Towards a Circular Economy: Challenges, Opportunities & Solutions for The Food and Beverage Industry

WATER

ENERGY

WASTE

Resourcing The World

VEOLIA

Our Mission: Resourcing the world

We believe in round

With over 160 years of expertise in these areas of water, energy and waste, we provide an array of sustainable environmental solutions that promote the transition toward a circular economy - where consumed materials are put back into the production chain to become new products or clean energy, so they are given a second or third life. We call this Resourcing the World.

IMPROVE ACCESS TO RESOURCES

CONSERVE RESOURCES

RENEW RESOURCES

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VEOLIA : GLOBAL COLLABORATION WITH FOOD & BEVERAGE INDUSTRY

WATER
Water Cycle Management

ENERGY
Energy Efficiency Programs & Management

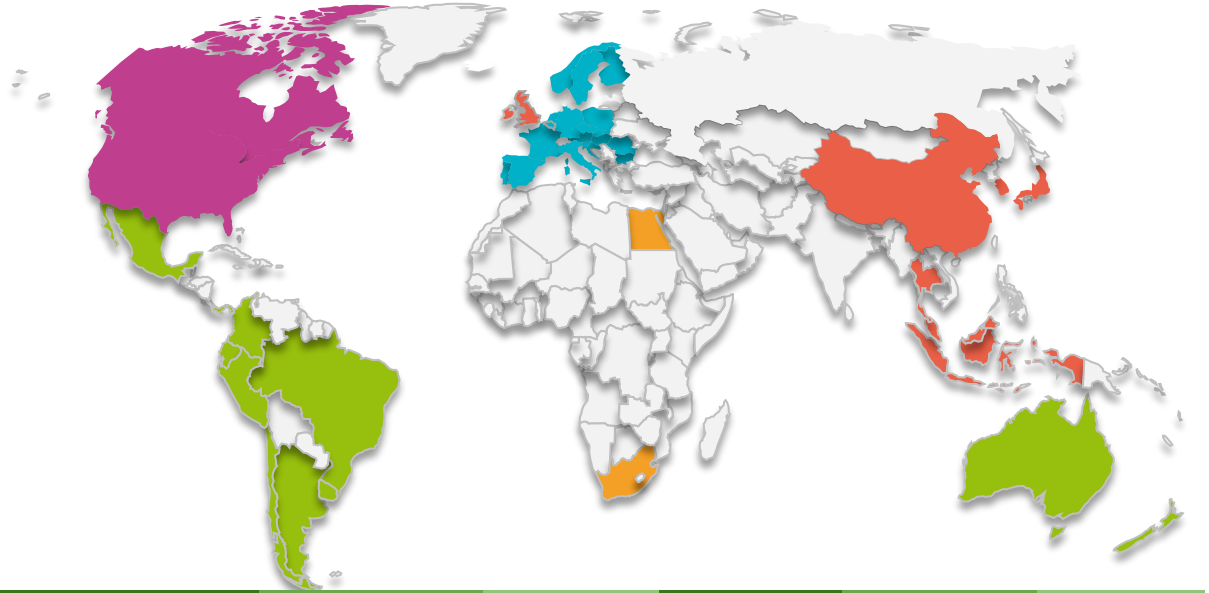
WASTE
360 Waste Management Programs

+200
Service contracts in Water, Energy and Waste for F&B

+20
Years of experience in energy services

+1,000
Water Treatment and Recycling Plants Constructed

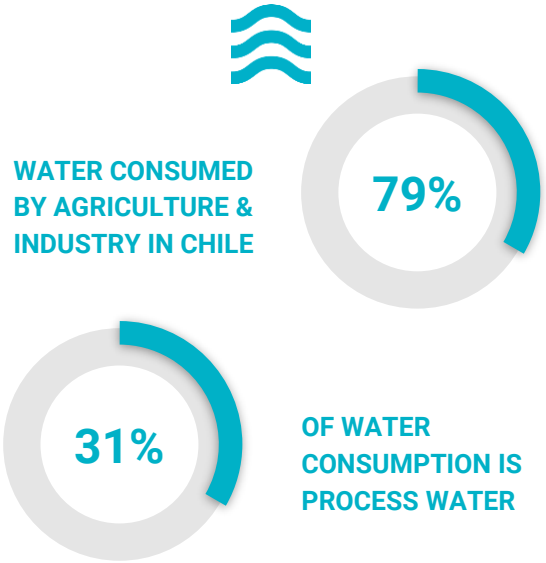
+120
Organic Waste Plants Operated



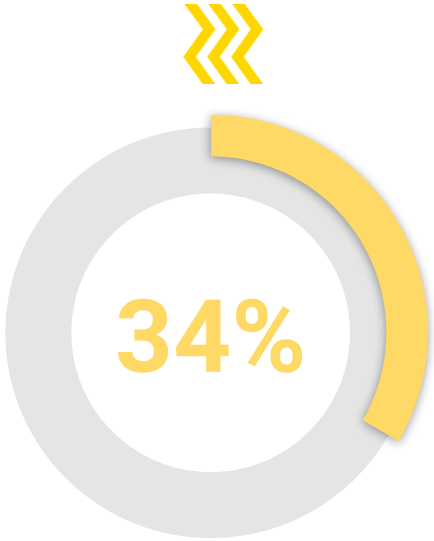
DAIRY	BEER & MALT	DISTILLERY	MEAT AND POULTRY	FRUIT AND VEGETABLE	& More
Danone, Nestlé, Lactalis, Friesland Campina, Arla, OSM, Dairy Crest, Naabtaller, Savencia	CCU, Heineken, Carlsberg, Guinness, Wolters, ABinBEV-SAB Miller Lion, Boortmalt,	Arcus, Altia, Diageo, Pernod Ricard	LDC, Scan, Hungerit, Saga	Bonduelle, Kraft Heinz, McCain, Findus, Tarami	Coca Cola, Unilever, Bunge, Mondelez...

CHALLENGES: WHY ACT NOW?

THE GLOBAL FOOD AND BEVERAGE INDUSTRY HAS UNPARALLELED ENVIRONMENTAL IMPACT:



HIGH DEPENDENCE ON GLOBAL WATER [1]



OF GLOBAL GHG EMISSIONS [2]

OF FOOD PRODUCTION IS WASTED [3]

1 https://h2oglobalnews.com/food-beverage-industry-urged-to-adopt-water-best-practice/

2 https://www.unpri.org/news-and-press/climate-action-100-sets-new-decarbonisation-expectations-for-food-and-beverage-industry-in-line-with-paris-agreement-goals/8361.article

3 https://www.fao.org/food-loss-and-food-waste/flw-data)

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REASONS TO THINK & ACT CIRCULAR

Agua Energía Residuos

Resources at Risk

Population Growth

Rise in Demand

Water Stress

Desertification

Land Degradation

Regulatory Shifts

Climate Crisis

Extended Producer Responsibility

Carbon Taxes

Water Regulation

Investors

Support for Sustainability

Climate Action 100+

Risk Mitigation

Industry Continuity

Cost Stabilization

Consumers

Climate Awareness

New Habit Adoption

Willingness to Support Sustainable Brands

Era of Public Transparency & Traceability

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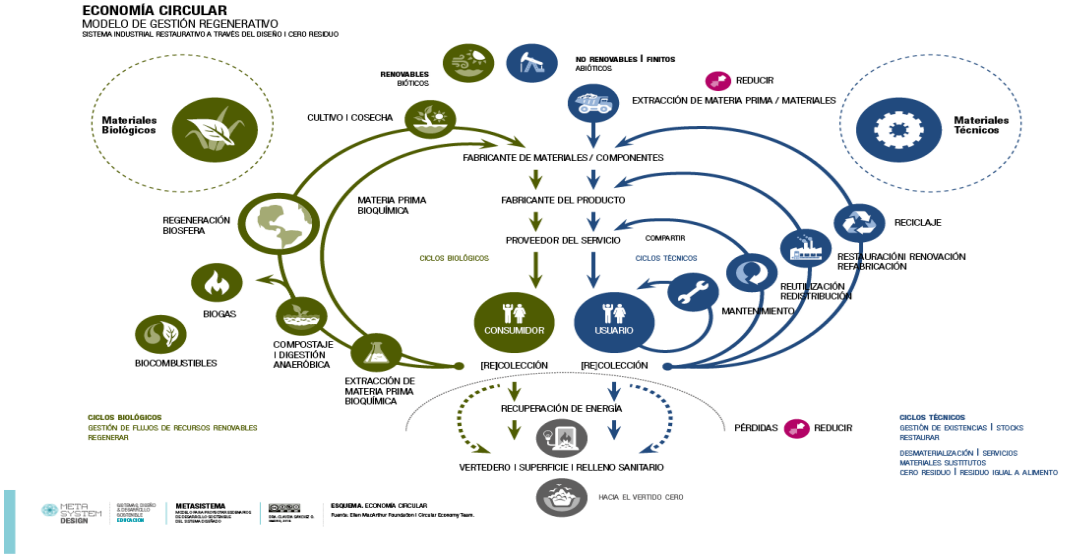
WHAT DOES THINKING CIRCULAR MEAN?

Agua Energía Residuos

Sustainability is not a linear concept, nature is built on loops

A Circular Economy:

- Recovers the highest quantity and quality of resources possible
- Maintains and re-utilizes them for as long as possible
- Reduces the extraction of raw materials and disposal/loss of waste
- Reduces negative effects on the biosphere (Air, Water, Soil)



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Farm to Fork, a Linear Process:

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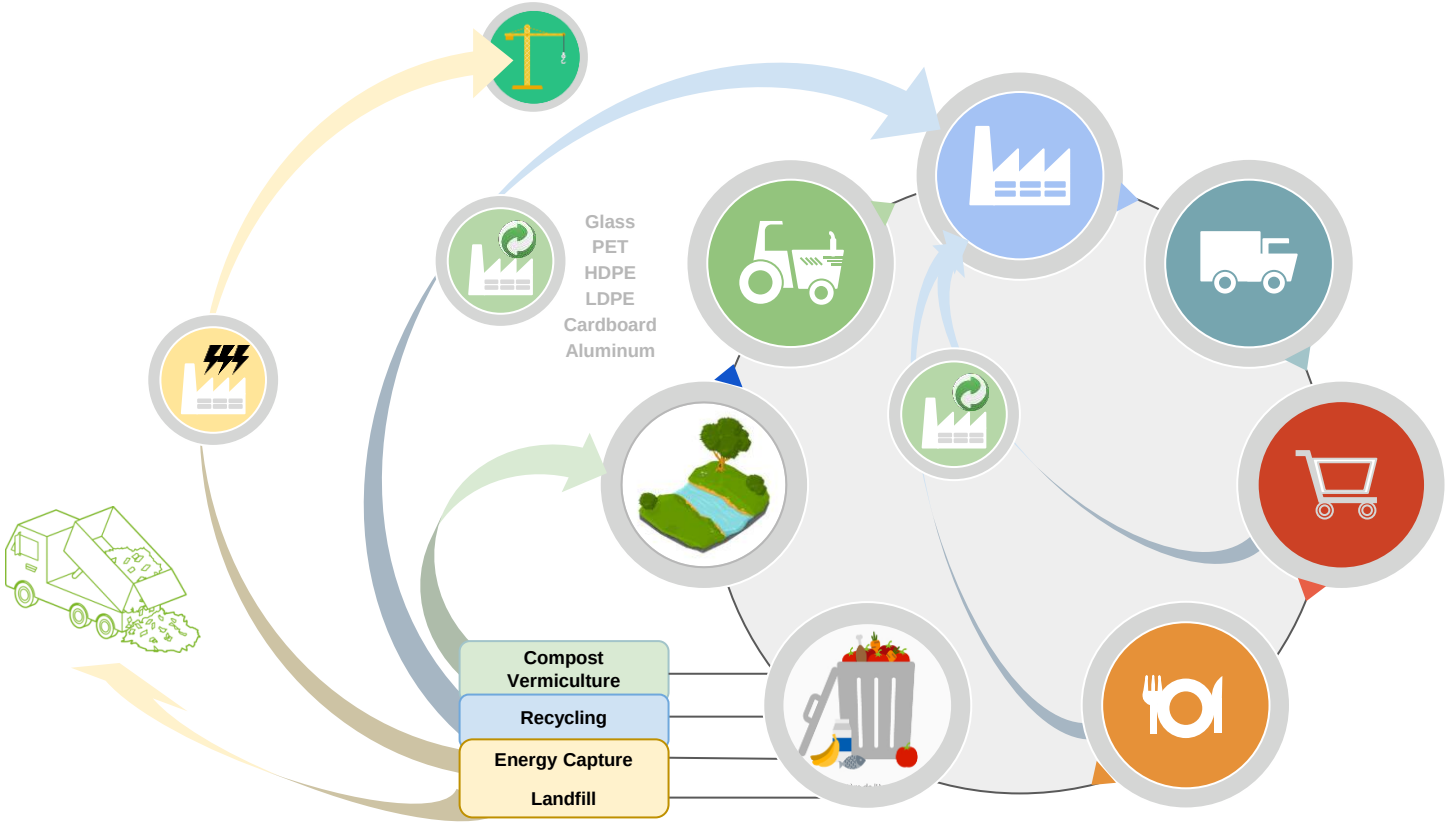
	Farm	Production	Distribution	Retail	Fork
RESOURCES	Land Water Animal Feed Agrochemicals Pesticides / Herbicides Energy	Water Energy Preservatives Additives Refrigerants Packaging	Metals Plastics Fuels Oils Refrigerants	Water Energy Refrigerants Packaging Fuels	Water Energy Refrigerants Packaging
WASTE LOSS INEFFICIENCY	Soil Loss Water Contamination GHG Waste Water Organic Waste	Process Water Cleaning Water Biological & Chemical Sludge Production Losses Heat Loss Industrial Packaging Steam Loss GHG	Solid Wastes Expired Products GHG HAZMAT Tires	Solid Wastes Expired Products Packaging GHG	Solid Wastes Organic Wastes Packaging GHG

TOWARDS A CIRCULAR PROCESS: CURRENT OPTIONS IN CHILE



THERE ARE OTHER OPTIONS

"SHORT LOOPS" - A PLANT LEVEL FOCUS

PROCESS

Production

Short Loops

RESOURCES USED

Raw Materials
Water
Energy
Packaging

WASTE LOSSES INEFFICIENCIES

Process Water
Biological Sludge
Production Losses
Expired Products
Heat/Steam Loss
Industrial Packaging

Residue to Resource	**Pallet Reuse** **Bin Reuse** **Inverse Logistics**
Residue to Resource	**Organics to Biogas** **Organics to Replace Fossil Fuels** **Organics to Animal Feed**
Emission to Retention	**Digitalization, Sensorization & Monitoring** **Steam Circuits** **Heat capture and reuse**
Effluent to Influent	**Treatment** **Filtration** **Recirculation** **Repurpose** **Reuse**

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"LOCAL LOOPS" - COLLABORATIVE AND REGENERATIVE APPROACHES

PROCESS

Agriculture

Production

RESOURCES USED

Compost
Fertilizer
Water

Raw Materials
Water
Energy
Packaging

Residue to Resource

Organics to Compost
Organics to Animal Feed

Local Loops

Cascading Loops

Collaboration with local industry to identify opportunities for the reuse of resources, surplus sharing, or asset optimization

Efluente a Afluente

Treatment for use in local irrigation

Regenerative Loops

WASTE
LOSSES
INEFFICIENCIES

Process Water
Biological Sludge
Production Losses
Expired Products

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Proven, Pragmatic y Successful Loops

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Biomass Energy

Natural, Renewable Energy

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Potentially available in Industrial Subproducts

Reduces Fossil Fuel Dependence

Reduces Carbon Footprint

Can Reduce Energy Costs in the Long Term

Water Reuse

Reduce Water Scarcity

Reduce Water Footprint

Reduces Supply Chain Risks

Preserves Natural Resources

Can Reduce Production Costs Over Time

Waste Recovery

Increase Useful Life of Products

Find Opportunities for reduction of raw material consumption.

Reduces the quantity of waste to Landfill

Reduces need for Raw Material Extraction

Provides Economic Return on Investment

Biogas Recovery

Source of Renewable Energy

Circular practice reduces environmental impact of linear economy.

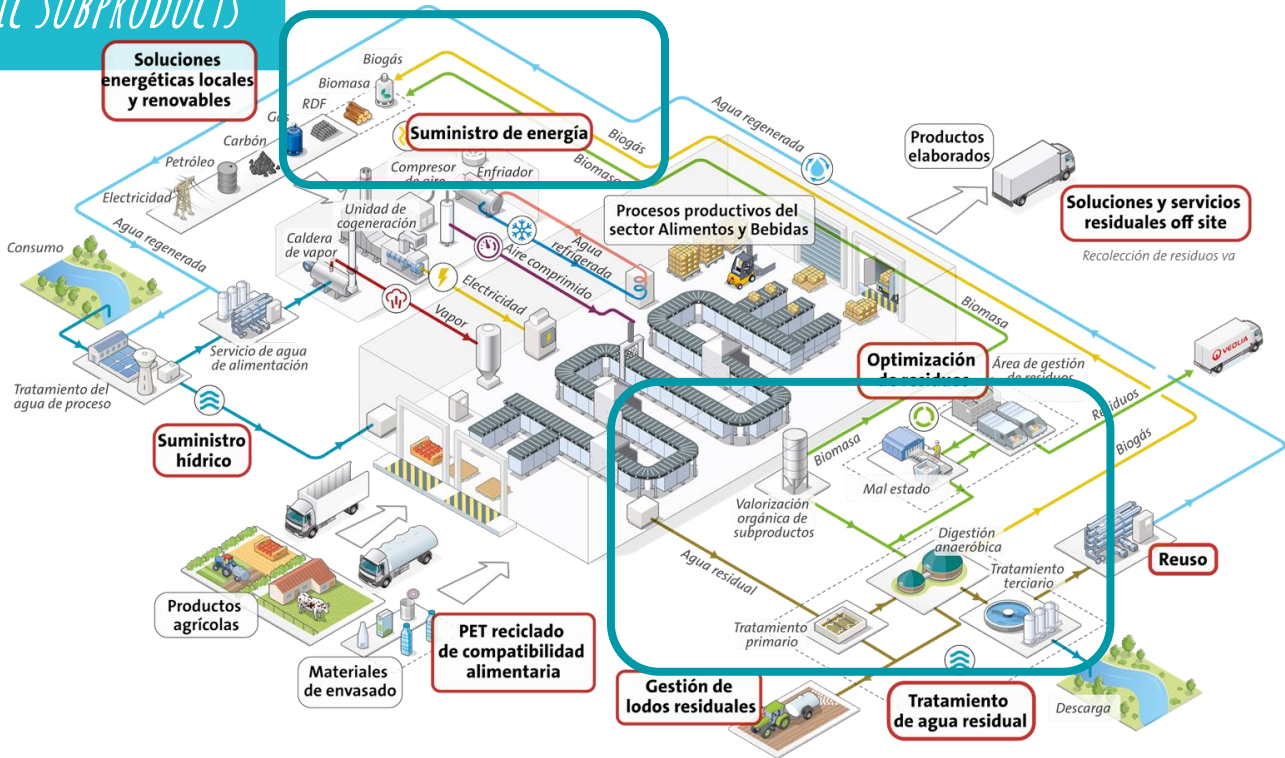
Reduces GHG Effect by converting methane to C02

Reduces Carbon Footprint of waste disposed in landfill

Diversifies the Local Energy Matrix

"SHORT LOOP" SOLUTIONS

VALORIZATION OF ORGANIC SUBPRODUCTS



Success Stories: Short Loop - Fruit Exporter, Chile

Challenge

- PRUNESCO, as a part of its sustainability goals, sought to reduce its dependence on fossil fuel use, CO2 emissions and reduce its disposal costs for 3.000 Tons of plum pits:

Solutions

- Co-Construción with the client of a solution for the thermal valorization of the plum pits that met the client's internal requirements for IRR and Legislative compliance
- Valorization of the Biomass in plant boilers
- 5 year Operating Contract

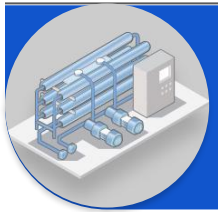
Benefits

Operational Cost Reduction: 50% reduction in the cost of steam production, 90% reduction in Landfill Costs

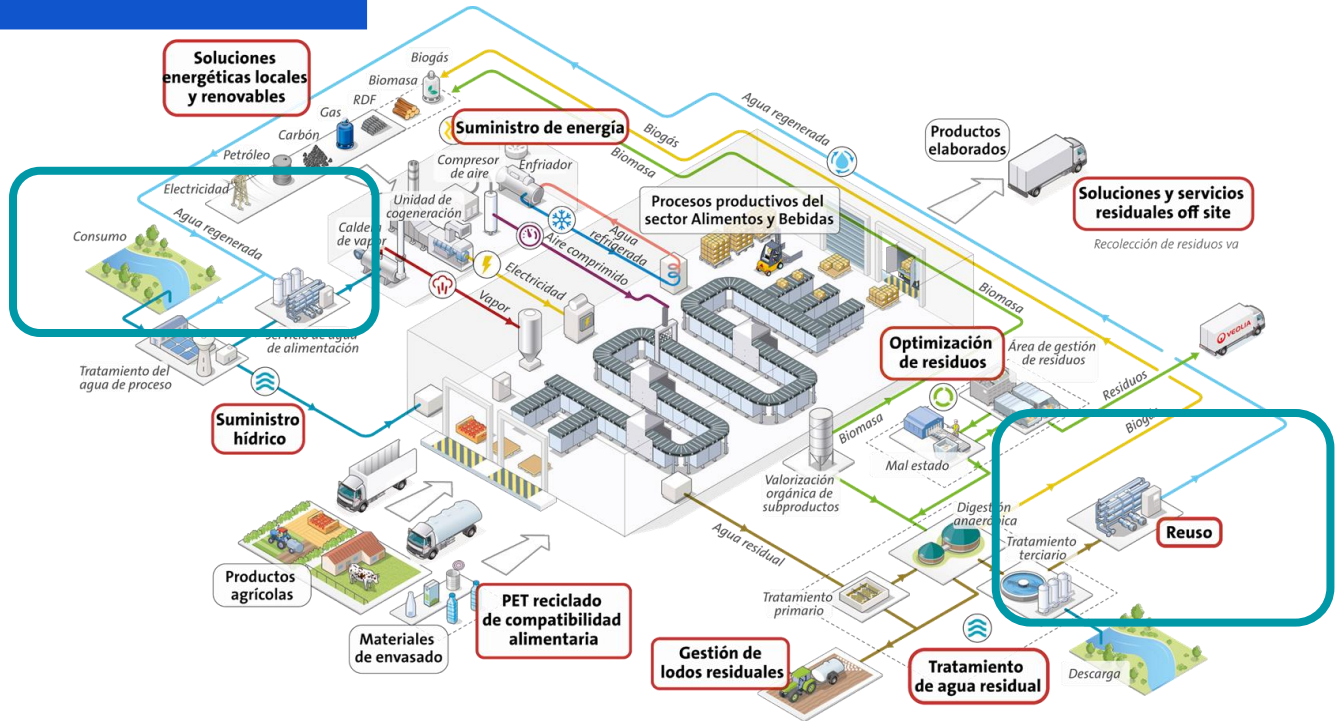
Subproduct Reutilization: Valorization of subproduct: Plum Pits.

Environmental Footprint: Reduction of 4.000 tons of CO_2 per year

Enfoque en "short loop" soluciones



Reuse & Valorization of Process Wastewater



Success Stories: Short Loop - Dairy

South Africa

Dairy

Powdered and Condensed Milk

Veolia Scope

Design, Construction, Operation and Maintenance of the PTAR: 600m³/day & On site Water Reuse and Biogas Valorization components: 700 kg/h

Challenge

- The Mossel Bay factory produces powdered and condensed milk for the domestic market.
- Nestlé seeks to implement best practices for the reduction, reuse and recycling of all of its water in all of its business and is committed to the strictest conservation goals in water use, natural resource saving, biodiversity protection, reduction of GHG and of its waste volumes.
- The looked for a trusted partner to assist them in finding the most adequate solution for the Mossel Bay factory.

Solutions

- Design and construction of a Water Treatment and Recovery Plant.
- Treated water is reused for non-food applications and the biogas generated by the effluent produces carbon neutral energy for the factory
- The technologies incorporated to reduce the plant impact include: acidification tank, anaerobic digester, ultrafiltration and reverse osmosis equipment, a biogas boiler and auxiliary equipment.
- Operación & Mantención de las instalaciones nuevas para garantizar rendimiento y resultados.
- Apoyo local técnico y de procesos.

Benefits

Product Reuse: Biogas used in the factory boilers

Access to sustainable resources: Water Reuse reduces local water dependence in a region affected by water scarcity.

Sustainability Objectives Achieved: Energy Neutrality thanks to the use of biogas produced on-site, reduction of the water footprint in a water scarce region.

Local Community Support: All possible components were purchased or acquired locally (valves, piping, tanks, automation equipment and electrical systems)

Conclusions:

The food & beverage industry is in a unique position to impact climate goals and benefit from the implementation of circular economy design thinking

- **Reduce Consumption at Agricultural Level Through Sustainable Practices**
- **Implement Existing In-Plant Technologies to Reduce Impact**
- **Close the Loop on Energy through the valorization of gas and organics produced in the process of water treatment**

- **Introduce Digitalization and Sensorization to Identify Opportunities for Savings**
- **Implement Existing In-Plant Technologies to Reduce Impact**
- **Close the Loop on Energy through the valorization of organics/biomass produced as subproducts**

- **Close the Loop on packaging through Ecodesign and rethink our procurement processes**
- **Implement Zero Waste to Landfill Goals to supply the local recycling industry with materials it needs**
- **Partner with local experts to increase the return on recycling & find local loop opportunities**

Keep the Conversation Going…

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