The Dairy Sector
and climate change mitigation

The diary industry is not among those that generate the greatest impact on climate change. However there's a link between their activity and the greenhouse gas emissions, mostly due to the intensive use of energy of this sector, because of the cooling and heating processes.

The connection between the energy use and the climate change is related to the fossil fuel energy origin. The industries have many easy mitigation measures to be implemented to improve their energetic efficiency and consequently to reduce, direct or indirectly, their greenhouse gas emissions.

Otherwise, the dairy sector can also contribute to the direct greenhouse gas emissions by their organic waste metanization, which has a bigger heating global potential than what the CO_2 has. Avoiding or reducing the metanization, the dairy industries can also reduce their greenhouse gas emissions.

Relation with gasses emissions of greenhouse effect

- By the energy consumption and the need for heating and cooling for the production process
- By the possible metanization of organic residues generated.

Proposal of mitigation alternatives of gas emissions with greenhouse effect in the dairy industry

GENERIC ALTERNATIVES

- Generic recommendations for more rational use of energy:
  - Avoid using more energy than necessary.
- Good practices in auxiliary operations:
  - In steaming generation systems.
  - In the compressed air generation.
  - In cold generation.
  - In climatic chambers.
- Atmospheric emissions:
  - Using low emission products.
  - Putting into practice low emission processes and systems.

COGENERATION

- Have a cogeneration system in those facilities where there is a use for heat and energy produced:
  - Applicable in all processes.
  - The operation involved is the generation and energy use.

BETTER ORGANIC WASTE MANAGEMENT AND TREATMENT

- Utilization of the biogas generated in anaerobic water treatment plants and in other waste by-products:
  - Its applicability depends on the type of installation.

IMPROVING THE ENERGY EFFICIENCY

- Heat recovery in milk thermal processing operations:
  - Applicable in all processes
  - Operations involved: pasteurization, sterilization, heat treatment and thermization.
  - You can achieve specific energy savings close to 80%.
- Using multiple effect evaporators in the evaporation processes of milk or whey:
  - Applicable in all processes of milk powder and whey recovery.
  - The only operation involved is the concentration.
  - Multistage evaporators allow significant reductions in specific energy consumption.
- Using vapour recompression systems in evaporators:
  - Applicable in the processes of milk powder and whey concentration.
  - The operation involved is the concentration.
  - There are two recompression systems:
    - Steam Heat
    - Steam mechanics
- Using the maximum concentration capacity of the evaporators before the dehydration stage:
  - Applicable in the processes of milk powder and whey concentration.
  - Operations involved: concentration and drying.
- Automatic hot gas defrost of the evaporators' refrigeration systems used in freezing chambers:
  - Applicable in all processes.
  - The operation involved is the cold generation.
- Thermal insulation of hot and cold surfaces:
  - Applicable in all processes.
  - The operation involved is the energy management.
- Measurement and control of the energy consumption in the facility key areas:
  - Applicable in all processes.
  - The operation involved is the energy management.
  - Setting measures for the energy consumption minimization and implementing best practices (lighting, air conditioning, equipment, etc.).
- Optimizing the efficiency of motors and pumps:
  - Applicable in all processes.
  - The operation involved is the energy management.
  - Methods to reduce engines' power consumption: installing more efficient motors and improving the motors existing.
- Consumption optimization in compressed air plants.








Case study: Eurial Poitouraine (France) (Source: MedClean 98)

Eurial Poitouraine is a French dairy products manufacturing company in the manufacture of dairy products.
Refrigeration is a key element in the dairy products production process, and is especially important for the pasteurisation and conservation of products as they leave the factory production sequence. Their energy requirements are high and also a critical stage.
Faced with these problems, Eurial Poitouraine conducted a re-assessment of its refrigeration system. In the light of the results of this re-assessment, the company decided to intervene to improve the operation of its existing refrigeration installation.

GENERAL MEASURES TO REDUCE EMISSIONS

- Installation of a logic controller equipped with a differential pressure sensor wich coordinates the operations of the different refrigeration units and guarantees stability of return chain temperatures
- Installation of an electronic speed controller in one of the pumps to optimise its operation.

RESULTS

Energy balance	
Before measures introduction	1,270 MWh/year
After measures introduction	913 MWh/year
Energy saving	357 MWh/year

With the implementation of these two measures, the company achieved significant energy savings (approximately 28%), mainly from the electricity used to produce cold water which is used in refrigeration systems.

INVESTMENT COST AND AMORTIZATION

The investment made by Eurial Poitouraine was 87,353 €, which was recovered in a period of 2 years, thanks to the benefits achieved with the energy savings. The direct financial gain from energy savings was 12,196 €, and the indirect financial gain was 30,490 €. Thus, the total annual financial gain was 42,686 €.