The Blender- Innocent

Innocent drinks, a London-based healthy drinks company, strategically built a new factory in Rotterdam’s “Food Hub” to accommodate its ongoing growth and bring production, bottling, and packaging processes in-house. The innocent industrial complex called “The Blender” became the world’s first all-electric fully renewable factory. This groundbreaking effort transforms both the production process and the employee working environment. The factory earned its BREEAM-NL New Construction ‘Outstanding’ certificate in December 2022, showcasing leadership in sustainable construction practices.

The goals and ambitions of innocent was to create a factory and building while giving people and planet a seat at the design table. Sustainability efforts were guided by the requirements for BREEAM-NL New Construction “Outstanding” and WELL “Platinum” certification requirements, marking a shift towards global benchmarks in energy efficiency.

Performance based targets of the Blender includes that it is all electric and fully renewable, it is completely independent from water and there is a large focus on employee well-being. Innocent has reduced beverage transportation miles by at least 25%, resulting in a notable 10% decrease in CO2 emissions. The integration of innovative multi temperature heat pumps, high-efficiency LED lighting, energy-efficient mechanical and process equipment, and robust insulation values collectively ensures minimal energy consumption. In demonstrating complete all electric, fully renewable, Deerns conducted advanced energy simulations. The remaining energy demand will be met through the utilization of solar panels and two wind turbines. Innocent’s success not only exemplifies sustainable business practices but also highlights the tangible environmental impact achievable through dedicated efforts and adherence to rigorous certification standard.

Deerns was tasked with:

- Designing the factory's energy and HVAC installations
- Incorporating specifications for the BREEAM-NL New Construction Outstanding certificate
- Integrating criteria for the WELL Platinum certification, ensuring aspects such as air quality, green spaces, and daylight entry

The project in numbers:

- Total site area is 14 hectares
- 46% of green areas
19% of building footprint
14% of energy production

Photo credit
Innocent

Stakeholders

Contractor
Name: Innocent

Construction Manager
Name: Integrated Food Project LTD- part of NIRAS Group

The project was led by Integrated Food Project LTD- part of the NIRAS group, the project management who coordinates the design and construction team and utilised their expertise and knowledge to guarantee the sustainable strategies proposed during the design phase.

Deerns NL have the BREEAM and Energy expert, a leading and guiding role in this project, in order to ensure that the BREEAM and energy neutral ambitions were achieved.

The architectural civil and structural design was led by Van Aken Architects who played an important role to integrate the sustainable strategies in the design phase.

Deerns UK produced the conceptual MEP designs to ensure that the technical specifications of the design were feasible for the project.

If you had to do it again?

The project is repeatable, but only if the BREEAM ambition is clearly integrated from the outset. It is important to have a clear idea of the BREEAM ambitions at the start of the project, as this significantly influenced the design, technical, and financial aspects of the building. It also created a collaborative working theme during the design and construction phase. Having a strong vision, underpinned by the principles of innocent's philosophy, enabled the design and construction team to create a world-class and industry-leading production facility. Incorporating some of the most advanced, innovative, and environmentally friendly strategies and technology currently available.

Energy

Energy consumption
Primary energy need: 77.66 kWhpe/m².year
Calculation method: Primary energy needs
Breakdown for energy consumption:

Expected final energy consumption: 30.1 GWh/year

The first objective was to reduce energy consumption and avoid the need for gas by relying on electricity.

- Low temperature for pasteurization.
- Design in multi-temperature heat circuits (65°C where possible, 90°C for pasteurizing and CIP).
- Maximizing the chill temperature (+1°C reduces energy required by 3%). Run the warehouse 1°C warmer.

The second objective was to reuse and recycle energy from one part of the factory to another, such as wasted heat energy using heat pumps.

- Introduce more energy-efficient pasteurizers with extended surfaces.
- Pre-heat CIP water using waste heat from air compressors.
- Use the silo’s as thermal batteries.

The integration of innovative heat pumps (Ammonia heat pumps 0 GWP), high-efficiency LED lighting, energy-efficient mechanical and process equipment, and robust insulation values collectively ensures minimal energy consumption.

The remaining energy demand will be met through the utilization of solar panels (12,000m²) and two wind turbines.

- 2.6 GWh/year of expected energy production from solar panels.
- 28.2 GWh/year of expected energy production from 2 wind turbines.

2 functional units installed: one for the office part and the other of the industry part.

Renewables & systems
Systems

Heating system:
- Fan coil
- Solar thermal

Hot water system:
- Heat pump

Cooling system:
- Fan coil

Ventilation system:
- compensated Air Handling Unit

Renewable systems:
- Solar photovoltaic
- Other, specify
- Heat pump

Renewables
- 12,000 m² of solar panels
- 2.6 GWh/year of energy production from solar panels
- 2 wind turbines
- 28.2 GWh/year of energy production from 2 wind turbines

Ventilation system
The ventilation of the entire building (offices and factory) is based on mechanically balanced ventilation. Electrical boiler and heat pumps help to keep the carbon emission to zero.
The whole envelope of the factory and office is airtight and watertight to prevent heat losses, alongside consideration for mold growth and condensation

Lighting
The general lighting was based on NEN-EN 12464 both internally and externally. Task lighting was provided to achieve the correct light level in the building. LED luminaires and light control were implemented to reduce energy consumption in the building

Smart Building

BMS:
Water and energy metering connected to a central BMS system

Environment

Urban environment
The new construction is located in the middle of the port of Rotterdam with a unique ecosystem. Strict rules were applied to preserve and protect birds and plants, as well as the dune edge around the construction site. Both during construction and in the landscape design, considerations were taken to preserve and enhance this ecosystem.

Reduction of the impact of construction on the environment:
- All the wood used on the construction site was sourced from a sustainable chain of custody.
- Maximizing the use of recycled materials.
- Limiting the waste production and implementing waste separation in at least six groups: wood, stone, metal, plastics, glass, insulation materials.
- To further reduce the impact on the environment, the contractor had a specialist waste processing arrangement.
- Suppliers of products were asked for environmental certificates that make clear their origin and suitability for inclusion in the building.
- Suppliers were asked when delivering their products to ensure they had minimal packaging material.
- A special ecological work protocol was drawn up for the project

Products

Product
The factory has transformed the supply chain logistics by reducing the road miles of their products by at least 25% and the carbon footprint by 10%; promotion of alternative modes of transportation, reducing the use of vehicles, and using battery electric HGV truck for the transportation of bulk ingredients:
- 4 e-trucks in the circuit on a daily basis
- A daily schedule, 90km per round trip
- Maximised payload (35T), minimised movements
- ‘Juice in Juice out’ charging strategy (DC 180kW)
• Overnight AC 44kW at base
• 250k e-kms driven so far

Recycled materials:
• Asphalt paving: 75% recycled content
• Concrete: 30% recycled Ecocrete from Melbin
• Structural steel: 85% recycled content
• Reinforcement steel: 97% recycled content

Concrete - Aggregates - Cement
B.V. Betonmortel Centrale Koudekerk
https://bck.nl/
Product category: Management / Others

Schüco Aluminium Façade-, Window-, Door- and Sun Shading Systems Silver
Schüco International KG
https://www.schueco.com/com/
Product category: Management / Others

Kingspan insulated panels

Costs

Construction and exploitation costs

Total cost of the building: 225 €
Additional information on costs:
The $225m factory is innocent's first owned and operated factory. A sustainable and healthy building requires an additional investment beyond the conventional design. However, this has created a far more environmentally friendly building and enhanced operating space for the people who work within it, compared to a standard facility. The costs and benefits for obtaining the BREEAM 'outstanding' certificate are included in the LCC (Life Cycle Cost) analysis. The design and the contractor teams were responsible for achieving the BREEAM certification and for implementing other sustainable strategies. In addition, the integration and continuous communication between the various team members reduced the risks in the construction phase of the project, resulting in an economical benefit for innocent.

Circular Economy

Environmental assessment
Impacts avoided: water, waste, CO2:

Waste
The Blender achieved a score of 100% in the Waste category for BREEAM certification. All wood used on the construction site was sources from a sustainable chain of custody, the use of recycled materials was maximized, the waste production was limited and the waste that was produced was separated in at least six groups (wood, stone, metal, plastics, glass and insulation materials). The contractor had a specialist waste producing arrangement as well in order to further reduce the impact on the environment. The suppliers of the products were asked to minimize the packaging materials and were asked for environmental certificates that made their origin and sustainability clear.

Water
Rainwater is recycled from the roof to be reused in the toilets of the office and further reduce freshwater consumption.
The rainwater tank capacity: 20 m³ = 45.2% of the total water consumption.
Water used for irrigation is avoided due to the specification of native plants that live on the natural precipitation of the area.

Health and comfort

Water management
Total water consumption of 287,438 ltr / year.
A working year consists of: ±365 days.

Number of users of the building is 190
Water consumption = 1.15 m³ / person / year

Specifications

Water efficient toilets, showers and washbasins were specified for the building, in order to ensure low water consumption for sanitary purposes:
Number of toilets: 42 (17 within the office bldg + 25 within the factory)
Flushing toilets: 6ltr / flush
131,400 ltr / year

Number of washbasins: 24 Hand wash per tap: 6ltr / min
73,913 ltr / year

Number of showers: 8 Water volume per shower: 9ltr / min
82,125 ltr / year

Presence detection and shut-off valves were installed for sanitary purposes, this prevents leakage and loss of water in toilets and showers.
To maintain the cleanliness of the pipes connecting the blending, mixing, and bottling equipment, an “air tornado” system shoots compressed air to remove grime. Compared to conventional systems, this reduces water use by 50%

Rainwater

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Water used for irrigation is avoided due to the specification of native plants that live on the natural precipitation of the area

Contest

Reasons for participating in the competition(s)

In order to design an all-electric, fully renewable factory, Deerns adopted a holistic approach in developing the energy system design. The sustainability efforts were guided by the requirements for BREEAM-NL New Construction “Outstanding”. This has led to a questioning of energy consumption. Our first focus was on energy efficiency, followed by energy production. The goal was to have a performance at all levels. To avoid the use of fossil fuels, we sought compensation through the development of renewable energy.

Ensuring minimal energy consumption has been accomplished by integrating innovative heat pumps (ammonia heat pumps 0 GWP), high-efficiency LED lighting, energy-efficient mechanical and process equipment, and robust insulation values. The remaining energy demand will be met through the utilization of solar panels (12,000m²) and two wind turbines. There is 2.6 GWh/year of expected energy production from solar panels and 26.6 GWh/year of expected energy production from 2 wind turbines.

The Blender achieved a score of 100% in the Waste category for BREEAM certification. All wood used on the construction site was sourced from a sustainable chain of custody, the use of recycled materials was maximized, the waste production was limited and the waste that was produced was separated in at least six groups (wood, stone, metal, plastics, glass and insulation materials). The contractor had a specialist waste producing arrangement as well in order to further reduce the impact on the environment. The suppliers of the products were asked to minimize the packaging materials and were asked for environmental certificates that made their origin and sustainability clear.

During design, tendering, and execution, specific requirements from BREEAM were translated into design and construction requirements for the designing and building companies. This ensured that compliance with the requirements was verified at a detailed level. Deerns provided the role of on-site sustainability manager to ensure that the various suppliers met the requirements and provided the necessary evidence.

innocent serves as a global exemplary project for the industry to achieve fully electric and renewable production. There is a significant challenge, especially for this sector, to take steps towards substantial CO2 reduction. The innocent project is living proof that with high ambition coupled with BREEAM as a certification methodology, achieving an all-electric, fully renewable facility is feasible.