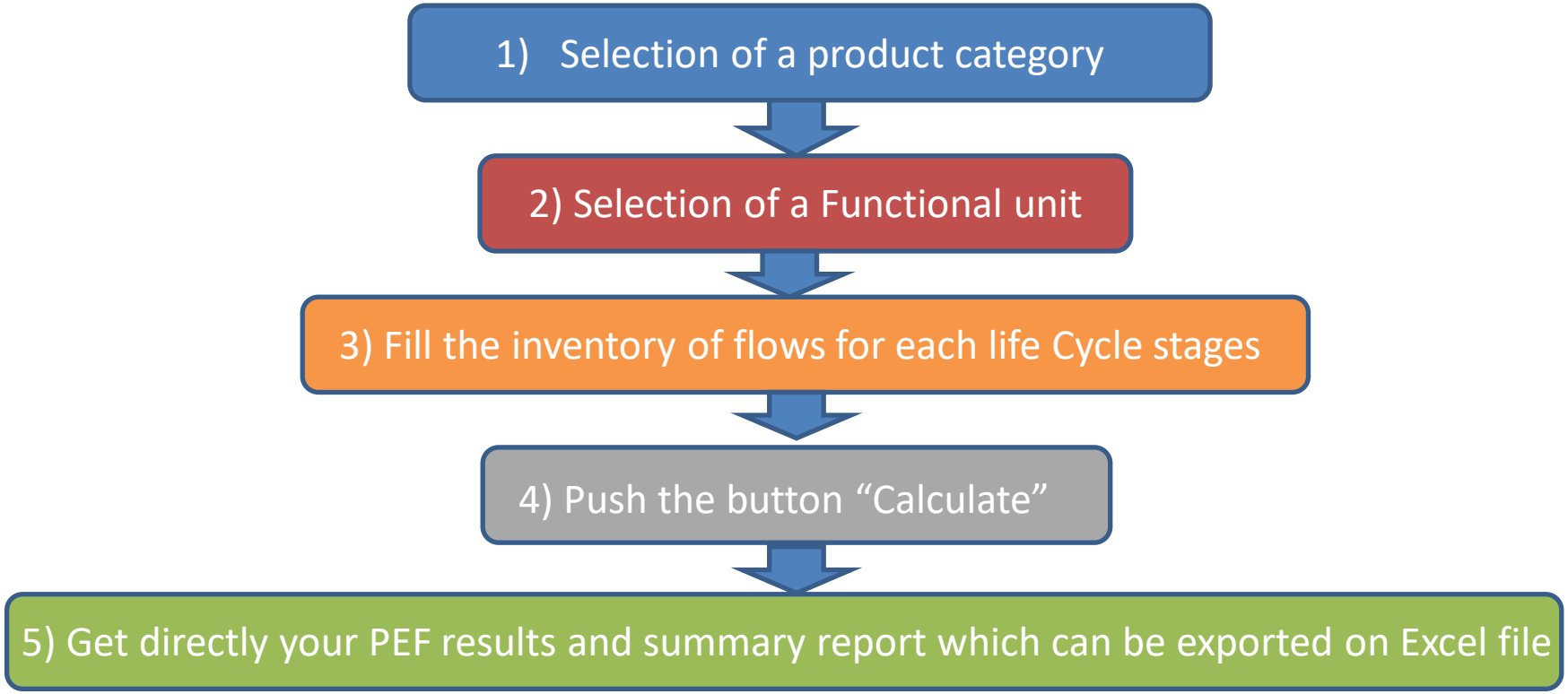


The Render Tool

- Implementation of Dairy PEFCR rules in an on-line tool

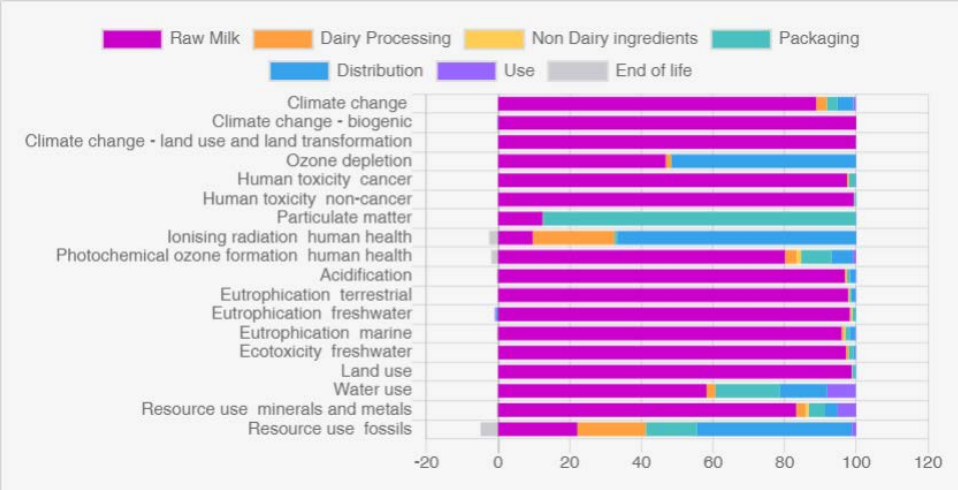


The Render Tool: The procedure



The Render Tool: The result features

Characterised, Normalised, and weigthted results + Single score



Determination of most relevant life cycle stages + processes

Most Relevant Life Cycle Stages

XLS

Impact Category	Most relevant lifes cycles stages	Percentage %
Climate change (kg CO2 eq)	Raw Milk	88.75%
Climate change - biogenic (kg CO2 eq)	Raw Milk	100.22%
Climate change - land use and land transformation (kg CO2 eq)	Raw Milk	99.86%
Particulate matter (disease incidence)	Packaging	87.27%
Acidification (mol H+ eq)	Raw Milk	97.16%
Eutrophication, terrestrial (mol N eq)	Raw Milk	97.85%
Eutrophication, marine (kg Neq)	Raw Milk	96.26%
Ecotoxicity, freshwater (CTUe)	Raw Milk	97.18%

Other features:

Comparison with EU benchmark / PEF study Report maker / BAT database / Export to Excel

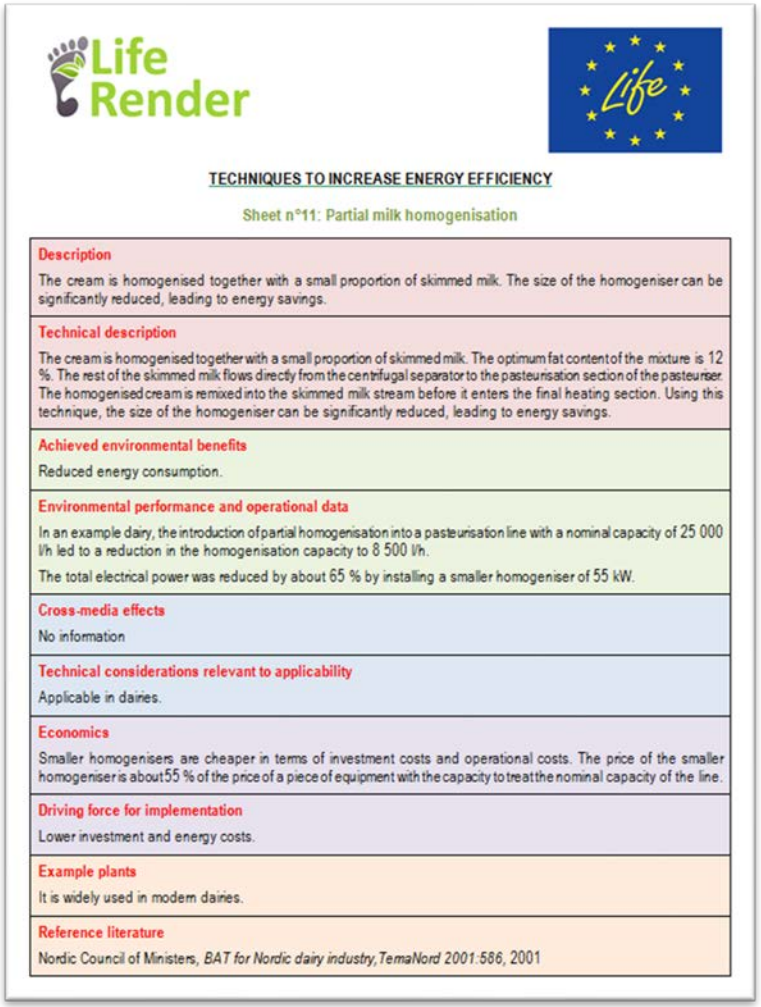
The Render Tool: The BAT database implemented in the tool

Organisation of BAT database:

Change of format → BAT sheets

New categories:

- General environmental performance
- Techniques to increase energy efficiency
- Techniques to reduce water consumption
- Techniques to reduce waste
- Techniques to treat wastewater
- Techniques to reduce emissions to water
- Techniques to reduce emissions to air



TECHNIQUES TO INCREASE ENERGY EFFICIENCY

Sheet n°11: Partial milk homogenisation

Description

The cream is homogenised together with a small proportion of skimmed milk. The size of the homogeniser can be significantly reduced, leading to energy savings.

Technical description

The cream is homogenised together with a small proportion of skimmed milk. The optimum fat content of the mixture is 12 %. The rest of the skimmed milk flows directly from the centrifugal separator to the pasteurisation section of the pasteuriser. The homogenised cream is remixed into the skimmed milk stream before it enters the final heating section. Using this technique, the size of the homogeniser can be significantly reduced, leading to energy savings.

Achieved environmental benefits

Reduced energy consumption.

Environmental performance and operational data

In an example dairy, the introduction of partial homogenisation into a pasteurisation line with a nominal capacity of 25 000 l/h led to a reduction in the homogenisation capacity to 8 500 l/h.

The total electrical power was reduced by about 65 % by installing a smaller homogeniser of 55 kW.

Cross-media effects

No information

Technical considerations relevant to applicability

Applicable in dairies.

Economics

Smaller homogenisers are cheaper in terms of investment costs and operational costs. The price of the smaller homogeniser is about 55 % of the price of a piece of equipment with the capacity to treat the nominal capacity of the line.

Driving force for implementation

Lower investment and energy costs.

Example plants

It is widely used in modern dairies.

Reference literature

Nordic Council of Ministers, *BAT for Nordic dairy industry, TemaNord 2001:586*, 2001

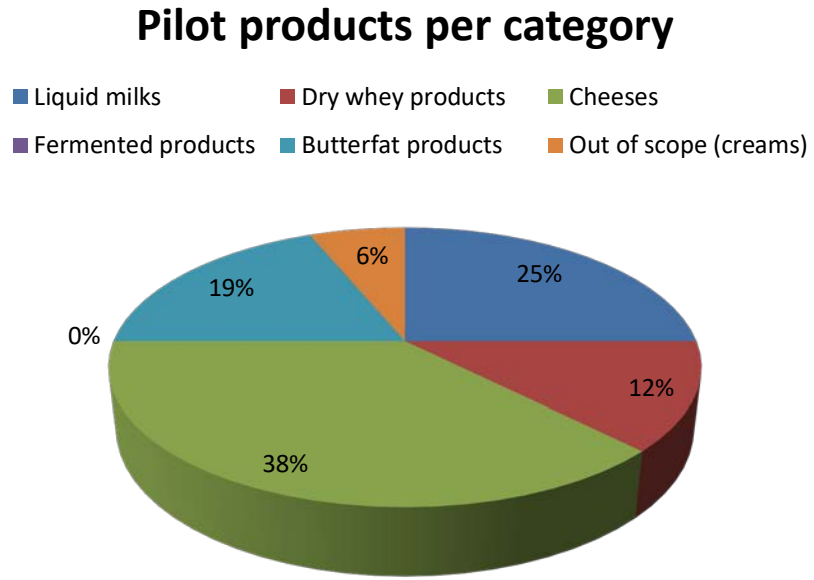
The demonstration phase

- OBJECTIVE… to apply the approach and tools in 30 products to identify the environmental hotspots affecting its life cycle.

- PROCESS OF THE EXPERIMENTATION…

1. Selection of Pilot products.
2. First training session on Dairy PEF methodology and Life cycle Assessment.
3. Second training session on Life RENDER tool.
4. Experimentation of the tool by companies with assistance of ACTALIA and IEIC.
5. Feedbacks from dairy companies about PEF methodology and Render tool.

The demonstration phase



- The company which should test fermented products couldn't reach the end of demonstration phase (but tested during replication phase)
- Except that, all product categories are represented
- Creams were tested to experiment product beyond PEF scope

The experimentation: Most Relevant Life Cycle stages

- **Most relevant LCS** represent at minimum 80% of impact for at least one impact category

Product Sub-category	Raw Milk Supply	Dairy Processing	Non-dairy Ingredients Supply	Packaging	Distribution	Use	End of Life
Liquid Milk	X	X		X	X		
Dried Whey Products	X	X					
Cheeses	X	X		X			
	X	X			X		
Fermented Milk Products	No information						
Butterfat Products	X	X			X		

The experimentation: Most Relevant Life Cycle processes

- **Most relevant LCP** represent at minimum 80% of impact for at least one impact category

LCS	Most relevant processes	Liquid milk	Dried whey products	Cheeses	Butterfat products
Raw milk supply	Cow Milk (FR) | grazing system	x		x	x
	Cow Milk (FR) | mixed system silage maize 10-30%		x	x	
	Cow Milk (FR) | mixed system, more than 30% maize	x	x	x	x
	Cow Milk (FR) | Organic			x	
	Cow Milk (FR) | mix average		x		
	Articulated lorry transport, Total weight >32 t, mix Euro 0-5			x	
Dairy processing	Tap water (EU)	x	x	x	x
	Electricity (FR)	x	x	x	x
	Thermal energy from natural gas (EU)	x	x	x	x
	Thermal energy rom light fuel oil			x	
	HCl production		x		
	Sodium hydroxide production		x		
Non-dairy ingredients	Sodium chloride powder			x	
Packaging	PET granulates, bottle grade	x			
	LDPE granulates			x	
	Plastic film PE			x	
	Uncoated wood free paper			x	
	Printing ink			x	
Distribution	Articulated lorry >32t Euro4	x			
	Storage at retail store (FR)	x		x	x
	Storage at distribution centre (FR)	x			
Use	Dishwashing at consumer home (FR)			x	

The experimentation: Main conclusions

- Milk production leads the overall impact
  - Concentrated milk products: More than 80% of the impact from raw milk supply for 12 impact categories on 16.
  - Non-concentrated milk products: More than 80% of the impact from raw milk supply for 8 impact categories on 16.

- Electricity, thermal energy and water are the most relevant flows for dairy processing
- Electricity consumption in Dairy Processing has a high contribution to Ionisation impact category for all product categories, due to the specificity of French electric mix mainly based on nuclear source.

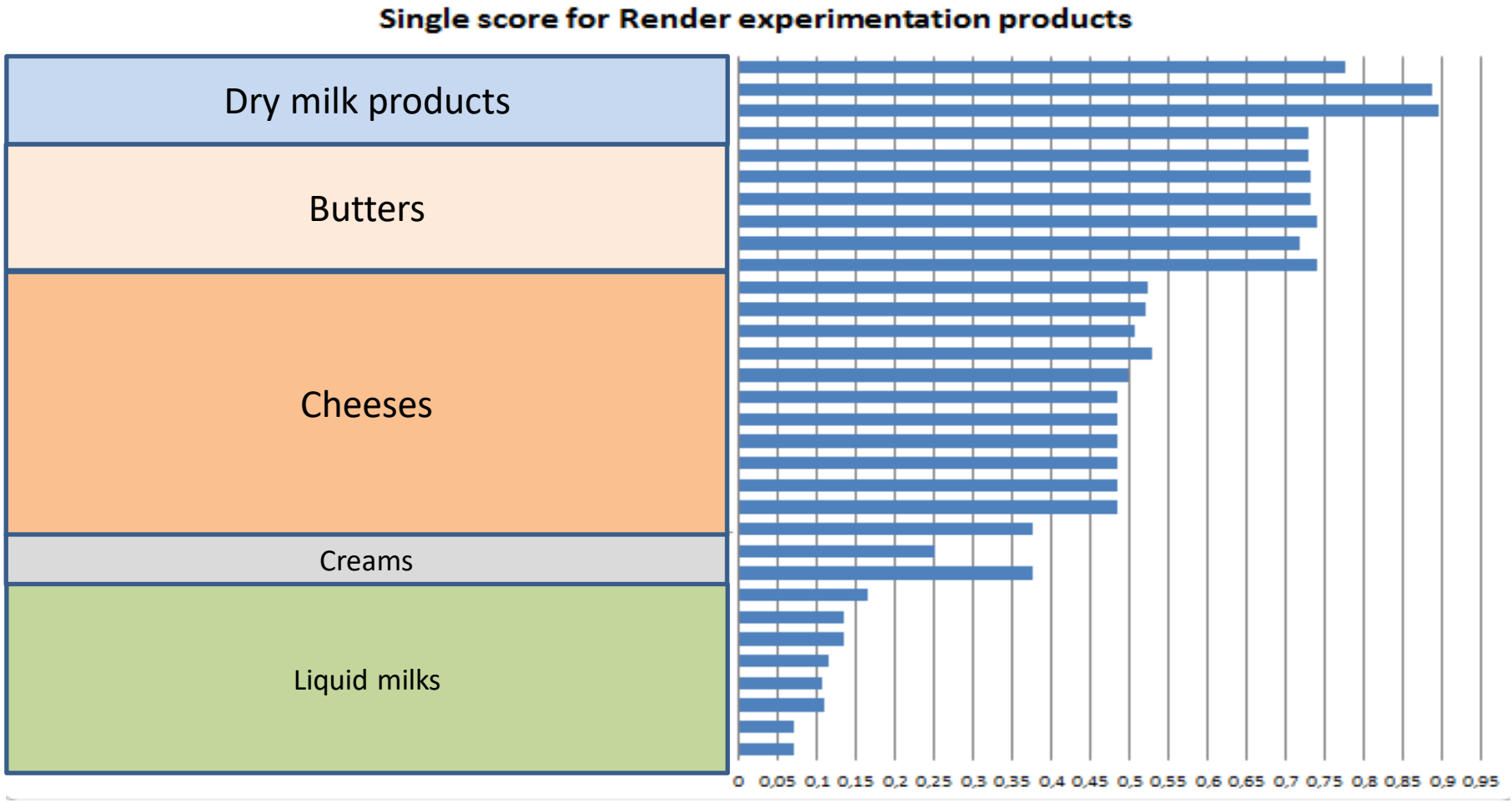
- Cleaning products have the main contribution to freshwater eutrophication

- The use of plastic in Primary Packaging of pilot products has a significant impact on fossil resource use

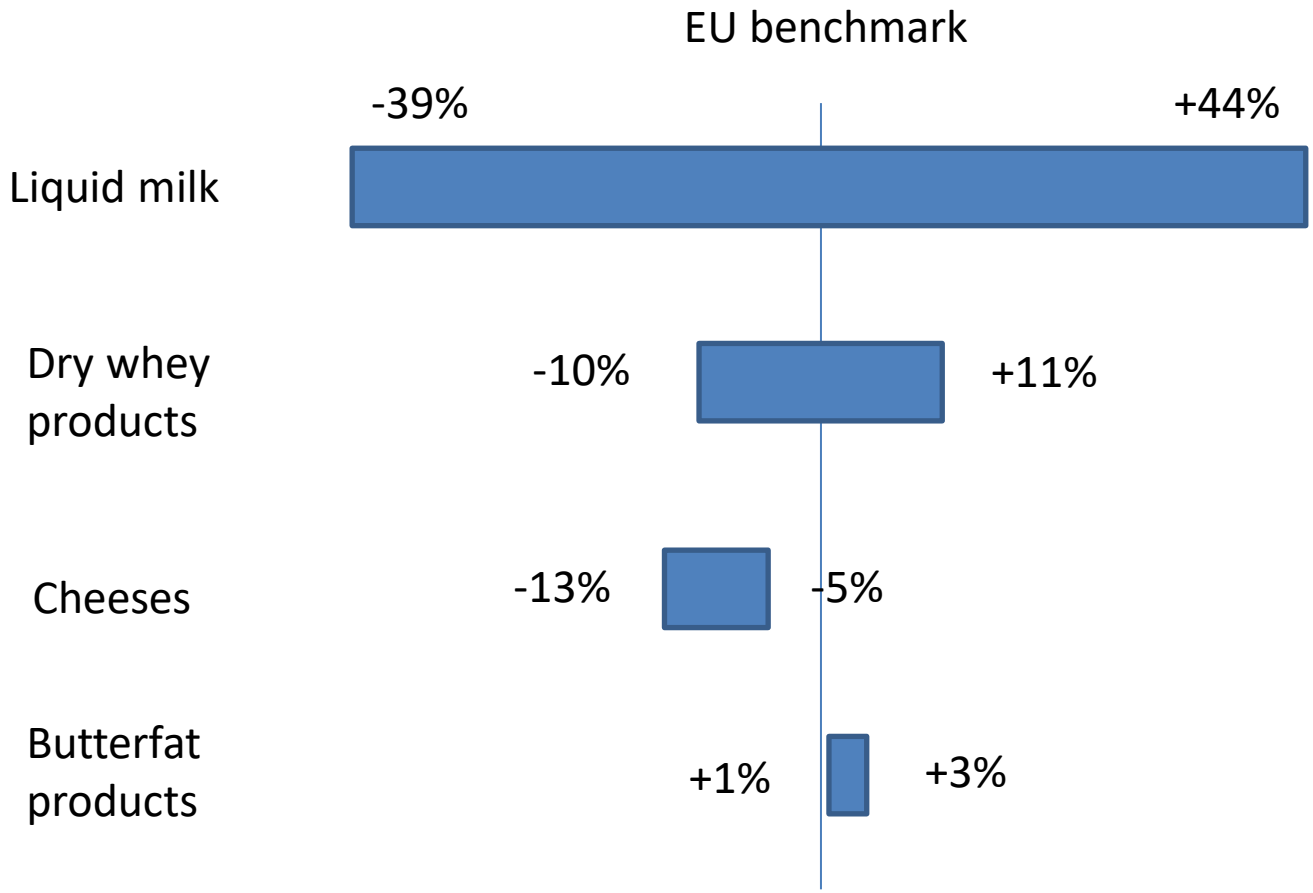
- Storage at point of sale
  - has a high contribution to Ozone depletion due to the use of refrigerant because dairy products are mainly stored at refrigerated temperature
  - is the stage with the higher electricity consumption and have great contribution to ozone depletion, and use of uranium resources

The experimentation: The single score

- **Single score:** Agregation of the 16 weighted impact categories



The experimentation: Comparison of Single score with the EU benchmark – Range of variation



Success and difficulties in the experimentation

❑ MAIN SUCCESS

- Main of companies could perform PEF studies
- Main feedbacks are positive about the experimentation
- The tool is effective and match with PEF methodology
- It's possible to test cow dairy products out of the scope
- Some companies have made PEF studies at process level giving very detailed results

❑ MAIN DIFFICULTIES FOUND…

- Covid crisis have highly impacted the experimentation.
- Difficulties for SME companies to get time to test the tool.
- Impossible for SME companies to manage the experimentation without hiring an intern dedicated to the topic.
- All companies needed assistance to better read the PEF methodology and the tool.
- Some companies wanted that ACTALIA finish their PEF profile by lack of human resource.

Thank you!

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