

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

LIFE16 ENV/ES/000173



TALLER METODOLOGÍA PEF APLICADA AL SECTOR LÁCTEO

APLICACIÓN RENDER

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Más de 400 labels ambientales a nivel mundial

Costos adicionales a las empresas que deben cumplir con distintos métodos

Confusión y pérdida de confianza

- ▶ ¿Qué es un producto "verde"?
- ▶ ¿Cómo pruebo que mi producto o empresa es "verde"?
- ▶ Si elijo un enfoque, ¿será aceptado por todos?
- ▶ ¿Tengo que demostrar que soy "verde" de diferentes maneras para diferentes clientes?
- ▶ ¿Los consumidores y socios comerciales entenderán mi información?

RECOMENDACIÓN DE LA COMISIÓN de 9 de abril de 2013 sobre el **uso de métodos comunes para medir y comunicar el comportamiento ambiental de los productos y las organizaciones a lo largo de su ciclo de vida.**

Huella Ambiental de (HAP) es una medida multicriterio del comportamiento ambiental de un bien o servicio a lo largo de su ciclo de vida. Establece unos criterios normalizados que den consistencia y reproducibilidad para que las empresas puedan evaluar el desempeño medioambiental de sus productos con criterios homogéneos y dando resultados comparables.

Reglas de categoría de huella ambiental de los productos (RCHAP) - Establecen requisitos metodológicos para categorías específicas de productos con el fin de lograr la comparabilidad, reproducibilidad y coherencia de los estudios de HAP.

- Versión Final – Marzo 2018.
- Conferencia final de la fase piloto de la Huella Ambiental (23-25 Abril 2018).

RCHAP Sector Lácteo



1. Leche líquida. (F)
2. Productos de suero seco. (I)
3. Quesos. (F)
4. Productos lácteos fermentados. (F)
5. Productos grasos de la leche. (F)

Sub-category	Representative product
Liquid milk	RP1 Liquid milk, standardised to specific fat content, and thermally treated, homogenised, unsweetened and unflavoured, packaged and conditioned.
Dried whey products	RP2 Whey, whey protein or lactose powder, standardised, with average lactose, protein and dry matter content, average packaging (partly packaged, partly bulk)
Cheeses	RP3 Average of unripened and ripened (soft, semi-hard, hard) cheese, standardised protein and fat, packaged and conditioned
Fermented milk products	RP4 Fermented milk, standardised, cultured, average of skimmed/plain, spoonable/liquid, plain/flavoured/fruited (strawberry), packaged and conditioned
Butterfat products	RP5 Average of butter, half-fat butter and dairy spreads, unsalted/salted, packaged and conditioned

Sólo **leche de vaca y sus productos derivados** considerados dentro del alcance del Dairy PEFCR.

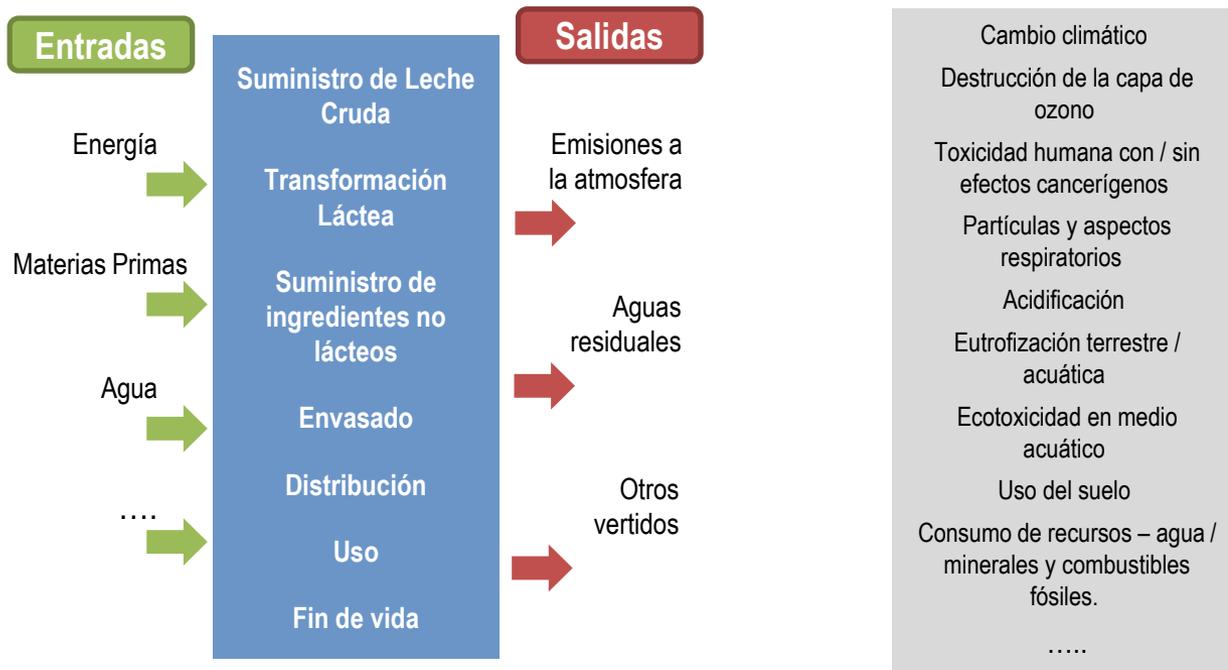


1
Objetivos
y Alcance

2
Inventario
de Ciclo
de Vida

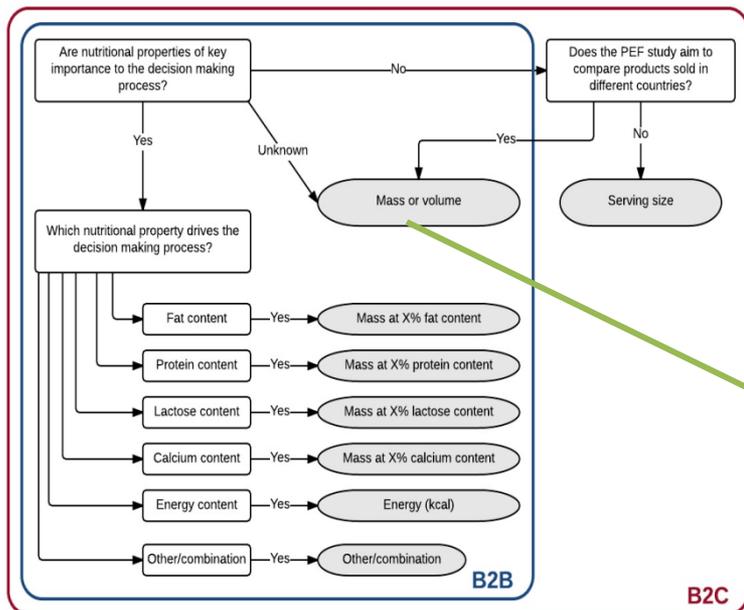
3
Evaluación
de
impactos

4
Interpretación



1
Objetivos
y Alcance

- ▶ Define los objetivos globales del estudio, el contexto de la toma de decisiones y el Destinatario del estudio.
- ▶ Permite definir la **Unidad Funcional** del producto.



El PEFCR permite una evaluación comparativa de **diferentes productos de la misma categoría** (no productos de diferentes categorías o productos lácteos con productos no lácteos).

Categoría	Unidad funcional	Flujo de Referencia
Leche líquida	(Liquid milk, consumed at home as final product without heating, cooking or further transformation)	100 ml
Productos de suero seco	(Dried whey product, at plant gate, for further processing into final products)	1.000 kg
Quesos	(Cheese, consumed at home as final product without cooking or further transformation)	10 g dry matter equivalent
Productos lácteos fermentados	(Fermented milk or yoghurt, consumed at home as final product without cooking or further transformation)	125 g
Productos grasos de la leche	(Butterfat product, consumed at home as final product without cooking or further transformation)	50 g

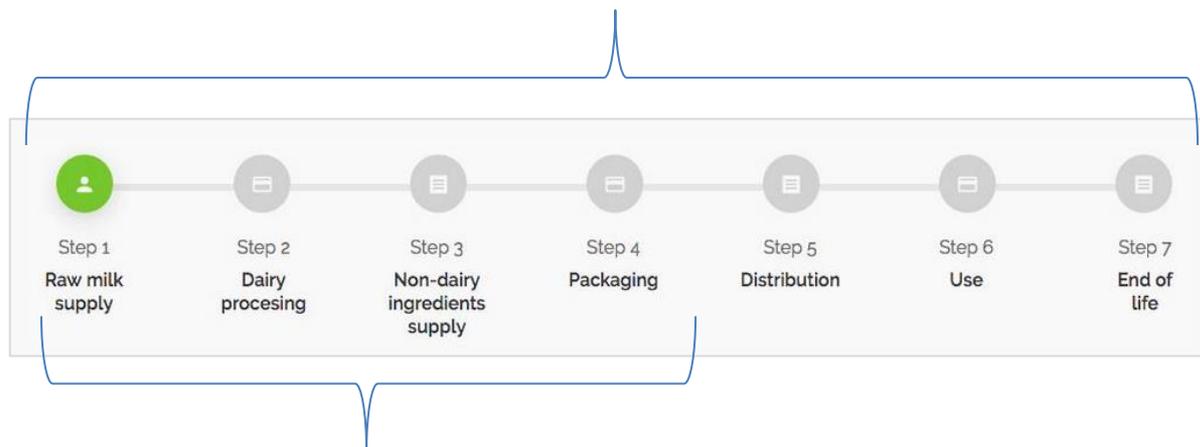
Árbol de decisión para seleccionar la unidad funcional adecuada



- ▶ Permite cuantificar las entradas (extracción de materias primas, etc.) y salidas (emisiones contaminantes, etc.) de la unidad funcional como punto de partida para el modelado HAP.

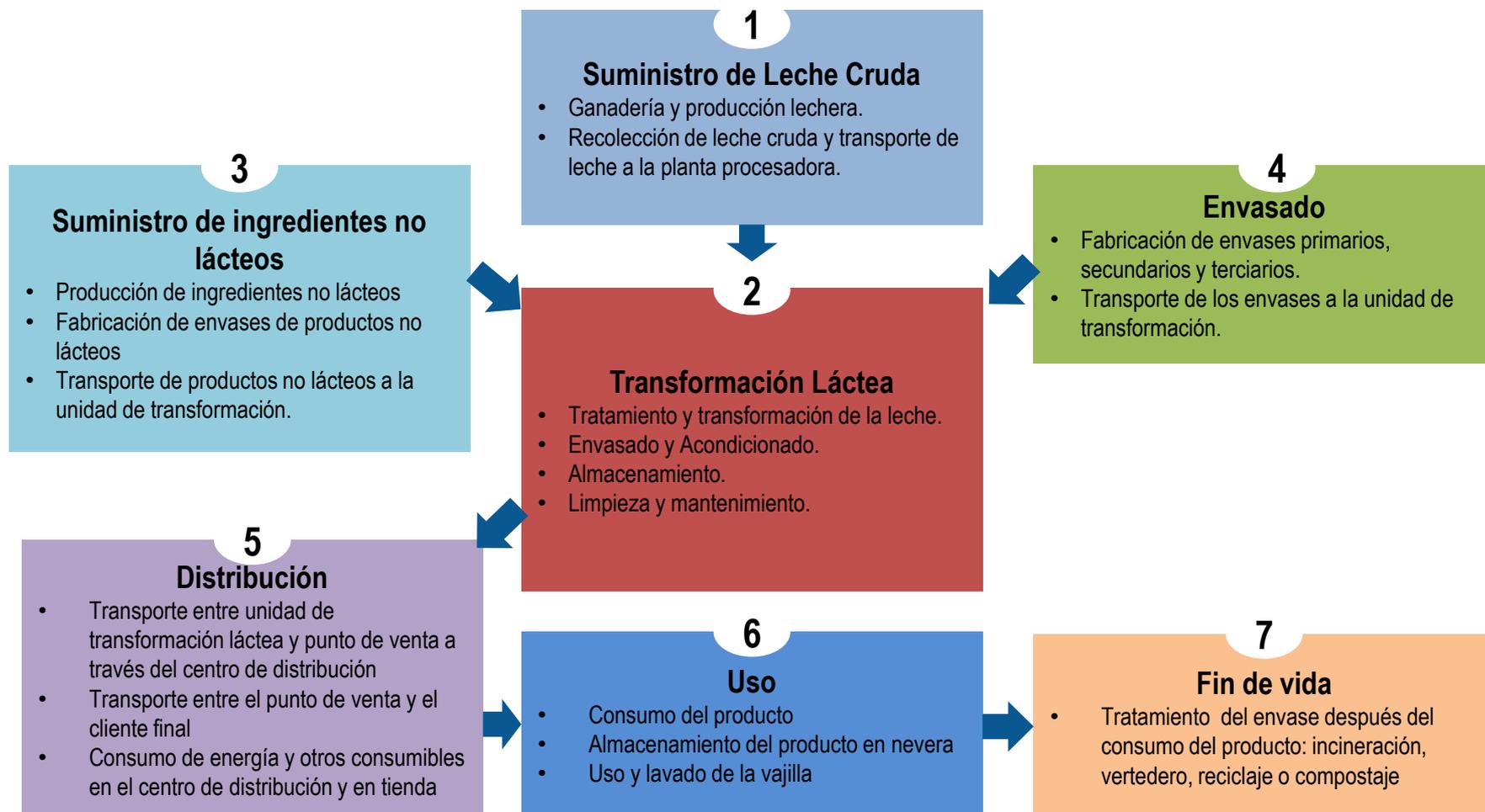
Productos Finales

Leche / Quesos / Productos lácteos fermentados / Productos grasos de la leche



Productos Intermedios

Productos de suero seco.



2

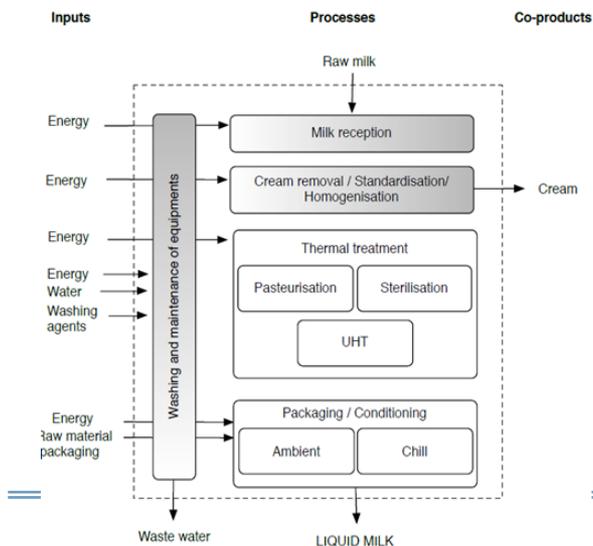
Transformación Láctea

3 Situaciones consideradas:

- ▶ **Situación A:** Datos conocidos a nivel de subproceso.
- ▶ **Situación B:** Datos conocidos a nivel de empresa y para algún subproceso
- ▶ **Situación C:** Datos conocidos a nivel de empresa.

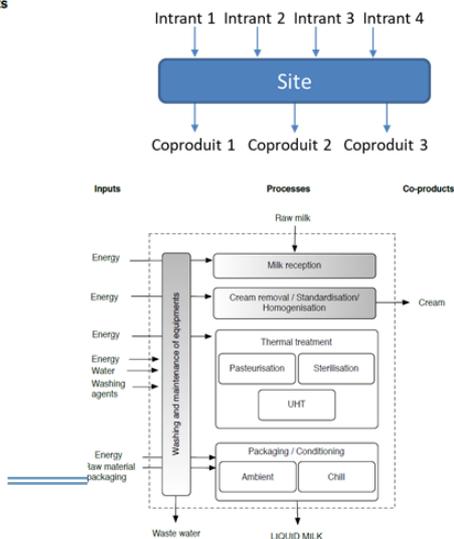
A

Données connues à chaque sous étape



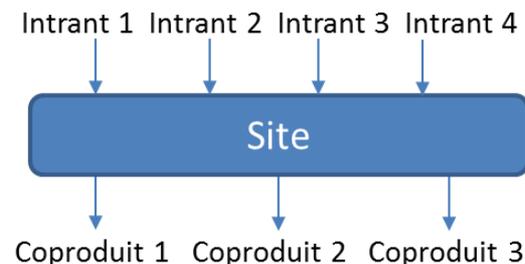
B

Données connues niveau site et des données connues pour certaines sous étape



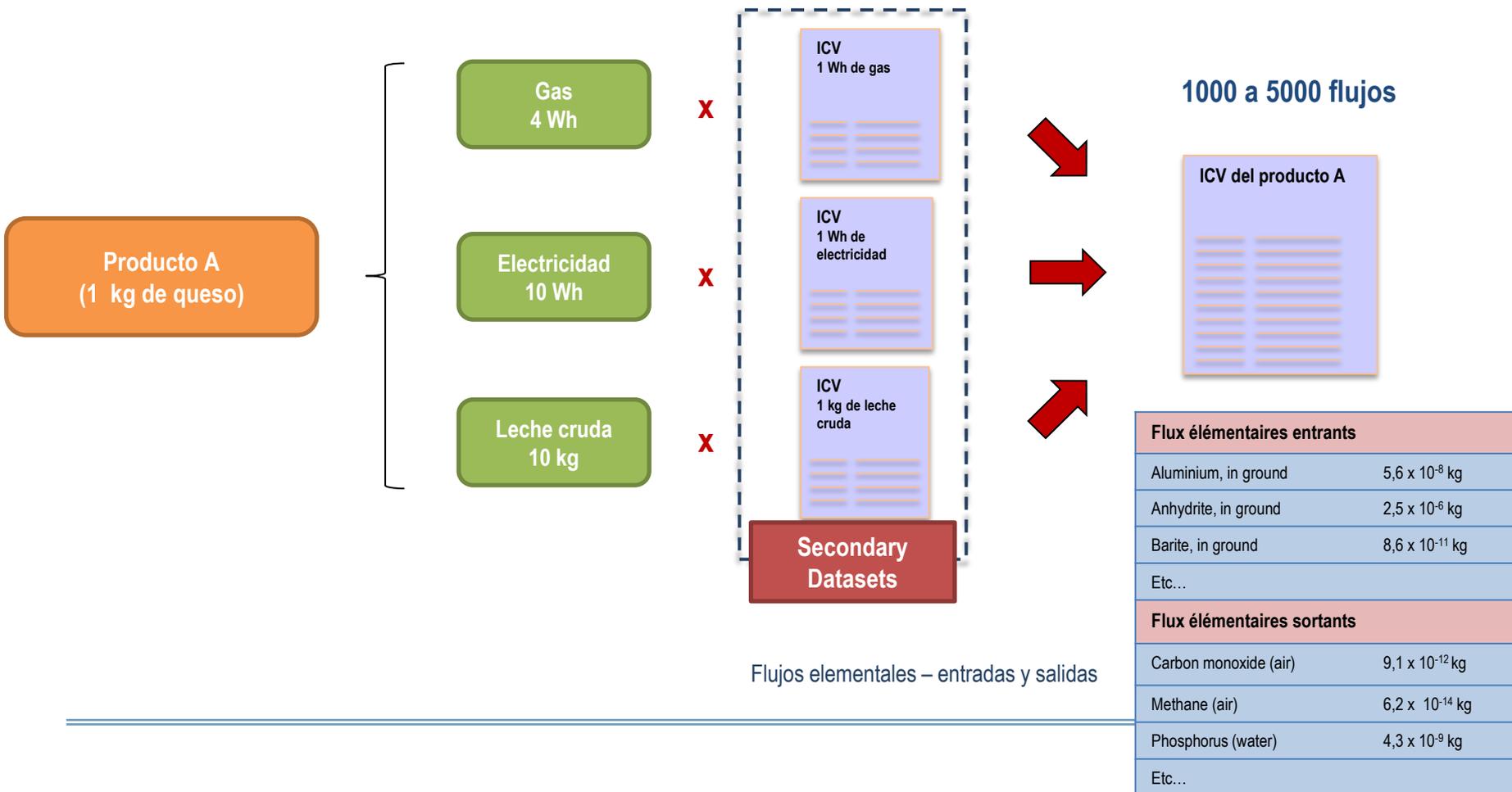
C

Données connues niveau site



En la fase de Inventario de ciclo de vida se podrán utilizar:

- ▶ Datos propios que son directamente medidos, calculados o estimados
- ▶ Datos procedentes de bases de datos que completan los vacíos existentes de información que puedan darse.



Los estudios HAP deberán utilizar conjuntos de datos secundarios que cumplan con los requisitos establecidos en la metodología → **EF-Compliant datasets.**

- ▶ Requisitos de modelado
- ▶ Requisitos sobre metadatos (Análisis de calidad de datos, documentación soporte etc)
- ▶ Requisitos sobre nomenclatura, factores de caracterización y otra información relevante.

Que datos secundarios debo usar?

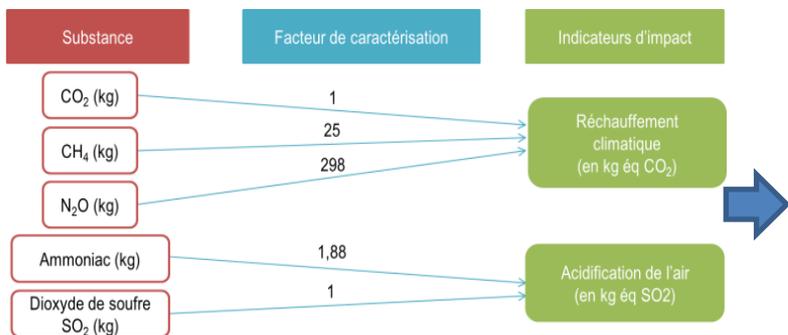
1. Listados en el MS Excel Annex “PEFCRDairy_SecondaryDatasets_2017-12-22.xlsx”
2. Uso de EF-Compliant datasets disponibles en los nodos.
3. Uso de EF-Compliant datasets disponibles en fuentes de datos gratuitas o comerciales.
4. Uso de PROXYS (uso de dataset para manzanas para representar peras) → 3 casos Dairy PEFCR
5. Uso de EF-Compliant datasets modelados de acuerdo con los requisitos de modelado incluidos en la versión 6.3 de la Guía.
6.

**EF
REFERENCE
PACKAGE 3.0**



► Evaluación de **18 Impactos Ambientales** determinados en el Dairy PEFCR

IMPACTO AMBIENTAL - Se refiere a todos los cambios cualitativos, cuantitativos y funcionales en el entorno (negativos o positivos) generados por un proyecto, proceso, procedimiento, organización y producto, desde la concepción hasta el final de la vida.



	Raw Milk	Dairy Processing	Non Dairy ingredients	Packaging	Distribution	Use	End of life
Climate change ... (kg CO2 eq)	1.12e+1	7.92e-3	3.12e-7	2.08e-2	8.52e-10	0.00e+0	0.00e+0
Climate change ... (kg CO2 eq)	7.22e+0	3.33e-1	1.61e-3	1.06e-4	4.89e-4	0.00e+0	0.00e+0
Climate change ... (kg CO2 eq)	1.33e+0	1.24e+0	1.35e-3	7.90e-4	1.63e-2	0.00e+0	0.00e+0
Ozone depletion... (kg CFC eq)	2.73e+1	6.08e-2	7.98e-4	6.44e-2	1.12e+0	0.00e+0	0.00e+0
Human toxicity,... (CTUh)	3.33e-3	-2.73e-3	4.34e-6	1.01e-3	3.79e-4	0.00e+0	0.00e+0
Human toxicity,... (CTUh)	8.11e-6	6.36e-9	0.00e+0	1.69e-8	0.00e+0	0.00e+0	0.00e+0
Particulate mat... (disease incidence)	1.07e-4	4.64e-4	4.61e-6	2.69e-4	1.70e-4	0.00e+0	0.00e+0
Ionising radiat... (kgBqU eq)	1.42e-1	1.12e-3	0.00e+0	2.99e-3	0.00e+0	0.00e+0	0.00e+0
Photochemical o... (kg NMVOC eq)	7.45e-2	-3.56e-2	1.58e-5	2.37e+0	1.05e-2	0.00e+0	0.00e+0
Acidification... (mol H+ eq)	1.08e-1	4.93e-5	3.26e-12	1.31e-4	1.78e-13	0.00e+0	0.00e+0
Eutrophication,... (mol N eq)	4.72e-1	1.43e-2	9.64e-5	3.78e-4	2.47e-9	0.00e+0	0.00e+0
Eutrophication,... (kg P eq)	7.47e-4	2.14e-4	1.36e-6	3.44e-6	2.73e-10	0.00e+0	0.00e+0
Eutrophication,... (kg Neq)	5.71e-2	2.79e-5	3.51e-7	6.67e-5	5.31e-4	0.00e+0	0.00e+0
Ecotoxicity, fr... (CTUe)	2.35e+1	1.72e-2	2.35e-11	4.58e-2	5.28e-9	0.00e+0	0.00e+0
Land use... (pt)	1.79e+3	3.29e+0	1.43e-6	8.76e+0	2.17e-3	0.00e+0	0.00e+0
Water use... (m3 world eq)	9.14e+0	1.38e-2	0.00e+0	3.17e-2	0.00e+0	0.00e+0	0.00e+0
Resource use, m... (kg Sbeq)	1.16e-2	7.10e-6	1.73e-7	9.76e-6	1.98e-4	0.00e+0	0.00e+0
Ressource use, ... (MJ)	2.51e+1	1.78e-1	1.31e-4	3.58e-1	1.67e-8	0.00e+0	0.00e+0



► **18 Impactos Ambientales**

Climate change (kg CO2 eq)

Climate change - biogenic (kg CO2 eq)

Climate change - land use and land transformation (kg CO2 eq)

Ozone depletion (kg CFC eq)

Human toxicity, cancer (CTUh)

Human toxicity, non-cancer (CTUh)

Particulate matter (disease incidence)

Ionising radiation, human health (kgBqU eq)

Photochemical ozone formation, human health (kg NMVOC eq)

Photochemical ozone formation, human health (kg NMVOC eq)

Acidification (mol H+ eq)

Eutrophication, terrestrial (mol N eq)

Eutrophication, freshwater (kg P eq)

Eutrophication, marine (kg Neq)

Ecotoxicity, freshwater (CTUe)

Land use (pt)

Water use (m3 world eq)

Resource use, minerals and metals (kg Sbeq)

Resource use, fossils (MJ)

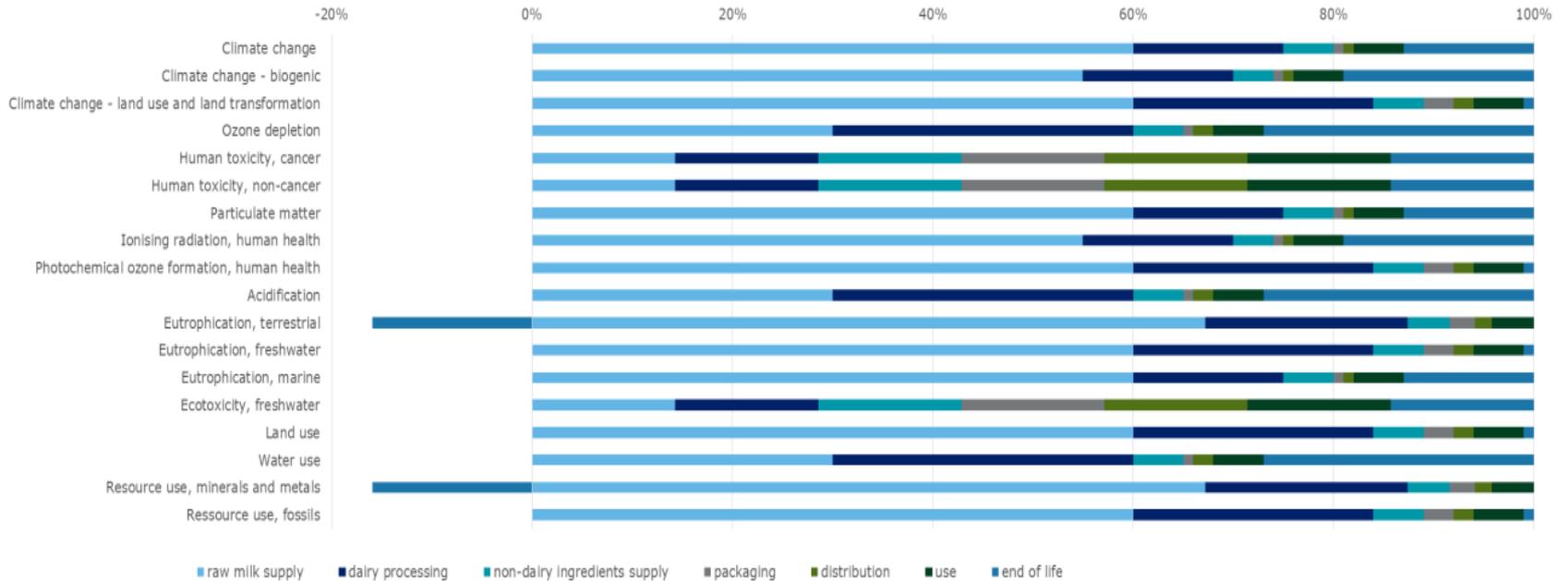


Dairy PEF CR establece los siguientes requisitos sobre la información que se incluirá en el informe PEF:

- ▶ **Resultados caracterizados** en valores absolutos, para todas las categorías de impacto (incluida la toxicidad);
 - Caracterización → Es un paso cuantitativo en el que se evalúa la contribución relativa de cada entrada y salida en cada categoría de impacto.
 - ▶ **Resultado normalizado y ponderado** en valores absolutos, para todas las categorías de impacto (incluida la toxicidad);
 - Normalización → Permite normalizar el resultado del indicador respecto a un valor de referencia.
 - Ponderación → Consiste en asignar pesos a las diferentes categorías basadas en la importancia o relevancia que tenga cada categoría respecto al global.
 - ▶ **Puntuación única agregada** en valores absolutos para la obtención de un índice ambiental global para el sistema.
-
-

Evaluación de impactos

Characterised results per life cycle stage for 1 FU



► Identificación de **Fases y Procesos más relevantes** del ciclo de vida

“Las Fases más relevantes del ciclo de vida son aquellas que juntas contribuyen al menos al 80% de una de las categorías de impacto más relevantes.”

Categoría de impactos más relevantes

- Climate change
- Particulate matter
- Acidification terrestrial and freshwater
- Eutrophication freshwater
- Eutrophication marine
- Eutrophication terrestrial
- Land use
- Water use
- Resource use, fossils

Most Relevant Life Cycle Stages



Impact Category	Most relevant lifes cycles stages	Percentage %
Climate change (kg CO2 eq)	Raw Milk	99.74%
Climate change - biogenic (kg CO2 eq)	Raw Milk	95.57%
Climate change - land use and land transformation (kg CO2 eq)	Raw Milk	51.48%
	Dairy Processing	47.81%
Particulate matter (disease incidence)	Dairy Processing	48.16%
	Packaging	25.32%
	Distribution	16.02%

Most Relevant Processes



Impact Category	Most relevant process	Life cycle stage	%	
Climate change ... (kg CO2 eq)	non_grazing	Cow milk non-grazing sy...	Raw Milk	58.84%
	organic	Cow milk organic at f...	Raw Milk	40.91%
Climate change ... (kg CO2 eq)	non_grazing	Cow milk non-grazing sy...	Raw Milk	52.85%
	organic	Cow milk organic at f...	Raw Milk	42.41%
Climate change ... (kg CO2 eq)	volume_wastewater (Dairy Unit)	Treatment of effluents fr...	Dairy Processing	45.67%
	non_grazing	Cow milk non-grazing sy...	Raw Milk	36.19%
Particulate mat... (disease incidence)	R404A (Dairy Unit)	Tetrafluoroethane product...	Dairy Processing	25.30%
	Carton boxes	Corrugated box, uncoated ...	Packaging	24.17%
	type_pack-1 ()	PET preform transparent ...	Dairy Processing	12.68%
	transport	Articulated lorry transpo...	Raw Milk	9.99%
	distribution-5 ()	Cargo plane technology m...	Distribution	7.96%

- **Benchmark** – Dairy PEFCR establece un punto de referencia para cada subcategoría → son los productos representativos definidos en el estudio de cribado (screening study) realizado durante la fase piloto.

Table 46: Characterised benchmark values for liquid milk (1000 ml)

Impact category	Unit	Life cycle excl. Use stage	Use stage
Climate change	kg CO ₂ eq	1.53E+00	8.29E-02
<i>Climate change - biogenic</i>		7.36E-01	1.67E-03
<i>Climate change – land use and land transformation</i>		1.92E-01	9.45E-05
Ozone depletion	kg CFC-11 eq	4.69E-09	3.26E-10
Particulate matter	disease incidence	1.03E-07	2.50E-09
Ionising radiation, human health	kBq U ²³⁵ eq	5.63E-02	3.23E-02
Photochemical ozone formation, human health	kg NMVOC eq	3.37E-03	1.38E-04
Acidification	mol H ⁺ eq	1.25E-02	2.51E-04
Eutrophication, terrestrial	mol N eq	5.34E-02	5.22E-04
Eutrophication, freshwater	kg P eq	1.04E-04	1.04E-05
Eutrophication, marine	kg N eq	3.75E-03	7.71E-05
Land use	Dimensionless (pt)	1.51E+02	7.51E-01
Water use	m ³ world eq	3.11E-01	7.10E-02
Resource use, minerals and metals	kg Sb eq	1.24E-06	1.08E-07
Resource use, fossils	MJ	6.79E+00	1.36E+00

► **Información ambiental adicional.**

- Esquema de certificación de cualquier ingrediente utilizado en el producto.
 - Información sobre impactos en la biodiversidad.
 - Proporción de la ingesta total de pasto
 - Hábitats seminaturales, en% del área de granjas lecheras
 - Proporción de alimento con posible riesgo de deforestación en su cadena de suministro
 - Esquemas relacionados con la biodiversidad
 - Además, se puede agregar información sobre el trabajo de la empresa con responsabilidad social / ambiental, pero también datos sobre características ambientales específicas del producto.
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CALIDAD DE LOS DATOS (DATA QUALITY RATING - DQR)

Seis criterios de calidad de los datos : cinco para los datos y uno para el método.

1. Representatividad tecnológica.
2. Representatividad geográfica.
3. Representatividad temporal.
4. Integridad
5. Incertidumbre de los parámetros.
6. Relevancia metodológica y coherencia.



Los requisitos de calidad de los datos deben cumplirse en el caso de los estudios de HAP para comunicación externa (B2B o B2C).

Para los estudios de HAP destinados a aplicaciones internas, se deben cumplir los requisitos de calidad de datos especificados, pero no son obligatorios.

Data Needs Matrix: Dairy PEFCR establece diferentes criterios de evaluación de Calidad de los Datos según el tipo de proceso bajo análisis.

- ▶ **Situación 1:** el proceso lo lleva a cabo la empresa que aplica el PEFCR.
- ▶ **Situación 2:** el proceso no lo ejecuta la compañía que aplica el PEFCR pero la compañía tiene acceso a información específica.
- ▶ **Situación 3:** el proceso no lo ejecuta la compañía que aplica el PEFCR y esta compañía no tiene acceso a información específica.

		Most relevant process	Other process
Situation 1: process <u>run</u> by the company applying the PEFCR	Option 1	Provide company-specific data (as requested in the PEFCR) and create a company specific dataset partially disaggregated at least at level 1 (DQR ≤ 1.6).	
	Option 2		Use default secondary dataset in PEFCR, in aggregated form (DQR ≤ 3.0). - If secondary dataset in PEFCR: DQR parameters from PEFCR - If secondary dataset not in PEFCR: DQR parameters from metadata of dataset
Situation 2: process <u>not run</u> by the company applying the PEFCR but <u>with access to (company)-specific information</u>	Option 1	Provide company-specific data (as requested in the PEFCR) and create a company specific dataset partially disaggregated at least at level 1 (DQR ≤ 1.6).	
	Option 2	Use company-specific activity data for transport (distance), and substitute the sub-processes used for electricity mix and transport with supply-chain specific PEF compliant datasets (DQR ≤ 3.0). - If secondary dataset in PEFCR: DQR parameters from PEFCR - If secondary dataset not in PEFCR: re-evaluate context-specific DQR parameters.	
	Option 3		Use company-specific activity data for transport (distance), and substitute the sub-processes used for electricity mix and transport with supply-chain specific PEF compliant datasets (DQR ≤ 4.0). - If secondary dataset in PEFCR: DQR parameters from PEFCR - If secondary dataset not in PEFCR: DQR parameters from metadata of dataset
Situation 3: process <u>not run</u> by the company applying the PEFCR and <u>without access to (company)-specific information</u>	Option 1	Use default secondary dataset, in aggregated form (DQR ≤ 3.0). - If secondary dataset in PEFCR: DQR parameters from PEFCR - If secondary dataset not in PEFCR: re-evaluate context-specific DQR parameters.	
	Option 2		Use default secondary dataset in PEFCR, in aggregated form (DQR ≤ 4.0). - If secondary dataset in PEFCR: DQR parameters from PEFCR - If secondary dataset not in PEFCR: DQR parameters from metadata of dataset

A blue circular icon containing a white number "4" and the word "Interpretación" in white text.

- ▶ La interpretación de los resultados de las fases de análisis de inventario y evaluación de impacto de acuerdo con los objetivos del estudio.
- ▶ Analizar los resultados por indicador y por etapa del ciclo de vida → Identificación de elementos más contribuyentes para impactos
- ▶ Permite adoptar estrategias de mejora ambiental, implicando nuevas modalidades de diseño, producción y consumo más sostenibles

MEJORES TÉCNICAS DISPONIBLES:

112 MTD incluidas en herramienta RENDER relacionadas con:

- A. Desempeño ambiental general
- B. Técnicas para aumentar la eficiencia energética.
- C. Técnicas para reducir el consumo de agua.
- D. Técnicas para reducir el desperdicio.
- E. Técnicas para el tratamiento de aguas residuales.
- F. Técnicas para reducir las emisiones al agua.
- G. Técnicas para reducir las emisiones al aire.

Información incluida en cada MTD:

- ▶ Technical description
- ▶ Achieved environmental benefits
- ▶ Cross-media effects
- ▶ Technical considerations relevant to applicability
- ▶ Economics / Driving force for implementation
- ▶ Example plants
- ▶ Reference literature

TECHNIQUES TO INCREASE ENERGY EFFICIENCY
Sheet of 25' Boiler Cluster

Description:
The boiler is oil or gas fired to heat the water in the processing tanks and return steam, which is connected to the processing plant for processing and cleaning purposes. Due to concerns about heating the plant areas and preventing damage, the system is constantly at a high pressure and the steam line is the same temperature as the steam tank, which means that there are high levels of heat loss. Improvements and savings can be achieved in multiple systems of a boiler, including operation and management, steam production, system losses, and potential to upgrade the entire plant.

Figure 1: Process diagram

The following have been identified as good practices related to the boiler processes in the Food and Beverage Sector:

- Install boiler filter
- Remove current boiler insulation and re-insulate with 20cm insulation and metal cladding
- Upgrade to direct digital control of boiler plant
- Heat recovery from the compressor installation
- Upgrade current boiler plant
- Install efficiency boiler burners & VSD Drives
- Upgrade distribution pumps VSD installation
- Fit Heat Exchanger regeneration circuit in return connect plant - chiller saving and boiler saving (not of existing saving from partial regeneration with VSD)
- Move the current steam boiler to a position nearer to the steam usage
- Use 3 bar steam boiler
- Upgrade to direct digital control of boiler plant with oxygen trim and variable speed drive control of the forced draft combustion air fan

Technical description:
Good Practice: Install boiler filter
The boiler previously only supplied steam for processing and cleaning for two shifts, the shift area uses. Due to concerns about keeping the plant open and preventing damage, the boiler ran continuously to keep the temperature up, resulting in 24-hour boiler use at a constant flow to ensure the steam pressure is up to working level at the start of production. The boiler is turned off by the line stop at weekends, with heat loss to cool the boiler the weather is approaching freezing temperatures.
Good Practice: Remove current boiler insulation and re-insulate with 20cm insulation and metal cladding
Many boilers only use insulation that is 20cm thick. By replacing this by 20cm thick insulation, heat loss was reduced, and the overall

Direct combustion air fan

Although it may be possible to manually monitor and adjust the burner on a daily basis it was not practical. The direct digital control (DDC) system took care from the modulation control system with the advantage that several control loops can be set through one controller. Continuous flow air analysis or oxygen trim is a further advance that can be achieved by a DDC system. On the classical PID approach of Pressure, Temperature and Flow the combustion air is controlled by an analytical function. By installing oxygen trim sensors in the flue and feeding the gas information back to the DDC control the air and fuel flow are continuously matched to the best combustion performance for a specific boiler demand.

Achieved environmental benefits

Min: 16.7 tcoy (primary energy saved)
Max: 4.007 tcoy (primary energy saved)
Average: 646 tcoy (primary energy saved)
Median: 104.4 tcoy (primary energy saved)

Environmental performance and operational data

Performance indicator	Score
Energy Conversion/Improvement (%) (data for 1 record)	20
Energy Intensity - Consumption reduction per unit product (tcoy/t)	Min: 0.1 Max: 0.2 Median: 1.0 Average: 1.1
Commutative Cash Flow (€)	Min: 70,988 Max: 16,701,896 Median: 1,014,822 Average: 2,819,372
Share of Project Cost Subsidized (%)	Unknown for all records
Cost of Energy Savings (€/kWh)	Min: 682.0 Max: 189 Median: 204.4 Average: 85
Cost of Carbon Savings (€/tCO ₂ e)	Min: 22.6 Max: 172 Median: 71 Average: 85
Renewable Energy Use (REU) (%)	0% of records

Costs media (€/kWh)

Technical considerations relevant to applicability
Applicable in the dairy sector

Economics

Costs of implementation

Min: 3,428 €
Max: 1,325,024 €
Median: 27,500 €

Upgrade to direct digital control of boiler plant

The direct digital control requires many of the components of the analogue system with a digital controller having a real time operating system. Each control loop on the boiler is serviced by the same digital controller. There are several advantages associated with the replacement:

- Digital equipment tends to be more reliable compared to analogue, and is easier to build back-up systems
- It is easier to programme a complex control strategy
- It is easier to modify the control strategy compared to its hardware analogue circuits
- It would reduce the costs of the direct digital controller can look after many control loops, and would reduce the amount of investment that is likely to be lost

Good Practice: Heat recovery from the compressor installation
The main air compressor was located adjacent to the boiler, and it required 2.2 tonnes of logical ducting to supply the waste heat from the compressors to the boiler. The waste heat was used to increase the temperatures of the boiler air inlets.

Good Practice: Upgrade current boiler plant
Upgrading the energy efficiency of the boiler system is the best long-term solution compared to retrofitting. A custom steam boiler will generally operate at an efficiency of 80-85%. Some distribution losses will be incurred in the pipe work between the boiler and the process plant. Use for a system modulus to compare elements. This loss should not exceed 5% of the total heat content of the steam. Once adjusted, the overall efficiency of the combined steam plant can be raised to around 85%. Recommendations that an upgrade can have are:

- Improve operation and maintenance
- Install blow down recovery and check automatic blow down equipment
- Upgrade variable speed drive combustion air fan and fuel gas economiser
- Recover condensation from preheating air
- Insulate heated tank, steam steam tank and install permanent connection hoses for fresh water treatment

Good Practice: Install efficiency boiler burners & VSD Drives
An efficiency burner provides the proper air to fuel mixture throughout the full range of firing rates, without constant adjustment. These burners without leakage allow for easy tune-ups, and minor adjustments, with consistent burning, or lack of emissions, and provide accurate point-to-point control. They also provide consistent performance and repeatability as the burner adjusts to different firing rates.

Good Practice: Control distribution pumps VSD installation
Optical is being used as a cooling agent as being pumped around the plant via a pump. The temperature of fluid ranges from: 4 °C to +10 °C, but a mean temperature of around 5 °C higher as it flows in heat from production areas. To control this temperature, variable speed drives can be used reducing the energy required to run the direct pump.

Good Practice: Fit Heat Exchanger regeneration circuit in return connect plant - chiller saving and boiler saving (not of existing saving from partial regeneration with VSD)
With the addition of a regeneration cycle with a suitable static plate heat exchanger (PHE), the milk supply could be pre-heated, and the whey concentrate discharge be pre-cooled, reducing the load on the chiller. The load on the boiler would also be reduced. In addition, by increasing the capacity of the existing PHE, the load on the boiler would be further reduced, thereby allowing the boiler to supply adequate steam for the 100% design temperature of the Reverse Osmosis (RO) plant.

Good Practice: Move the current steam boiler to a position nearer to the steam usage
The steam distribution system which extends over 200m was generally in poor condition. The installation of gas fired steam boilers and a water boiler made the majority of the steam return useless. The only item within the plant that is now consuming steam is the pressure cookers, which are positioned in one central area within the plant. The steam generator boiler is moved from its current position to a new position that is within close proximity of the steam pressure cookers.

Good Practice: New 3 bar steam boiler
A more efficient boiler is installed. Steam boiler output can be expressed in terms of steam requested per hour with temperature and pressure. Therefore, a 3 bar boiler will produce 3 tonnes of steam output per hour.

Good Practice: Upgrade to direct digital control of boiler plant with oxygen trim and variable speed drive control of the forced

Average: 163,345 €

Payback time:
Min: 0 year
Max: 1.0 year
Median: 0.3 years
Average: 0.4 years

Subsidies not issued

Driving force for implementation
Reduced energy costs.

Example plants
13 out of 13 measures occurred in the UK

Reference literature

- 6148502
- <http://www.abcc.co.uk/wp/wp-content/uploads/2014/04/44674681257416003298.pdf>

5 FLUJOS AMBIENTALES considerados

ELECTRICIDAD
ENERGÍA TÉRMICA
CONSUMO DE AGUA
PRODUCTOS QUÍMICOS
AGUAS RESIDUALES



Procesos y datos
secundarios de
Inventario



Mejores Técnicas
Disponibles

¡Gracias!

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