Category: Sustainable Industrial Buildings

Case Study: Heineken Brewery

Project cofinanced by
European Regional Development Fund

Lead Partner
Provincia di savona

Sustainable Construction in Rural and Fragile Areas for Energy efficiency

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Client: Heineken España S.A.
Project : Heineken Supply Chain Services and Heineken España S.A.
Contractors : Ayesa
Oppening Year: 2008

Context

Heineken Spain considered the construction of a new brewery in Seville because of different factors. The old brewery was located in the middle of the city since 1905. With an initial production of 3,5 million liters, it was 350 millions liters in 2006 (grew 100 times in 100 years). Layout, as a consequence, was suboptimal and with severe space limitations for capacity extension, the factory has low potential productivity (production costs) and there were required high investments for a replacement. Furthermore, the new EU legislation on Environment and Safety would make its continuity not feasible.

Factors such as the close relationship of the brewery with Seville and to continue using water from Seville to not change the characteristics of the beer was forced to find a location suitable for this large installation inside the city.

The new brewery was built within Sevilla municipality in a new industrial area at the outskirts of the city for an initial sales capacity of 400 millions liters designed to be extended easily to 500 millions liters, based on future domestic market

Description

The main principles for the construction of the new brewery were:

- Automation & IT: Latest but proven technology, guarantying same product quality/profile.
- Environmentally friendly brewery, efficient in energy/water usage and with a responsible waste management.
- Industrial safest operation. Lowest ammonia.
- Product Integrity: Full compliance with European legislation and Heineken standards.
- Practical design, easy to clean, accessible. High standard on Hygiene. Modular layout, easy to extend.

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Left:

Old brewery

Below: Aerial view of the new brewery

- Design the brewery for the desired productivity and production costs, at the targeted budget.
- Warehouse operations to be outsourced.
- Reasonable flexibility in brewing, limited to minimum volume of 10 millions liters. High flexibility in packaging, leaving enough space in the layout.

The result is the most modern brewery in Europe where little or nothing is thrown away. Much of the CO_2 produced naturally during fermentation is collected and sold to soft drink companies, bagasse, a byproduct of the process consists of chaff and cereal debris, is filtered and distributed for animal feed, water is treated and returned clean to Emasesa, the municipal corporation of water of Seville, with Heineken as its largest customer.

It is practically the ideal factory layout as far as environment is concerned. Without the constraints of space and technology of the old factory, Heineken has been designed in Seville periphery a model that combines all the advances in environmental savings.

The company has entered in the CO_2 market to sell their excess emissions. According to the 2009 environmental report of the company, Sevilla brewery issued in 2009 14.985 tons of CO2, 5.018 less than the 20.003 that was granted as a ceiling. The data has much more meaning when compared to 2006, the last year in which the old brewery worked 100%. Then, real emissions were 32.208 tons, slightly above permitted (31.003), and more than double that nowadays (with a production in 2006 50 millions liters lower than in 2009)

The drastic reduction of emissions has been parallel by a substantial cut in energy consumption per liter of beer. One of the main achievements of the new production center in Seville is to improve energy efficiency in respect to the old factory. In this regard, it has reduced the thermal energy consumption by more than 20% since 2003, and consumed 28% less electricity and 24% less water.

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View of the brewery

Closed warehouses, refrigerated and insulated with air drying (also contribute to energy saving)

CO_2 recovery line

To date, only 4 hectoliters are needed to generate 1 hectoliter of beer, which puts the factory in Seville at the forefront of best practice breweries in the world, and above the average of the Heineken factory in Spain 4,6 hectoliters in 2010.

Nationally, in 2009 Heineken recycled 99% of solid waste. In Seville, the 22 kilos of waste generated per hectoliter of beer only 0,2 were deposited at the landfill to be non-reusable. In addition, to better treatment of wastewater, Heineken has created an auxiliary tank that stores liquid waste that are above the permitted limit. If PH (acidity), temperature or organic load did not meet the required parameters, the water undergoes a treatment prior to purification, which can be, for example, reducing the level of PH.

In the process of purification of wastewater, Heineken produces biogas, a form of clean energy that is used as a supplementary fuel in the boilers. For now, biogas is only about 5% of total consumption of the factory and it is expected that next year get to reach the theoretical maximum of 8%.

The new Heineken brewery has also updated how to store beer, and that has reported a surplus of energy savings. One of the enemies of conservation is the humidity, and that is the reason why usually the tanks are usually placed outdoors. However, the factory in Seville has brought together all tanks in one building as a large refrigerator. The refrigeration inside is produced with cold and dry air, with the goal of no frost forms on the walls of the tanks. The air is continuously circulating and transferring the cold, but without bringing a bit of humidity.

Another innovation is the use of superheated water in the process of cleaning and sterilizing facilities, returnable bottles and beer kegs. The conventional solution is to use the steam generated in boilers, in this brewery, they use superheated water as heat distribution mean, and by maintaining a high pressure they can keep the liquid phase at 160 degrees. Unlike steam, superheated water is not lost and the use of heat and water is better.

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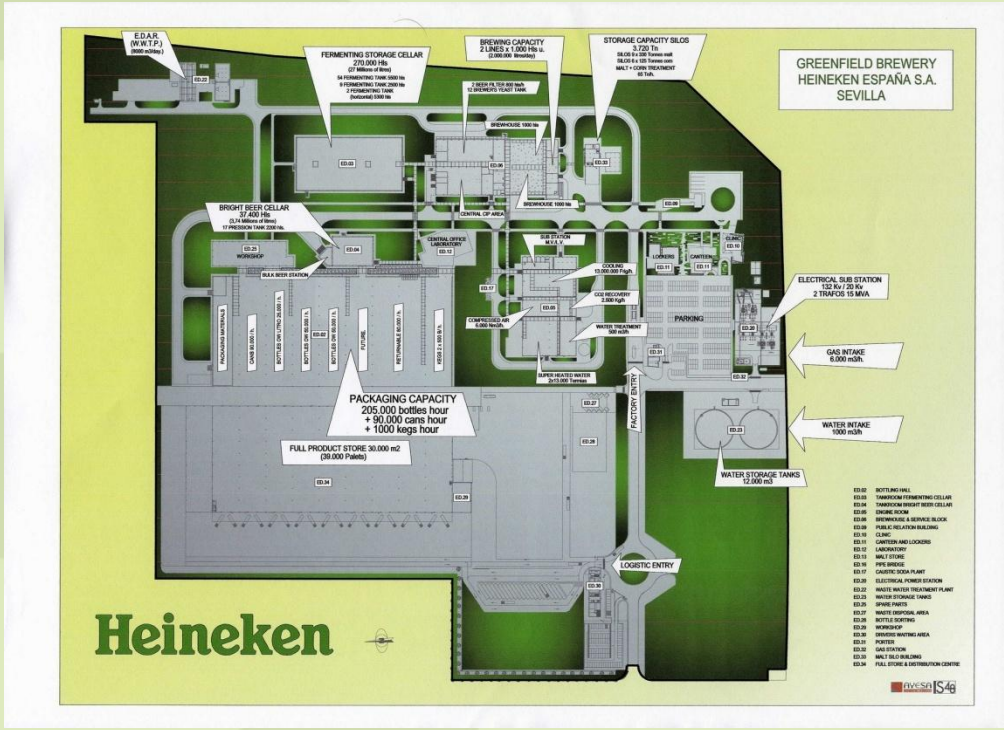
Indicators	Units	2007	2008	2009	2010	2011 (JUN)
Thermal Energy	MJ/hl	75,6	67,3	67,8	63,4	63,1
Electricity	kWh/hl	10,6	8,0	7,7	7,6	7,3
Water Supply	hl/hl	5,0	4,4	4,4	4,1	3,7
Recycled industrial waste	kg/hl	0,4	0,5	0,2	0,2	0,2
Indicator Eco-Care*	%	74,0	68,0	80,0	79	-

Annual Enviroment Report Heineken Spain
*Eco-care; summary measure comprised of 33 sub-indicators



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Evaluation

The new factory increases significantly productivity and flexibility with the economic benefit that this implies, but also achieves environmental commitment of Heineken Spain with sustainable development:

- Increase efficiency in the consumption of natural resources, especially water and energy.
- Improve waste management.
- Reduce the impact of emissions to the atmosphere.
- Reduce the impact of discharges on the water environment.
- Integrate environmental management into the process of continuous improvement TPM (Total Productive Management).

Potential for transferability

The main obstacle to the transferability of this good practice may be the investment that is required.

On the other hand, it is true that such investments to not damage the environment are due to companies in the countries of the European Union. These requirements are increasingly marked by the laws and the responsibility to the environment that requires society to these companies.

Moreover, some of the measures taken in this new factory may need a stronger investment, but there are many others that have been exposed that can be applied without a big investment. Regarding the technologies used in the factory of Heineken are all proven technologies, previously working in other facilities and all of them available on the market.

A clear example of this portability is the factory that the company has built in South Africa Heinieen image of the Seville one but not with all its innovations, efficiency and productivity.

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- Province of Savona (ITALY)

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- Region of South Aegean (GREECE)
- Read S.A. (GREECE)
- Local Energy Agency Pomurje (SLOVENIE)
- Agência Regional de Energia do Centro e Baixo - Alentejo (PORTUGAL)
- Official Chamber of Commerce, Industry and Shipping of Seville (SPAIN)
- Rhône Chamber of Crafts (FRANCE)
- Development Company of Kefalonia & Ithaki S.A. - Kefalonia (GREECE)
- Chamber of Commerce and Industry Drôme (FRANCE)
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SCORE

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