

“ECO-innovative Energy FACTory Management System”



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Manufacturing
conference

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ECOFACT Overview



Project Details

ECOFACT is a EU Horizon 2020 Programme under Grant Agreement No 958373 running from 2020 to 2024

Consortium Members

The project is made up of 20 consortium members from several European countries



Demonstration Cases

The project is being applied to four demonstration cases



FOOD



AUTOMOTIVE



BEVERAGE



WHITE GOODS



ECOFACT Demo Sites



Athenian Brewery – Thessaloniki, Greece



- Greece's largest brewing company.
- Produces over 2 million hl/day of beer.
- Thessaloniki's plant produces around 850,000 hl/day.

Arcelik – Ulmi, Romania



- Washing machine factory located in Romania.
- Spans a total closed area of 70,000 m².
- Construction completed in 2018; production commenced in 2019.

Tofas – Bursa, Turkey



- Turkey's 4th largest industrial establishment, employs 7,000, occupies 1 million m².
- Only Turkish automotive manufacturer of both passenger cars and light commercial vehicles.
- Produces 4 brands, accounting for 20% of Turkey's automotive industry.

Gullon – Aguilar de Campoo, Spain



- Spanish producer of biscuits and cereal-based products, with two factories.
- The newest factory (VIDA) spans 110,000 m².
- Recently upgraded end-product storage building with a capacity of 57,000 pallets.



ECOFACT Concept



Leveraging the presence of experienced digital solution & service providers for the industrial sector within the consortium, ECOFACT integrates innovative components into a sustainable management methodology via a single integrated platform.

ECOFACT Components



Smart Data Collection
by Smart Sensors
and IIOT Networks



Data Acquisition
Layer for Edge
Interoperability



Industrial
Digital Twin



Production
Planning
Algorithms



Industrial
Energy
Disaggregation



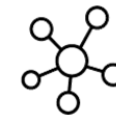
Industrial
Energy Flexibility



Dynamic
LCA/LCCA



Supply Chain
Collaboration



Holistic Decision
Support System



Cybersecurity
Mechanism



ECOFACT Focus Areas



- 1** Optimizing Energy Performance

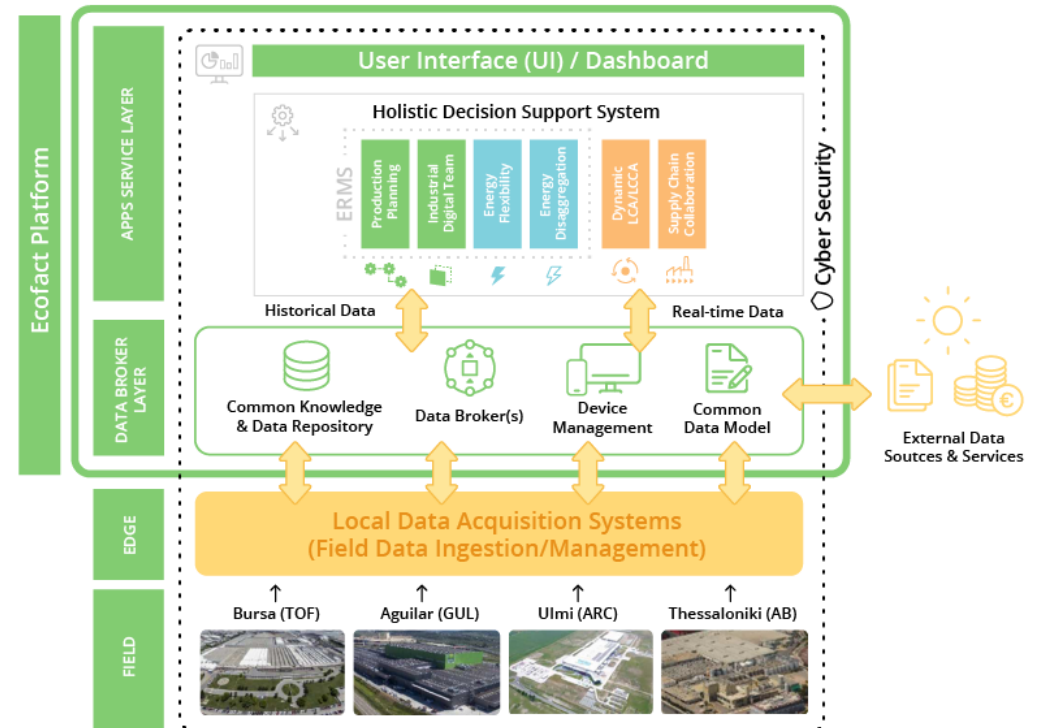
Develop methodology and platform for manufacturing industries to optimize energy performance within constraints, utilizing advanced ICT.
- 2** Green Marketing Approach

Introduce novel green marketing approach by considering energy and environmental signature of products from a life-cycle perspective.
- 3** Integral Sustainability

Enhance integral sustainability in manufacturing management via platform modules and use case validations.

Holistic Management Platform

A single, flexible high-level platform is being developed to provide holistic management and decision-support. This platform is built upon a structure consisting of 4 interrelated innovation tiers.



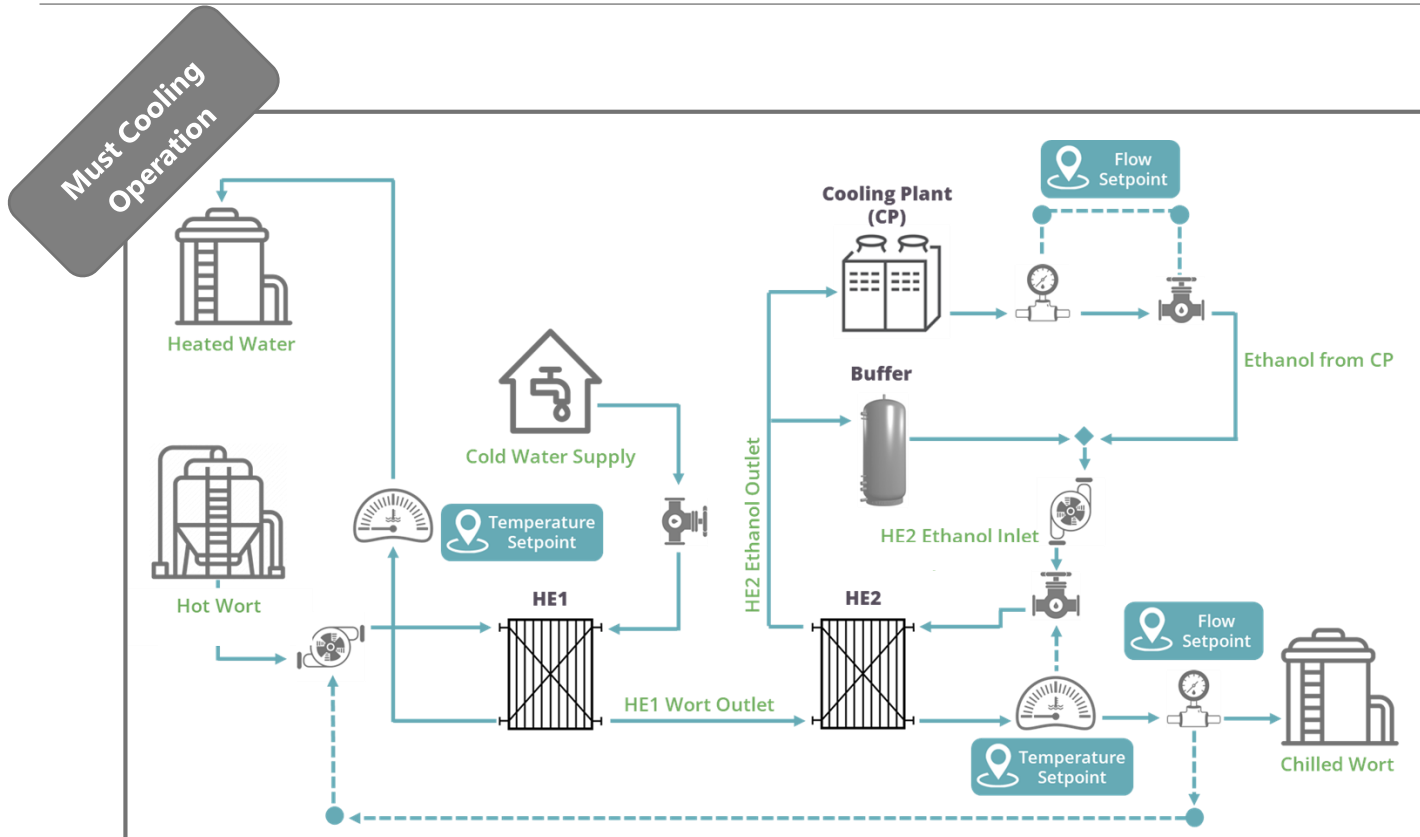
ECOFACT Components



ECOFACT in Athenian Brewery



Optimization of Must Cooling Operation: ECOFACT aims to optimize the must cooling operation in Athenian Brewery by identifying the best combination of controlled parameters to minimize electricity consumption while maintaining the optimal ethanol temperature of -3.5°C .



Controlled Parameters

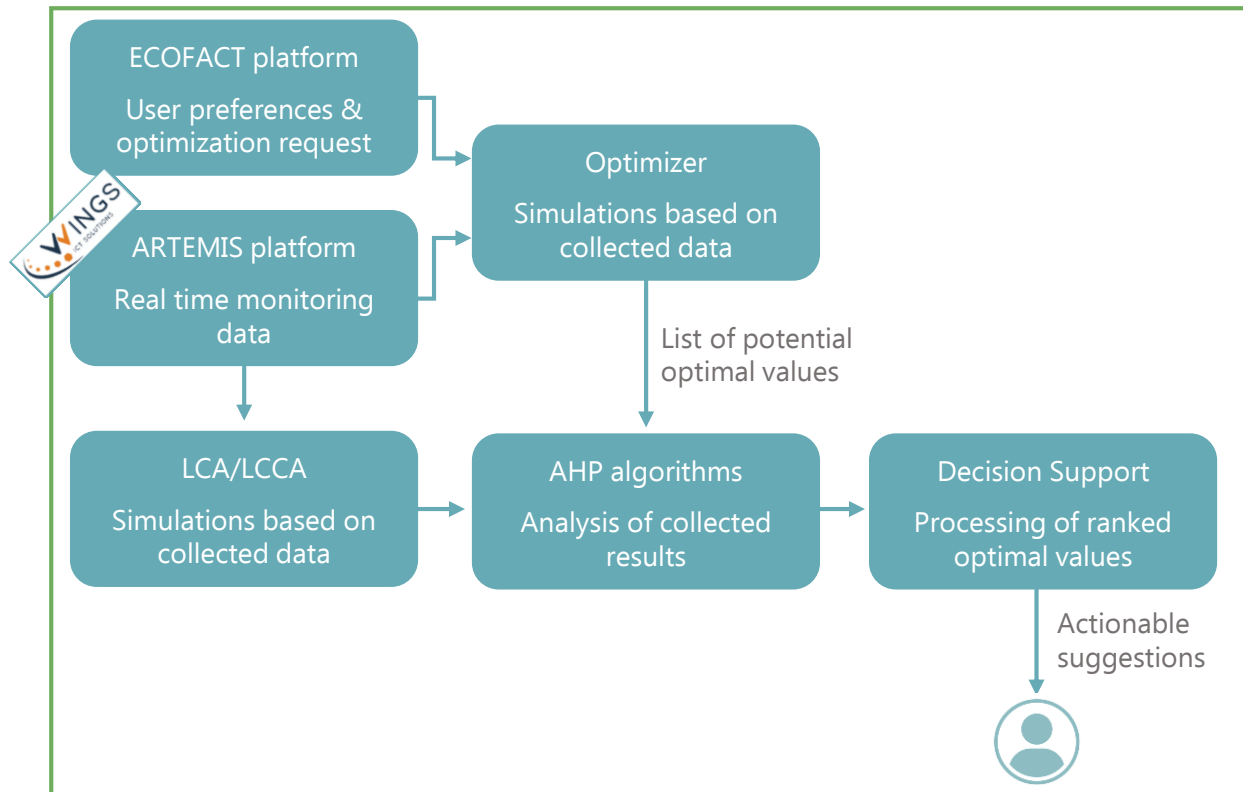
1. Heat Exchanger 2 Outlet Temperature
2. Water Outlet Temperature Setpoint
3. Ethanol Valve Control
4. Stored Ethanol Temperature
5. Hot Water Tank Level



ECOFACT in Athenian Brewery



Use Case: Optimization of Must Cooling Operation



Process

1. User Inputs Preferences: **User inputs preferences** and optimization requests via the **ECOFACT platform**.
2. Data Collection: ARTEMIS platform gathers **key operational data** (e.g., outlet temperatures, ethanol flow, ambient temperature, and electricity consumption) and sends it to the ECOFACT platform.
3. Optimization Simulations: The Optimizer runs simulations using the collected data to explore scenarios and compiles a **list of potential optimal values**.
4. Analysis and Ranking: AHP algorithms receive the optimal values, analyze them, and **rank them based on user preferences and expected optimizations**.
5. Decision Support: The ranked optimal values are processed by the Holistic Decision Support Tool, which then provides **actionable suggestions to the user**.



ECOFACT in Athenian Brewery



1. Use Case: Boiler efficiency improvement through exhaust gas monitoring in utilities

- ✓ Enhance boiler efficiency by monitoring exhaust gas parameters and triggering alarms when thresholds are exceeded, allowing proactive maintenance and optimization, reducing energy consumption, and improving overall efficiency in Athenian Brewery.
- ✓ Calculate and implement optimal air and gas flow values to maximize boiler efficiency using real-time data and dynamic simulations, providing data-driven optimization of boiler settings, leading to cost savings and more efficient energy use at the brewery.

2. Use Case: CO₂ evaporator using Alcohol or Water in Utilities

- ✓ Monitor the CO₂ evaporator's ethanol temperature and trigger alarms if it falls below a set threshold, focusing on detecting malfunctions, ensuring proper operation, preventing disruptions, and maintaining safety at the brewery.
- ✓ Optimize ethanol supply-to-CO₂ flow ratio by recommending values for glycol and CO₂ flows, focusing on systematic control via an automated PID system, improving process efficiency, stability, and performance at the brewery.
- ✓ Optimize CO₂ evaporator operations by recommending ideal operational ranges, prioritizing glycol-based evaporators to minimize their number, thereby enhancing resource utilization, efficiency, and cost-effectiveness in Athenian Brewery.





Tofas (Automotive Manufacturer)

- ✓ Tofas implements fourteen use cases aimed at optimizing production efficiency, enhancing energy management, and improving monitoring systems across various production lines, notably the Geico, Eisenmann, Primer, Solvent topcoat, and Water-based topcoat lines. These initiatives target the reduction of energy wastage, promotion of energy-efficient behaviors among operators, and significant improvements in overall operational efficiency.



Arcelik (Washing machine Manufacturer)

- ✓ Arcelik implements six use cases, enhancing production processes, energy efficiency, and monitoring systems for better traceability. Through these implementations, Arcelik aims to optimize resource utilization, reduce energy consumption, improve system performance, enable real-time monitoring, and enhance overall efficiency across its operations.



Gullon (Biscuits Producer)

- ✓ Arcelik implements six use cases, aiming to optimize energy consumption, enhance maintenance operations, and improve process efficiency through dynamic reporting, alarm systems, and monitoring functions. Through these implementations, Gullon expects to optimize production processes, reduce energy losses, and enhance overall operational efficiency at its facility.

ECOFACT Scientific and Technological Objectives



1 Connectivity Enhancement

Improving integration of energy data into production systems by bridging IT and OT domains for enhanced operational efficiency.



2 Forecasting Empowerment

Assisting manufacturing O&M staff in problem prediction, planning, and resource optimization through a prognosis-based ERMS.



3 Environmental Control

Enabling better control over manufacturing process and supply chain environmental impact, promoting green production and design as cost-effective solutions.



4 Methodology Development

Developing user-centric guidelines and tools for holistic sustainable manufacturing management, leveraging smart ICT.



5 Platform Demonstration

Demonstrating ECOFACT methodology and platform at TRL7 through four case studies, showcasing real-world applicability.



ECOFACT Non-Technical Objectives



1

Standardization Influence

Contributing inputs to new standardization, certification, and regulation schemes for integrated, sustainable manufacturing management, shaping industry standards.



2

Exploitation Strategies

Developing exploitation strategies for the validated ECOFACT approach and platform, fostering early replication and creating compelling business cases for adoption.



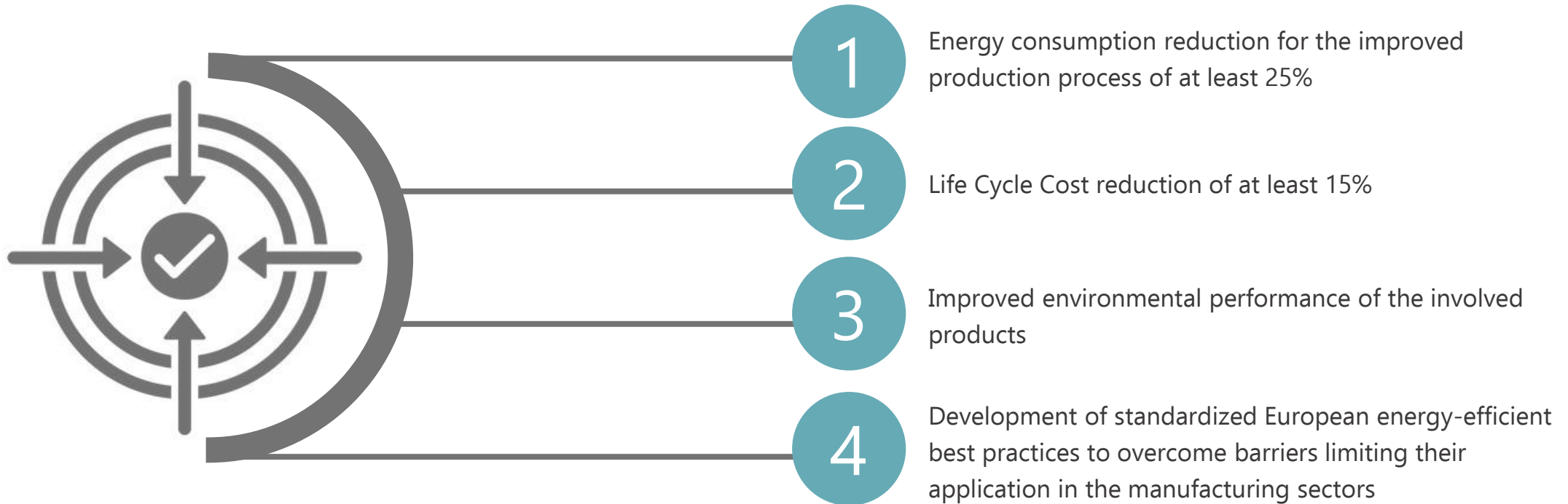
3

Dissemination & Capacity Building

Facilitating dissemination, communication, and capacity building efforts to promote widespread adoption and understanding of sustainable manufacturing practices.



ECOFACT Expected Impacts



ECOFACT Greek Consortium



Centre for Research and Technology Hellas (CERTH), founded in 2000 and based in Thessaloniki, is among Greece's largest research centers, ranking top in the north. CERTH participates with two key: CPERI focuses on high-caliber research in Chemical Engineering to meet the needs of Greek and European industries, while ITI specializes in Informatics, Telematics, and Telecommunications.



Athenian Brewery S.A. is the largest producer and distributor of beer in Greece. It was established in 1963 by a group of Greek entrepreneurs and it is member of Heineken NV group. Today it sports four plants across Greece, three beer factories in Athens, Thessaloniki and Patras and a factory in Lamia bottling natural mineral water IOLI.



WINGS ICT Solutions, specializes in developing software and hardware solutions for diverse sectors including utilities (water, energy, gas), smart cities, food security, and industry/logistics. Their expertise lies in IoT technologies, advanced wireless networks, cloud and big data platforms, AI algorithms, and security mechanisms, with specific platforms like Artemis tailored for proactive utility management.





Thank you!



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