

Santa Fe Sustentable:

1er Congreso de Eficiencia Energética

Impulsando la Transición Energética

01 al 03 de octubre 2025, Rosario

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Grupo Lactalis



From Boiler to Cooling: Best Practices in Energy Efficiency for Dairy Industry Utilities

The Lactalis Groupe

Lactalis collects more than 22.8 billion liters of raw milk per year from 400,000 farmers. Processing is carried out at 266 production sites located in 50 countries. Lactalis has 85,500 employees worldwide. Lactalis generated revenue of €30.3 billion in 2024. Over 250 brands.



No. 1

- Global dairy company
- Global group in the cheese market
- Global group in butter and cream
- Global player in PDOs and raw milk cheeses



No. 2

- Global group in the ultra-fresh dairy products market
- Global group in the fluid milk market



No. 9

Global food company



For the Planet – Lactalis Commitments

Emissions

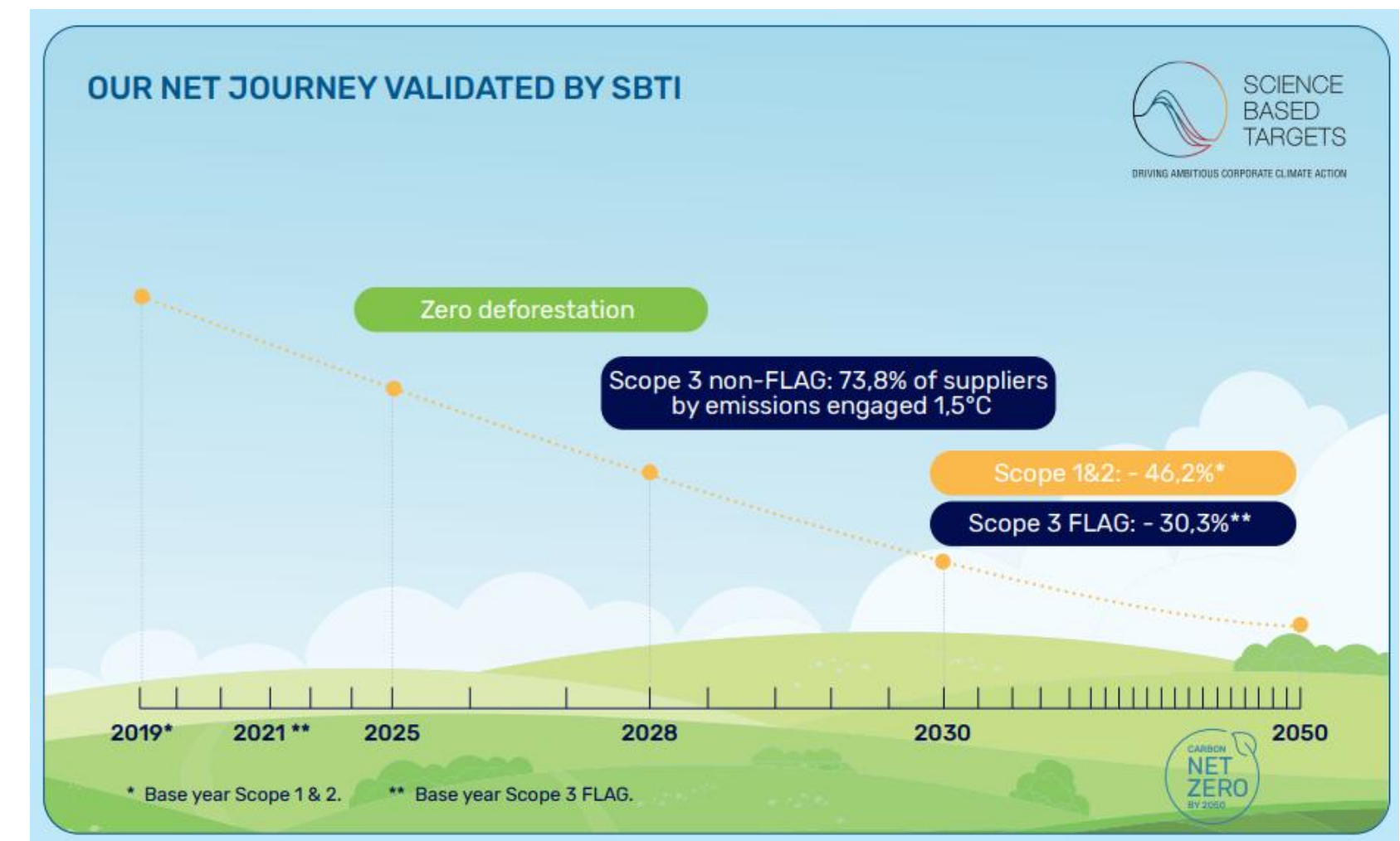
- -46.2% GHG emissions (Scopes 1 & 2) by 2030
- -30.3% GHG emissions (Scope 3 FLAG) by 2030
- 73.8% of suppliers/customers aligned with science-based targets by 2028
- Carbon Net Zero by 2050

Forests & Resources

- Zero deforestation by end of 2025
- 100% virgin paper sustainably certified (since 2023)

Packaging

- Eco-design tool for all packaging by 2025
- Minimum 30% recycled materials in packaging
- Eliminate PVC in packaging by 2025
- 100% recyclable packaging by design in 2025
- 100% recyclable packaging in practice by 2033





Energy Efficiency & Renewable Energies

To limit the impact of its industrial activities on the environment and the climate, Lactalis has an energy management policy based on three principles:

- Energy sobriety – reducing unnecessary consumption
- Energy efficiency – optimizing processes and utilities
- Low-carbon transition – shifting to cleaner energy sources

Lactalis is increasingly integrating renewable energies into its energy mix:

- Solar power
- Biomass

Each site is encouraged to develop conversion projects aligned with the group's performance goals and long-term objectives.



Energy Management

Objectives:

- Manage the saving plan
- Integrate energy in CAPEX plan
- Contribute to CO₂ roadmap

Tools:

- Reference Booklet
- Internal training

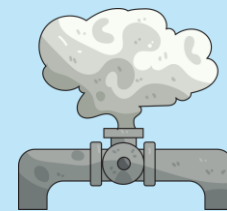


3 axis for Energy Performance in the plant



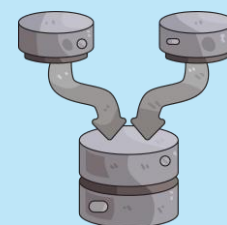
Utilities efficiency

Boilers, refrigeration system,
compressed air



Decrease of losses
in distribution network

Proper sizing &
leak detection



Process optimization

Operating/waiting time,
heat recovery,
right sizing

Energy Management – Supply Drivers & KPIs

Energy Supply Drivers

- Right sizing – supply the good quantity of energy (avoid oversizing)
- Reliability – supply energy with no failure (backup & maintenance)
- Compliance – internal & external requirements
- Fluids quality – reliable and stable setpoints (pressure, temperature)

MAIN KPI		Target Exemple
Total	Specific Ratio Elec. kWh/ton	By Activity (Reference Energy team)
	Specific ratio Heat (kWh/ton)	By Activity (Reference Energy team)
Heat	Boiler unit efficiency	94% (to Gas/ Coal Boiler)
	Boiler room efficiency	87%
	Condensate return	Indirect milk 90%, Cheese 80%, Ingredients 60%, Yogurts/desserts 50%
Refrigeration	COP (Coefficient of Performance)	COP 3 (–8 °C glycol water) COP 4.5 (0 °C chilled water)
Compressed Air	Efficiency	130 Wh/Nm³ (including dryers)

BEST PRACTICES FOR AIR COMPRESSED FACILITY

- Compressors are among the largest electricity consumers in the plant.

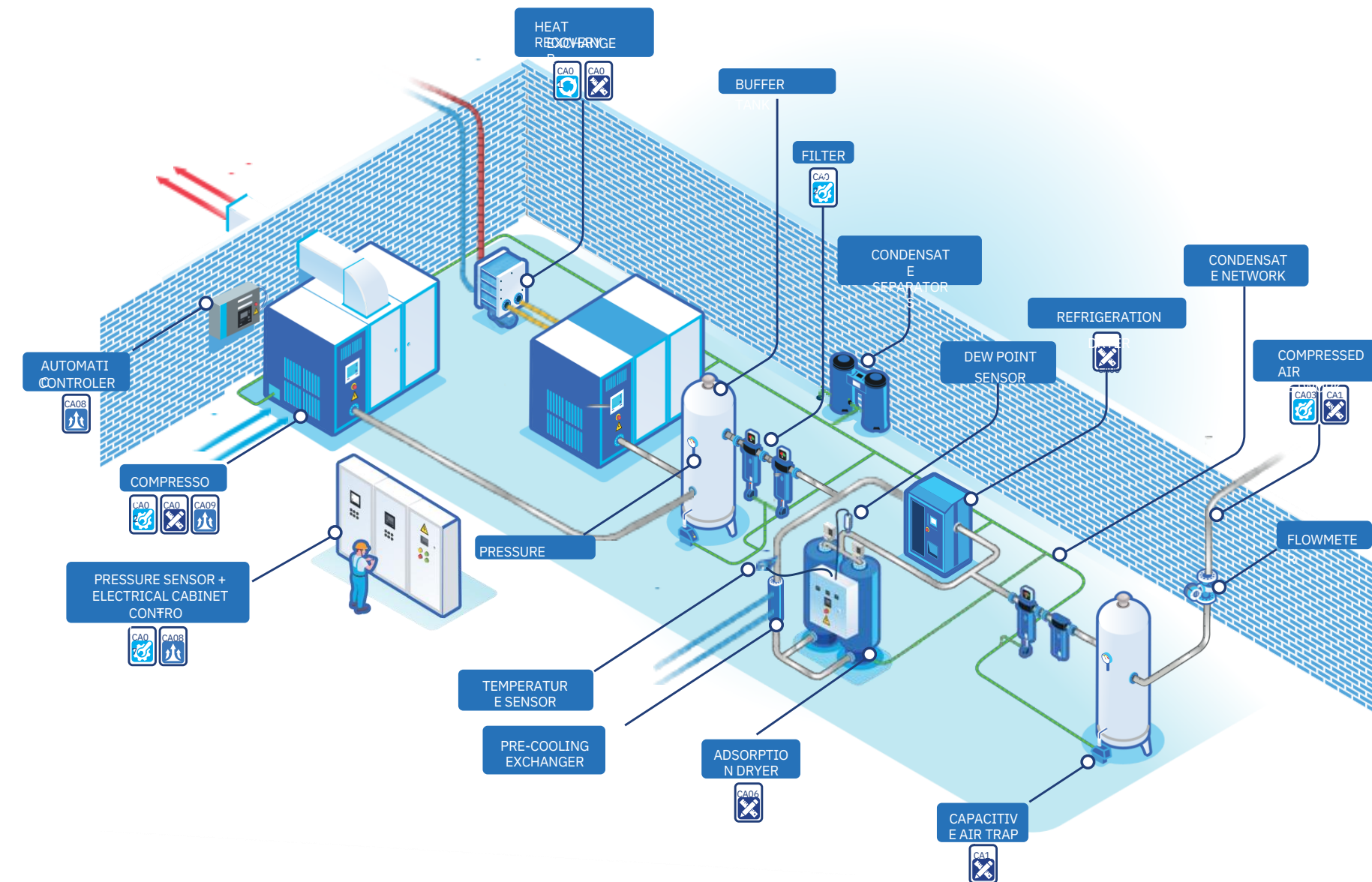
Right sizing & pressure control: set pressure at max. 100 PSI, or less if possible.

Regular checks: monitor electricity use, oil level, filters, and running hours.

Sequencer (controller):

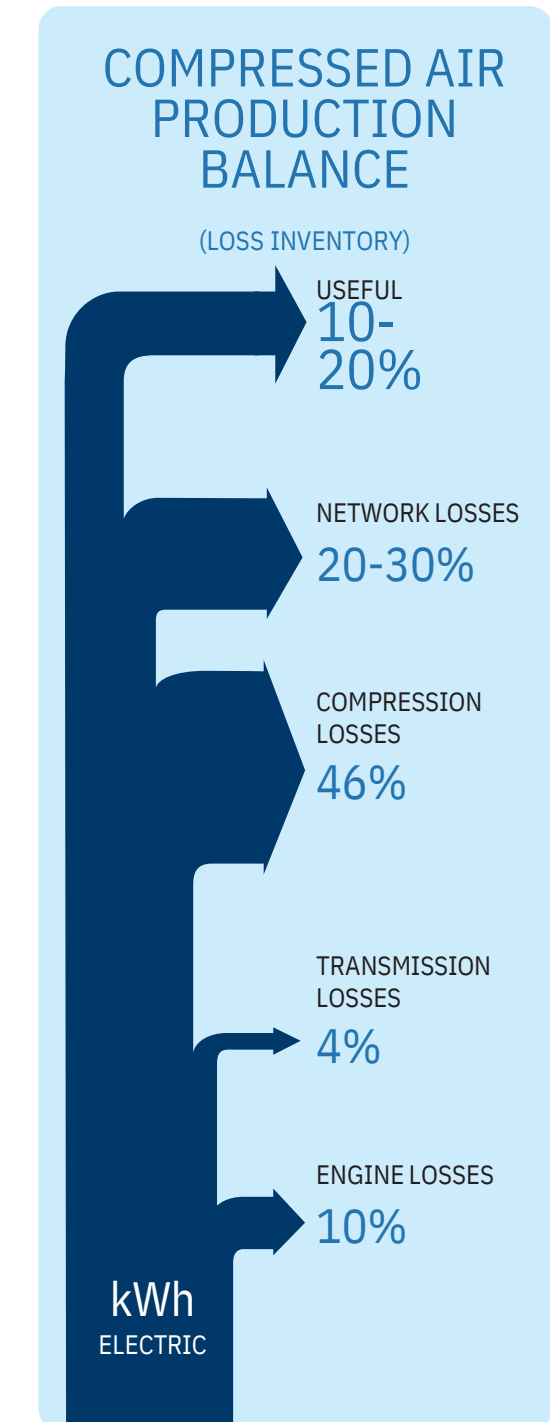
- Coordinates start-up and shutdown.
- Limits no-load running.
- With VSD compressors, aim for 20–80% load range.

Key impact: Proper control can reduce energy consumption by up to 10–20%



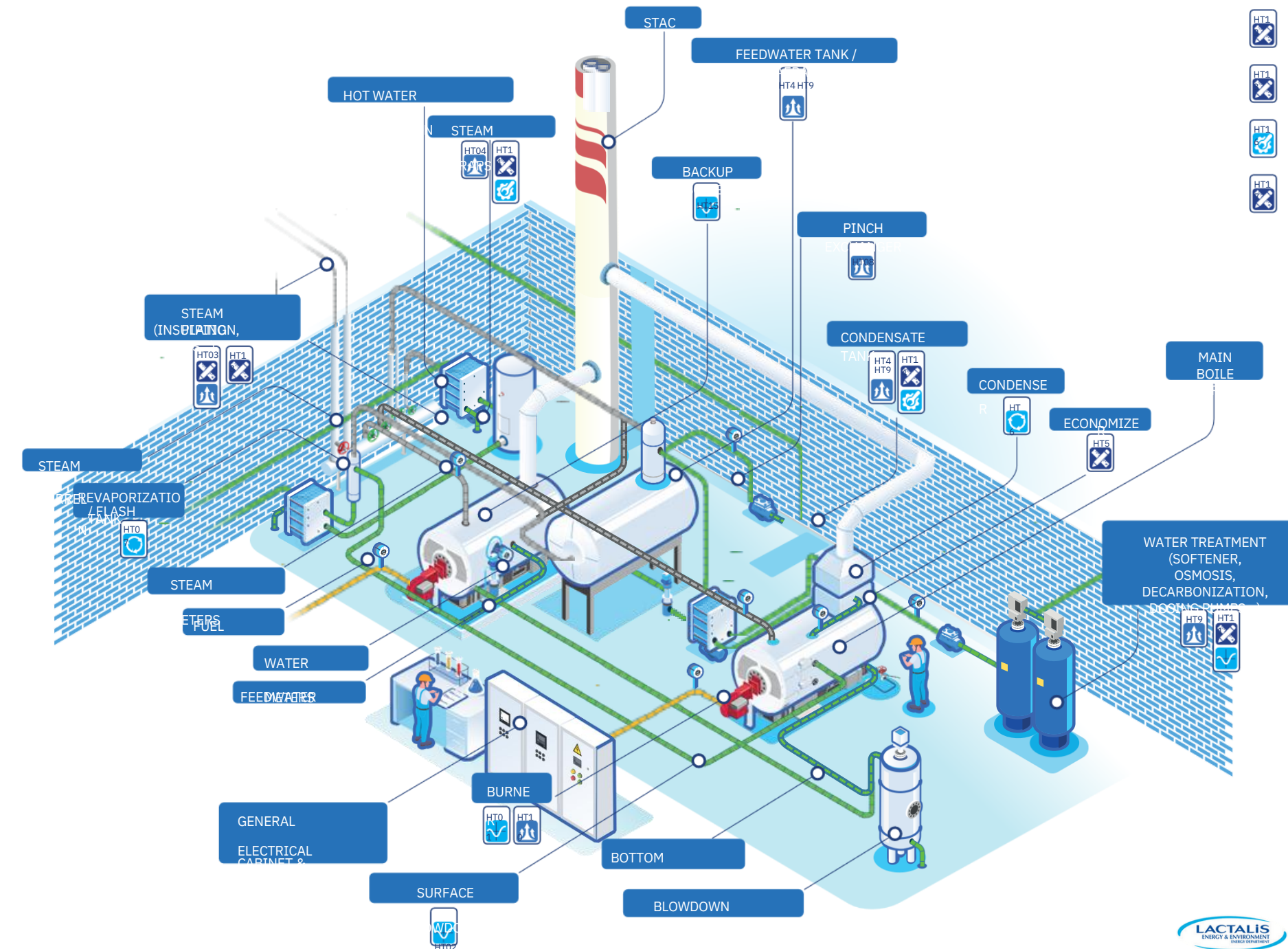
- Air Quality, Recovery & Loss Reduction

- Filtration & drying → avoid corrosion, damage, and wasted energy
- Poor filter condition = 52 MWh/year wasted
- Condensate management (drains & oil separators) to protect environment
- Heat recovery → reuse compressor heat for water/process heating (up to 288 MWh/year)
- Leak detection & repair → cut leakage from 50% to $\leq 15\%$ (saves ~210,000 kWh/year, ROI < 6 months)
- Network optimization with valves and dedicated small compressors



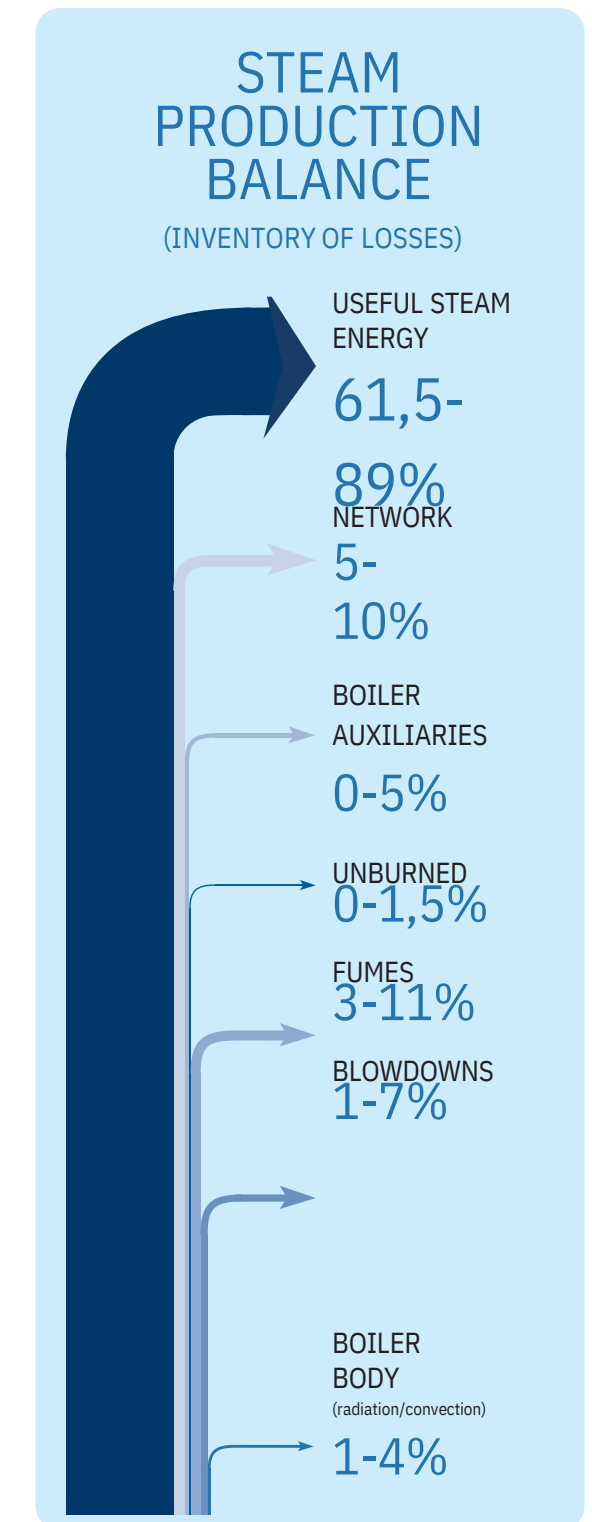
BEST PRACTICES FOR STEAM PRODUCTION

- Steam is widely used in dairy plants: CIP, sterilizers, pasteurizers, HVAC, drying, hygienic barriers.
 - Boiler efficiency:
 - Gas-fired boilers → 90–94% (higher efficiency, lower GHG factor).
 - Oil-fired boilers → 85–90% (risk of SO_x, careful material selection).
 - Biomass boilers → 80–88% (lower efficiency, but strong decarbonization potential).
 - Coal-fired boilers → 75–85% (lowest efficiency, high CO₂ and pollutants).



Energy Recovery & Loss Reduction

- Best practices:
 - Regular inspection of boilers and safety devices.
 - Water treatment (softeners, reverse osmosis, chemical dosing) to prevent scaling, foaming, and corrosion.
 - Burner tuning with O₂ monitoring to reduce excess air and fuel losses (up to +2% efficiency).
- Exhaust heat recovery:
 - Economizers → recover heat from flue gases (4–6% efficiency gain - Gas boilers).
 - Condensers → recover additional heat from exhausts.
- Insulation:
 - Insulate boiler, deaerator, valves, collectors, and steam lines to reduce thermal losses.
 - Use removable thermal blankets for valves and registers.



Energy Recovery & Loss Reduction

- Blowdown optimization:
 - Poorly managed blowdown = up to 7% losses.
 - Optimization reduces it to ~2% → annual savings: \$25,000 and 610 klb CO₂.
- Blowdown energy recovery:
 - Flash tanks recover ~15% of blowdown as low-pressure steam.
 - Remaining hot water can preheat make-up water.



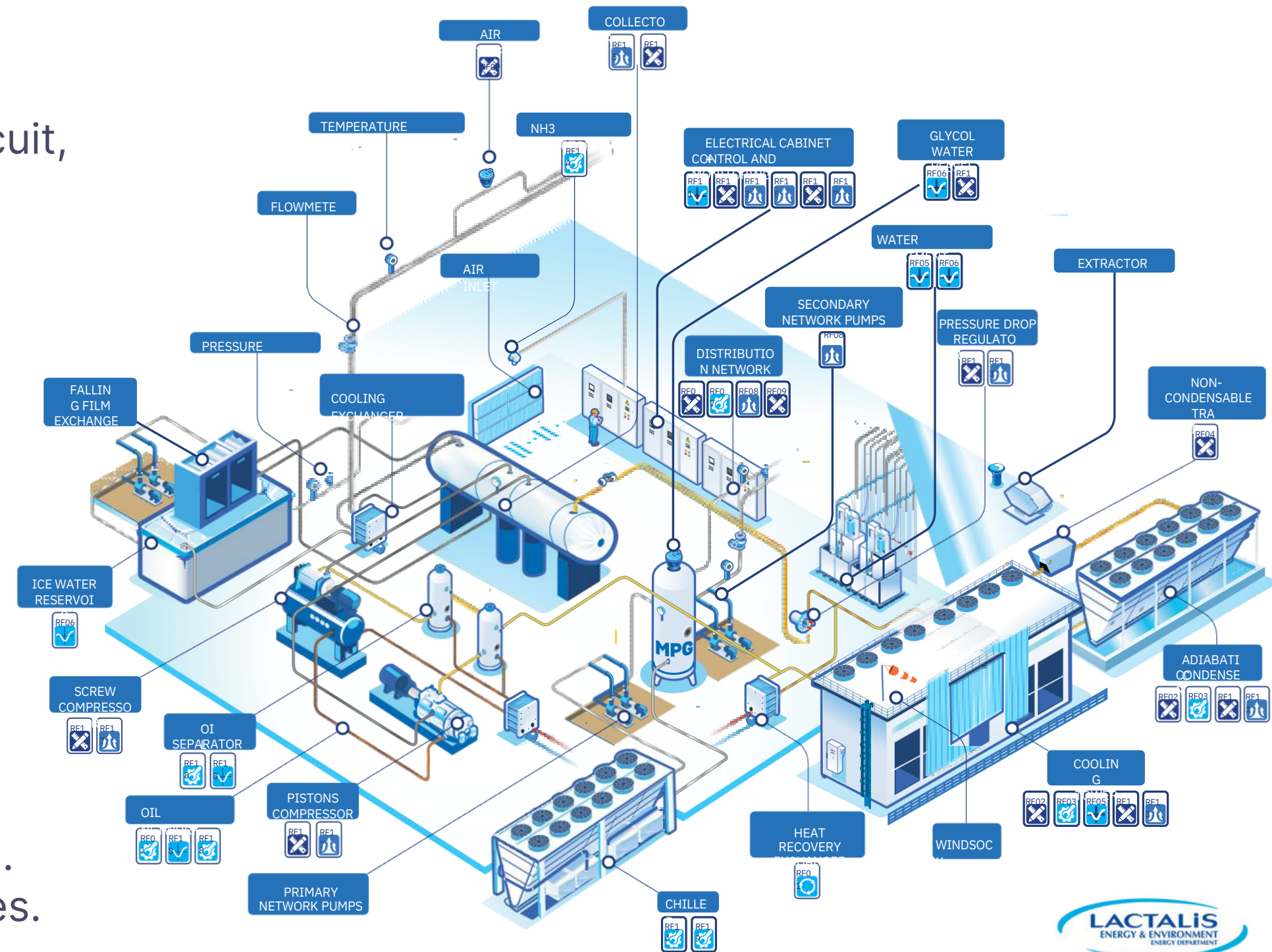
SURFACE BLOWDOWN



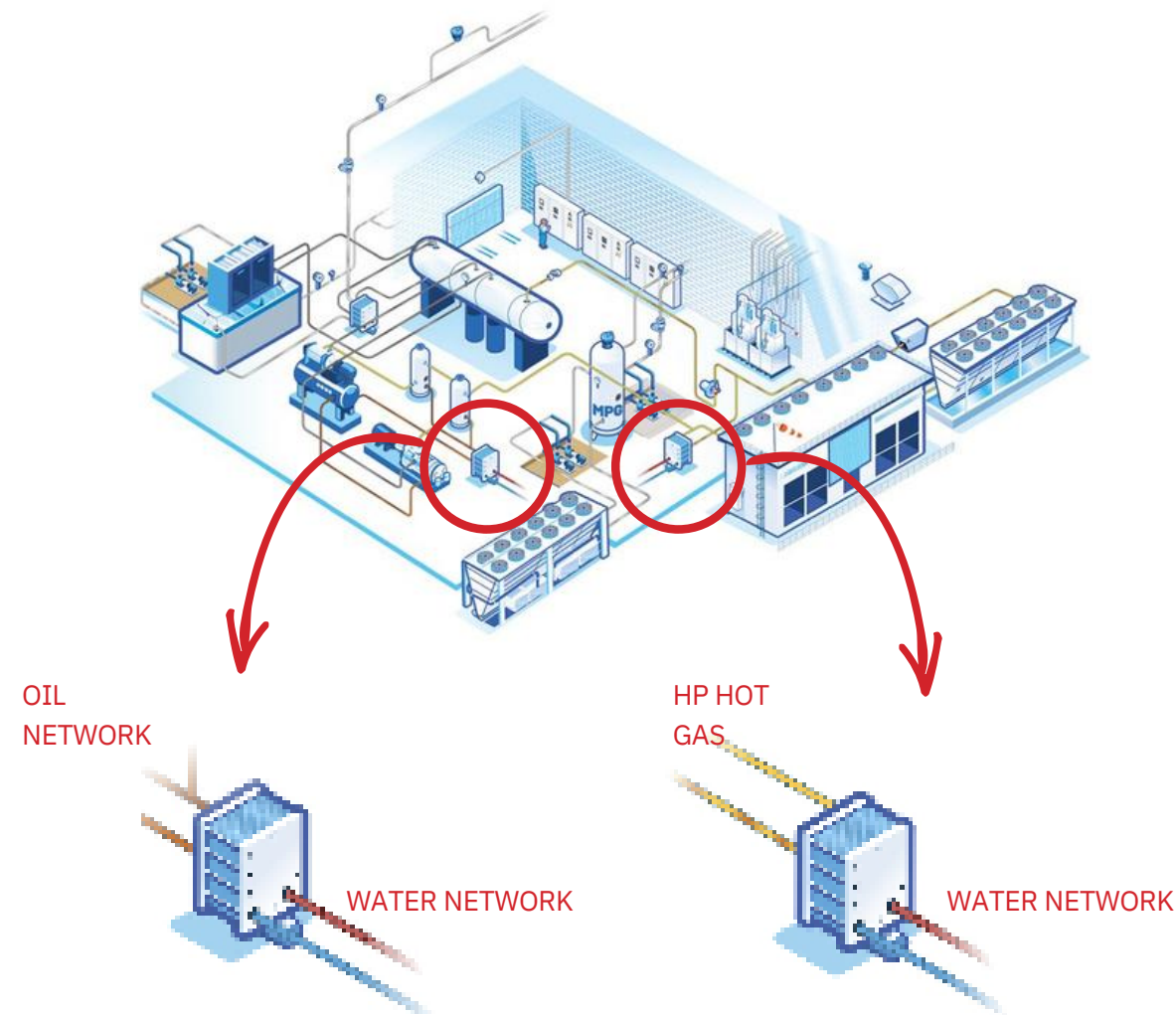
BOTTOM BLOWDOWN

BEST PRACTICES FOR REFRIGERATION FACILITY

- Compressors:
 - Regular monitoring of alignment, vibration, oil circuit, energy use.
 - Screw and reciprocating compressors are most common.
- Condensers:
 - Keep exchangers clean – 1 mm scaling reduces efficiency by 9%.
 - Clogged condensers can cause 22% extra energy use.
 - Optimize water treatment, fan control, and airflow.
- Evaporators:
 - Ensure regular defrost and avoid oil accumulation.
 - Monitor ice thickness and LP (low pressure) values.



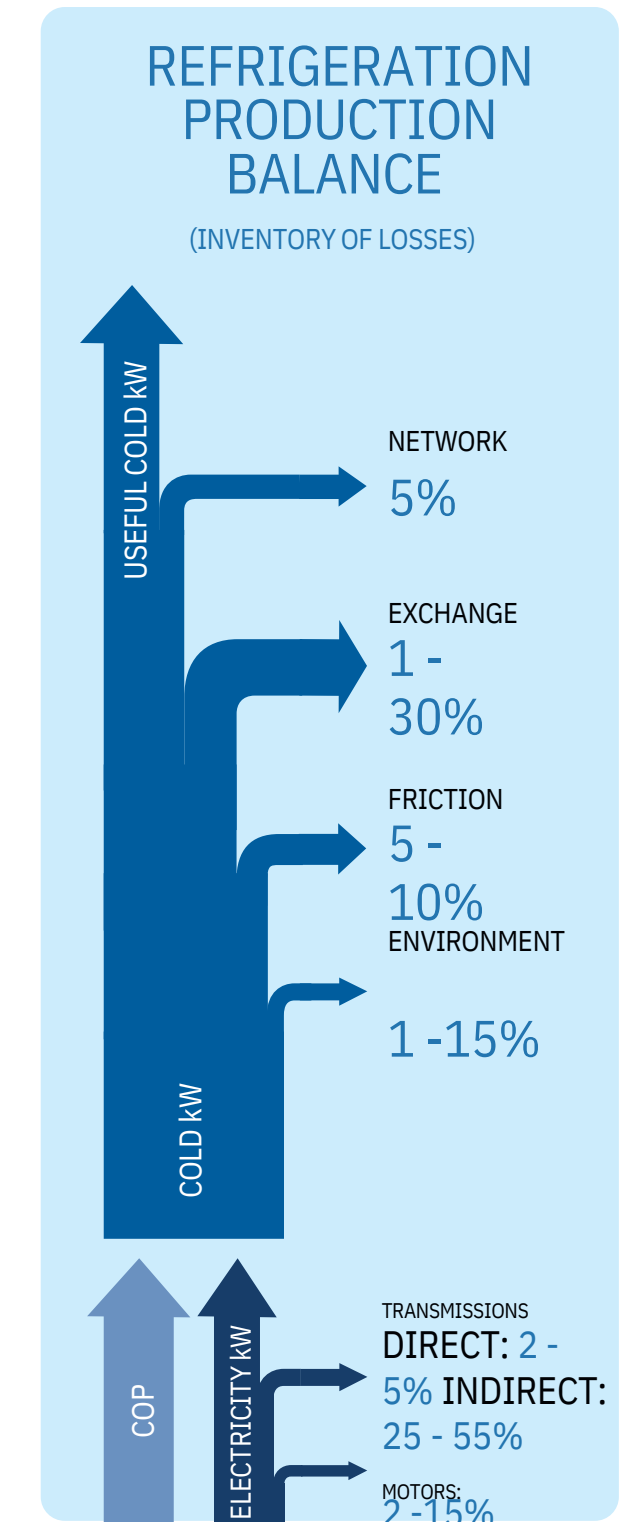
Energy Recovery & Optimization



- Heat recovery:
 - Reuse heat from oil cooler and hot gas (high pressure).
 - Applications: domestic hot water, CIP, heating of workshops, product warming.
 - Integration with buffer tanks or hot water loops for continuous recovery.
- High & Low Pressure Control:
 - Floating HP control (linked to wet bulb temperature) saves 5–30% compressor electricity.
 - Each 1.8°F lower condensation temperature = ~4% savings (for ammonia).
 - Optimized LP setpoints improve COP and reduce auxiliary consumption.

Distribution & System Management

- Pumps & Distribution:
 - Use VSDs to adapt flow to process needs → average 30% savings.
 - Balance circuits, avoid faulty mixing valves, implement pressure/temperature sensors.
- Cooling Towers:
 - Regular cleaning of exchangers and nozzles.
 - Prevent scaling → +1 mm scale = -9% efficiency.
- Control Systems:
 - Calibrate probes and sensors.
 - SCADA monitoring helps track consumption and efficiency improvements.
- Safety:
 - Gas leak sensors, safety valves, emergency protocols mandatory.



Conclusion – Towards Sustainable Dairy Industry

- Energy efficiency means more than cost reduction: it is the key to competitiveness and sustainability.
- By applying best practices in steam, refrigeration, compressed air, and utilities, Lactalis reduces energy use, emissions, and operational risks.
- With €75 million investment in 2026 for energy & environment projects, we reaffirm our commitment to a low-carbon future.

Better Together: building a more efficient and sustainable dairy industry.



Gracias por su atención

Nathália L. Bitencourt
Lactalis Group