Central kitchen of Lille

by Rodolphe Deborre / 2018-05-28 14:16:48 / France / 8746 / FR

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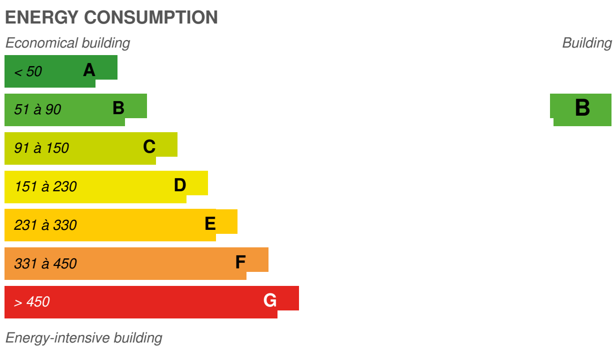
Primary energy need :

62 kWhep/m².an

(Calculation method :)



Building Type : Other building
Construction Year : 2016
Delivery year : 2016
Address 1 - street : 3, rue Jean Perrin 59000 LILLE, France
Climate zone : [Cfb] Marine Mild Winter, warm summer, no dry season.

Net Floor Area : 3 500 m^2
Construction/refurbishment cost : 13 000 000 €
Number of none : 15 000 none
Cost/m2 : 3714.29 €/m^2

Proposed by :

POUCHAIN

Rabot Dutilleul Construction

General information

Central kitchen for the school of the city of Lille. Construction site design maintenance maintenance with commitment of energy performance. A deadline of 12 months. 15,000 meals a day, 4800 m².

HQE approach

Sustainable development approach of the project owner

The central kitchen project in Lille is part of the city's sustainable development policy, one of the major objectives of which is to demonstrate its exemplarity in terms of high environmental quality of its construction operations. This results in a benchmark associated with specific objectives such as **reducing expenses by at least 30% compared to a "classic" service** , user comfort and minimizing environmental impacts.

Remember that the operation has no certification objective, and that the HQE® approach is considered here as a framework, a method of work for ecodesign that has been focused on four **high-performance targets** :

- Energy management
- easy maintenance management
- acoustic comfort, with limited noise levels
- visual comfort thanks to natural light

Preservation of biodiversity with a green roof and a landscaped pond favoring the infiltration of rainwater.

- With 0 accidents, the shipyard is one of the **winners of the internal safety competition** .

Musculoskeletal disorders avoided with a low-speed blowing system for cooling parts.

Above all, the project is part of a real Energy Performance Guarantee initiative by the Rabot-Dutilleul Group to **go beyond the only computational performance** and deliver buildings that really achieve reliable energy performance, hence a **real work on uses** .

Architectural description

Building beautiful, original from a technical point of view since cold preservation processes are in place, and a green roof will be created. "It's not just a sustainable project because it respects the environment, it's a sustainable project because it respects the people who work there." Source France 3. (https://france3-regions.francetvinfo.fr/hauts-de-france/emissions/nord-pas-de-calais-matin/lille-les-coulisses-de-la-future-cantine-centrale .html)

Building users opinion

Testimony of Frédéric Rotolo, Director of Central Kitchen:
"I can emphasize as an operator the quality of the construction and its aesthetics. The landscape integration of the building in the neighborhood is clearly a success and many of our visitors testify. The comfort of the premises is also an added value for this cuisine, which is a key factor in the motivation of our agents to come and work on a daily basis. Access is perfect for our service providers, delivery trucks and staff. "

If you had to do it again?

Absolutely: the guarantee of energy performance during the use phase is at the heart of Rabot Dutilleul's strategy.

See more details about this project

https://www.20minutes.fr/lille/1930639-20160925-lille-cuisine-centrale-machine-guerre-nourrir-enfants
https://france3-regions.francetvinfo.fr/hauts-de-france/emissions/nord-pas-de-calais-matin/lille-les-coulisses-de-la-future-cantine-centrale.html

Stakeholders

Contractor

Name : Ville de Lille
https://www.lille.fr/

Construction Manager

Name : GO Architecture
http://www.goarchitectes.com/portfolios/vdl-cc/

Stakeholders

Function : Company

Rabot Dutilleul Construction

Marc Bernard

http://www.rabotdutilleulconstruction.com/
Conception Realization

Function : Site manager

POUCHAIN

Franck Sprecher

http://www.pouchain.fr/
Operation and maintenance. Delivery of the guarantee of perf energetic

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Function : Other consultancy agency

QUIDORT

Alain Quidort

http://www.icegen.fr/cuisine.html
Designer Cold Ice Slurry System

Function : Assistance to the Contracting Authority
SYMOE

Victor Jumez

http://www.symoe.fr/
HQE approach

Contracting method

Other methods
https://www.construction21.org/france/data/sources/users/4713/concours-de-la-cle-dor-2017---rdc-lille-cuisine-centrale.pptx

Energy

Energy consumption

Primary energy need : 62,00 kWhep/m^2.an

Primary energy need for standard building : 110,00 kWhep/m^2.an

Calculation method :

Breakdown for energy consumption : Heating: 19%
Cooling: 27%
ECS: 16%
Lighting: 16%
At ventilation: 21%
At distribution: 1%

Real final energy consumption

Real final energy consumption/m2 : 410,00 kWhef/m^2.an

Real final energy consumption/functional unit : 0,80 kWhef/m^2.an

Year of the real energy consumption : 2 017

Envelope performance

Envelope U-Value : 0,20 W.m^{-2}.K^{-1}

More information :
See RT calculation in pj

Indicator :

Air Tightness Value : 1,00

More information

Actual consumption: 1 433 728 KWh (August 2016 / July 2017) or 0.804 kwh / meal.
ISO 50001 certification in progress. It makes it possible to supervise very largely the optimization of the equipments, their management, their maintenance and the behavior of the cooks who must become efficient.
There is still work but the benchmark is already very favorable: http://www.ademe.fr/expertises/batiment/pass-laction/elements-dequipement/dossier/usages-professionnels/cuisson-professionnelle

Renewables & systems

Systems

Heating system :

- Urban network
- Fan coil

Hot water system :

- Urban network

Cooling system :

- Water chiller

Ventilation system :

- Double flow heat exchanger

Renewable systems :

- No renewable energy systems

Other information on HVAC :

Cf Calculation RT

http://www.icegen.fr/cuisine.html

Solutions enhancing nature free gains :

https://france3-regions.francetvinfo.fr/hauts-de-france/emissions/nord-pas-de-calais-matin/lille-les-coulisses-de-la-future-cantine-centrale.html

Smart Building

BMS :

• effiPilot software for data management and energy optimization
• Heating control: 2 Boiler, 2 distribution circuits, 34 heating zones
• Ventilation control: 2 central double flow
• Implementation of an algorithm for optimization of heating and ventilation operation (freecooling, recovery optimizer, anticipation of overheating,)
• Counting Plan Recovery # 100 calorie / electric / water / gas meters

Users' opinion on the Smart Building functions :

Digital driving service to improve the quality of service = permanent presence

- remote monitoring of the installations
- Weekly Digital Round: Data Analysis by HVAC Expert - Energy, Optimization of Plant Settings
- teleintervention within <1h

Establishment of a monitoring of the comfort rate for the real estate property manager (BNPP Real Estate Property Management): 88% since the beginning of the year

Bream tracking for BNPP Services

Environment

Urban environment

Land plot area : 11 600,00 m^2

Built-up area : 4 500,00 %

Green space : 2 000,00

Periurbain and close to Lille station

Products

Product

Flower Meadow

https://toiture.ecovegetal.com/

Resp commercial

https://toiture.ecovegetal.com/

Product category :

Complete system of green roofs

Costs

Construction and exploitation costs

Cost of studies : 1 300 000 €

Total cost of the building : 13 000 000 €

Health and comfort

Water management

Consumption from water network : 5 776,00 m^3

Water Consumption/m2 : 1.65

Water Consumption/none : 0.39

Expected environmental program

- Reducing drinking water consumption by 30% by efficient equipment both on the tertiary / social premises and on the kitchen process part
- Produce a balance sheet by use (food, process, health) in the form of a synoptic
- Evaluate the volume of rainwater recovered and the volume of recycled water
- Evaluate the rate of waterproofing of the plot and the leakage rate
- Pre-size the rainwater retention / infiltration structure by alternative techniques
- Describe the equipment used for the treatment of rainwater

The decision is to plant visible roof slopes, which excludes the possibility of rainwater recovery, but in return reduces the rate of waterproofing. The objective is to reproduce the natural cycle of water, that is to say to favor the evaporation of all the small and average rains which represent more than 75% of the annual rainfall. In the event of thunderstorms (heavy to exceptional rainfall with a return time of less than 10 years), the excess runoff water from the roofs and roads is directed to an infiltration basin located under the wetland and composed of granular materials embedded in a geotextile, with a porosity> 30%. The objective is to temporarily store the stormwater (buffer) and to evacuate it in a delayed manner, by infiltration and / or regulated flow towards the public sewerage network, without risk of saturation of the latter. The expected buffer volume is 100m3.
The rate of waterproofing of the plot was estimated at 37% (see note VRD). The authorized leakage rate of the plot is 2 l / s / ha, and the infiltration rate is estimated at 10 · 6 m / s. As a result, the volume of water to be buffered for the project rain (return time 10 years) is estimated at 40 m3.
The wetland has a double interest, the alternative management of rainwater but also the development of a remarkable ecosystem that we have integrated. As long as it is properly designed (choice of river species, submerged); this wetland is a source of biodiversity in this largely urbanized site: a green lung between roads and dense buildings.

Pollution control of runoff
Runoff from vomes and impervious surfaces will be collected by manholes with large volume of settling. They will be equipped with plunging blades to trap floats and oil residues, decant large sands. In addition, it is planned to implement a hydrocarbon separator downstream of the runoff water from the turning zone. Regular maintenance of this separator is essential to its proper functioning. In fact, all too often, this system is left without maintenance, in which case it is no longer useful.

Reduction of water consumption
In the tertiary zone and the social buildings, water-saving solutions are implemented to reduce water consumption: pressure reducer at 3 bar from the network, flush dual control 3/6 L, Time-delayed hand wash equipped with jet aerator, sink equipped with thermostatic mixing valve with stop (50% of nominal flow) with jet aerator.
A report was made using the CERTIVEA method for tertiary buildings. The solutions implemented allow a 33% reduction in water consumption, ie about 182 m3 per year and a savings on the water bill estimated at about € 636 / year.
There is no rainwater recovery or use of recycled water; The consumption of sanitary drinking water is estimated at 367 m3 / year.

In the first year of use, the planned consumption was 6100m3. The actual consumption 3500m3

Indoor Air quality

Health impacts are known for 100% of surfaces in contact with indoor air.

The hygiene requirements being very specific on this type of project, watertight partitions allowing to control the environment of the room were chosen.

All the emissions of fibers and particles from the products in contact with the indoor air are known, these materials do not have carcinogenic fibers.

Floor coverings are of three types:

flocked floors

stoneware

concrete with floor paint

For all materials in contact with indoor air, VOC emissions will be below regulatory thresholds.

100% of the materials meet the tests provided by the European Directive 97/69 / CE of 5/12/97 transposed into French law on 28/8/98. In the production phase, the material data sheets will be recovered and justify this sub-target.

Expected environmental program

Finishing materials (interior coatings) free of VOC, CMR, formaldehyde, ...;

Use of eco-labeled paints

The use of pathogenic fibrous materials in contact with indoor air is prohibited

The design of ventilation networks must facilitate disinfection operations

The choice of materials should facilitate maintenance operations

Identification of electromagnetic pollution

Project responses

Technical plenum design allowing easy access to ventilation networks for disinfection operations

In production area

Self-cleaning filter ceilings to maintain hygienic conditions

Implantation of the premises studied to avoid lost places, corners or corners.

Process designed to guarantee the efficiency of cleaning: rear of machines accessible without manipulation, technical networks embedded in the partitions, small equipment suspended from the partitions.

Facings of smooth interior partitions in polyester laminate coated with a layer of PET 55µ food grade, allowing easy maintenance and very good durability; They are protected by skirting boards 32cm high in areas with heavy traffic.

The bulkhead core consists of CFC / HCFC foamed polyurethane encapsulated in the polyester shell.

Tiled floors and high-strength epoxy joints, or in screed or quartz concrete

In tertiary and social areas

Thermal lining in contact with the indoor environment made with projected polyurethane foam and mineral wool (depending on thermal study location).

Eco-labeled paints, guarantees without solvent (aqueous phase) and low levels inCOV

Joinery and interior finishes based on solid or reconstituted wood, free from glues and pathogenic products (formaldehyde, phthalates, VOCs)

Tiled floor coverings (sanitary) or soft textile floors free of glues and pathogenic products (formaldehyde, VOC)

Comfort

Health & comfort :

Expected environmental program

Avoid summer overheating with passive solutions (no energy consumption)

Favor comfortable heating modes, based on radiation and provide a regulation that anticipates intermittences (warming up)

Limit air velocities to 0.2 m / s in tertiary zone, 0.3 m / s in production zone

Control overpressure / underpressure areas

Responses of the summer thermal project

The bioclimatic design (see target 01) integrates the risk of overheating by placing intermittent premises (restaurant, meeting rooms) on the SW façade, which is the most detrimental in terms of orientation.

Spaces such as circulations, lobby and visit play the role of thermal buffer, even in summer

The opening rate of the facades (tertiary zone) is the result of a compromise between good natural lighting and limiting the risk of overheating. In the offices of the floor, second-rate natural lighting is provided by lumitubes without risk of overheating.

The concept of facade prefabricated concrete panels, alternating with joinery, allows shading the facades and therefore reduce solar gain in summer

All the rooms having a translucent glass surface on the outside are equipped with external occultations such as rot-proof window blinds to control both the glare and thus the visual comfort, and the solar contributions, and therefore the risks of overheating.

Winter thermal

In the production zone, air heating via hot water batteries, double flow with energy recovery via plate heat exchangers (except in the cooking zone); The number and location of the blow / return ports is designed to limit speeds to 0.3 m / s.

In the tertiary and social areas (pause), dual flow air heating with energy recovery, via cassette fan coils, allowing fine control by work station (individualized programming, modulation of temperatures and flow rates). ventilation, horizontal blowing on 4 sides and at low speed <0,2 m / s)

Control of the overpressure / underpressure zones is ensured by a principle of fine balancing of the ventilation networks

Visual ComfortAttend of the Environmental Program

Good level of natural lighting in long-term premises (qualitative record + FLJ calculation)

Give priority to zenithal lighting and patios, multiply interior glass walls to maximize lighting in the second day

Avoid dazzling and too dark areas

Light sources with high efficiency (> 70 Lm / w) and high quality (T0 color> 4000 K and IRC> 86)

Focus on photometric probes and presence detection

Reflection index of controlled walls (80% ceiling, 70% walls, 30% floor)

Project ResponsesThe functional constraints of such a project lead to the design of a large building with multiple premises that are difficult to illuminate through the facades. In addition, the energy approaches show that, apart from the process, the lighting station can represent an important part of energy consumption, of the same order of magnitude as the heating station. It seems essential in this type of project to reduce the need for artificial lighting by optimizing the use of natural lighting. This goes through a reflection very early on the design. To answer this problem, the principles we have adopted are as follows:

The production area is organized around 2 patios designed, among other things, to provide natural lighting in the long-term production premises,

The other inner circulations connecting the different production zones, have at least one of their end naturally lit by the patios;

Part of the extended-use premises in the production area (eg, unclogging, deconditioning, preparation, heat sealing) are lit naturally by the patios;

The main cooking area is illuminated on the second day by the SE façade.

Two premises (Corn 15 infirmary and Corn 11 secretariat) concerned by the labor code are naturally lit by Solarspot or equivalent. Their positioning does not allow to have a joinery on the outside.

This device presents a technical opinion (6 / 11-1975). It also complies with the Labor Code: "Buildings shall be designed and arranged in such a way that natural light may be used for the lighting of premises intended to be used for work, except where the technical nature of the activities is such that 'opposes' (Chapter 5 provisions applicable to construction operations in the interest of health and safety at work, Section 2 Hygiene rules).

In addition to natural lighting devices, all artificial lighting fixtures will be controlled by photometric probes and / or presence detectors, so as to adapt as closely as possible to the needs and conditions of natural lighting. The light sources are low-power compact fluorescent type, with efficiency> 70 lm / w and IRC> 86%. As an option, LED sources are available (see CCTP strong currents). A study of natural lighting was carried out. Olfactory comfort Environmental program expectations

Treatment of the extracted air to avoid nuisances for the neighborhood;

Differentiation of ventilation networks by use (tertiary, production, sanitary, rest), without recirculation of polluted air

Air intakes away from external sources of pollution

Local biodegradable waste refreshed

Injection of "sanitarily neutral" perfumes into the blowing network

Project responses

Design of the ventilation system in small independent unit to differentiate very finely the ventilation networks (4 independent networks in cooking zone)

Generalization of the double-flow ventilation technology allowing a homogeneous air renewal (blowing and recovery by room) and offering possibilities of air filtration

Fresh air removed from the protected facade at R + 1 and in the patio (see plan plenum) protected from sources of external pollution

Filters on fresh air with a minimum gravimetric test yield of 90%.

Energy recovery on the outgoing air without contact with fresh air (plate heat exchangers),

No recycling of stale air, the extracted air is treated via filter ceilings and rejected on the roof via caissons.

Local biodegradable waste cooled to + 3 ° C

In the tertiary zone and the social premises, the dual-flow ventilation, completely independent of the process, makes it possible to filter the air introduced into the premises.

Acoustic comfort :

Expected environmental program

- Reduce nuisances due to equipment for the neighborhood
- Wall treatment and choice of suitable materials
- Soundproof interior equipment

Project responses

- The design of the mass plan (target 01) integrates the problem of acoustic nuisances due to the exploitation (confinement of the technical yard);
- The technical plenum design avoids the installation of HVAC equipment on the roof and thus considerably reduces noise pollution to the neighborhood
- Isolation of the facades SE and SO of the offices and social premises by the implementation of glazing having a weakening index RAtr greater than or equal to 30 dB
- Index of attenuation RAtr greater than or equal to 37 dB for the roof of the rooms located at R + 1, by the implementation of a principle of roofing in steel tank with 100mm of insulation.
- Isolation required between local DnTA ???? 38/40 dB, obtained by the implementation of partitions type 98/48 with plaster of 25mm and acoustic insulation of 45mm; and gates with a weakening index RA ???? 40 dB.
- Insulation between RDC and R + 1 obtained by concrete slab (> 0, 18m) + underlayment of flooring
- Implementation of absorbent false ceiling in the tertiary zone
- CTA air intake and exhaust with silencer
- Cold unit installed on the terrace equipped with an absorbing screen of 2m height

The choice of kitchen equipment takes into account their quality of soundproofing.

Carbon

GHG emissions

Methodology used :
See HQE procedure note

Building lifetime : 50,00 année(s)

See HQE procedure note

Life Cycle Analysis

Eco-design material :

See HQE procedure note

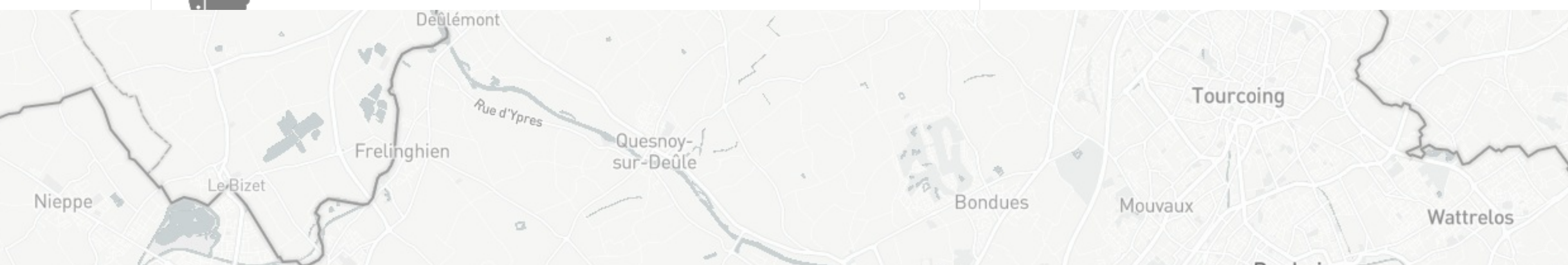
Contest

Reasons for participating in the competition(s)

- Real energy performance commitment based a little on the technique and a lot on the behavior of the users cooks.
- Contractual goal of 0.76 KWH / meal
- https://www.20minutes.fr/lille/1930639-20160925-lille-cuisine-centrale-machine-guerre-nourrir-enfants

Building candidate in the category

Energie & Climats Tempérés



Prix des Etudiants

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