Nianing's church, Senegal

by Nicolas Vernoux-Thélot / 2019-06-07 17:00:50 / Francia / 7216 / FR

Primary energy need :

3 kWhep/m².an

(Calculation method :)

ENERGY CONSUMPTION

Economical building *Building*

< 50	A
51 à 90	B
91 à 150	C
151 à 230	D
231 à 330	E
331 à 450	F
> 450	G

Energy-intensive building

Building Type : Other building
Construction Year : 2016
Delivery year : 2019
Address 1 - street : Nianing, Sénégal Sénégal NIANING, Autres pays
Climate zone : [As] Tropical dry

Net Floor Area : 457 m²
Construction/refurbishment cost : 1 059 799 €
Cost/m2 : 2319.04 €/m²

General information

Located on the shells' coast, south of Dakar, the project is imbued with this regional particularity taking as a starting point the spiral shape of a cymbium.

Oriented towards the east and sloping towards the sky, the building closes to the north and the south to protect itself from the sun and the harmattan.

The building opens to the west to capture the freshness of the trade winds by a set of volumes broken down into seven vaults with a bell tower that rises to 45 meters and plays the role of both signal and ventilation chimney.

In order to put in place a natural passive ventilation, the project is inspired by the functioning of the African termite mound which is an extremely efficient model of thermal regulation. It is also inspired by the operation of wind towers in East Africa, which have also been known for centuries for their effectiveness.

Sustainable development approach of the project owner

Promote the hiring of a local workforce for the construction of the building.

The Eiffage company honored this request and hired more than 50% of the construction team in the Mbour region

Architectural description

The woods all come from Cameroon forest labeled "respect for the environment and sustainable development". All non-reusable formwork timber for other sites

was recovered to build the church choir chairs.

Building users opinion

Without knowing the work on the passive natural ventilation, the abbot told us when the final reception of the works in April 2019: What a freshness in this church!

Photo credit

King L'enemy

Stakeholders

Contractor

Name : Archidiocèse de Dakar
Contact : Benjamin Ndiaye, archevêque de Dakar

Construction Manager

Name : IN SITU ARCHITECTURE
Contact : contact@insitu-architecture.net
http://www.insitu-architecture.net

Stakeholders

Function : Construction company

Eiffage Sénégal

Dominique Job / Sandra Villepontoux / Gérard Sénac

http://senegal.eiffage.sn/
General Enterprise

Function : Structures calculist

ETECS

Lucien Santolini

https://www.etecsafrique.com/
Office of study structure

Function : Construction Manager

GA2D

Eric Mulot

executing project management relays

Energy

Energy consumption

Primary energy need : 3,00 kWhep/m^2.an
Breakdown for energy consumption : Nave: emergency block * 5 / Baffles * 10 / Projectors * 28 Sacristy and sanitary block and technical: 5 ceiling lights / 1 amp

Real final energy consumption

Final Energy : 1,00 kWhef/m^2.an
Real final energy consumption/m2 : 1,20 kWhef/m^2.an
Year of the real energy consumption : 2 019

More information

LED bulb (total consumption: 496 kWh / year)

Renewables & systems

Systems

Heating system :
- No heating system

Hot water system :
- No domestic hot water system

Cooling system :
- No cooling system

Ventilation system :
- Natural ventilation

Renewable systems :
- No renewable energy systems

Solutions enhancing nature free gains :
rafraîchissement par tirage thermique qui permets d'économiser 112 % de la consommation énergétique de l'édifice

Environment

Urban environment

Land plot area : 5 691,00 m^2

Built-up area : 725,00 %

Green space : 4 311,00

Products

Product

Concrete

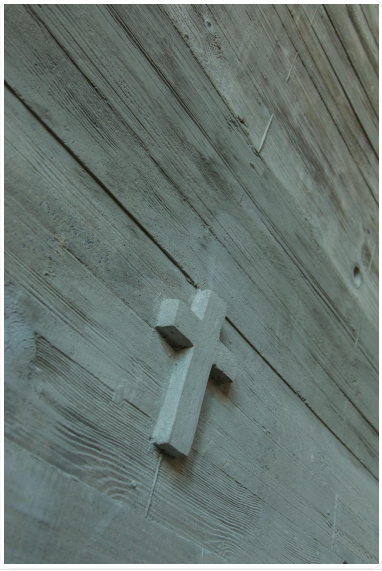
cimenterie locale (à Kirene, environ 50km)

Cimenterie du Sahel

Product category : Table 'c21_italy.innov_category' doesn't exist SELECT one.innov_category AS current,two.innov_category AS parentFROM innov_category AS oneINNER JOIN innov_category AS two ON one.parent_id = two.idWHERE one.state=1AND one.id = '6'

Reinforced concrete vault, optimization of the material (15cm thick)

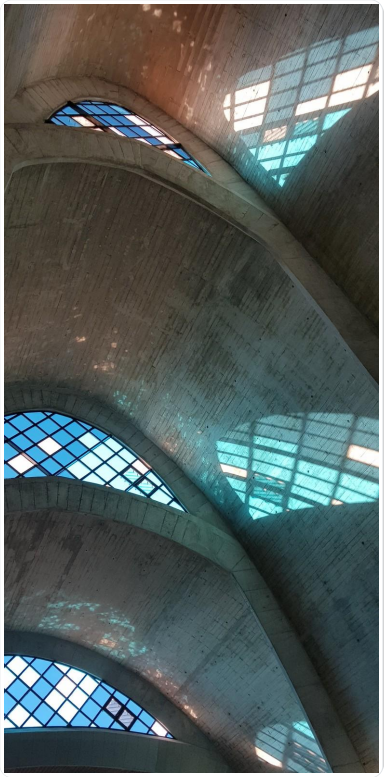
The product was enthusiastically accepted by all stakeholders.



steel canopy

Product category : Table 'c21_italy.innov_category' doesn't exist SELECT one.innov_category AS current,two.innov_category AS parentFROM innov_category AS oneINNER JOIN innov_category AS two ON one.parent_id = two.idWHERE one.state=1AND one.id = '10'

The product was enthusiastically accepted by all stakeholders.



Coated coating

Product category : Table 'c21_italy.innov_category' doesn't exist SELECT one.innov_category AS current,two.innov_category AS parentFROM innov_category AS oneINNER JOIN innov_category AS two ON one.parent_id = two.idWHERE one.state=1AND one.id = '16'

Local shell used as aggregates

The product was enthusiastically accepted by all stakeholders.

Large cunettes and retention basins

Product category : Table 'c21_italy.innov_category' doesn't exist SELECT one.innov_category AS current,two.innov_category AS parentFROM innov_category AS oneINNER JOIN innov_category AS two ON one.parent_id = two.idWHERE one.state=1AND one.id = '23'

At the foot of the vaults were drawn large cunettes that are gravitarily connected to landscaped retention basins located below the site. The retention ponds compensate for the waterproofing created by the building and allow the infiltration of progressive water into the soil during the rainy season.

The product was enthusiastically accepted by all stakeholders.

more than 50% of the workforce was hired in the region

Product category : Table 'c21_italy.innov_category' doesn't exist SELECT one.innov_category AS current,two.innov_category AS parentFROM innov_category AS oneINNER JOIN innov_category AS two ON one.parent_id = two.idWHERE one.state=1AND one.id = '33'

The product was enthusiastically accepted by all stakeholders.

Cooling by thermal print of the bell tower

Product category : Table 'c21_italy.innov_category' doesn't exist SELECT one.innov_category AS current,two.innov_category AS parentFROM innov_category AS oneINNER JOIN innov_category AS two ON one.parent_id = two.idWHERE one.state=1AND one.id = '19'

The verticality of the building has been exploited to the maximum to create natural ventilation day by "chimney effect" and at night the system turns by natural convection.

The product was enthusiastically accepted by all stakeholders.

Costs

Construction and exploitation costs

Global cost : 1 059 800,00 €

Reference global cost : 1 059 800,00 €

Global cost/none : 353266.67

Reference global cost/none : 1059800

Cost of studies : 113 032 €

Total cost of the building : 1 059 799 €

Energy bill

Forecasted energy bill/year : 99,00 €

Real energy cost/m2 : 0.22

Real energy cost/none : 33

Health and comfort

Comfort

Acoustic comfort :

PRO BET Impedance acoustic study

Carbon

GHG emissions

GHG in use : 0,30 $KgCO_2/m^2/an$

Building lifetime : 167,00 année(s)

Contest

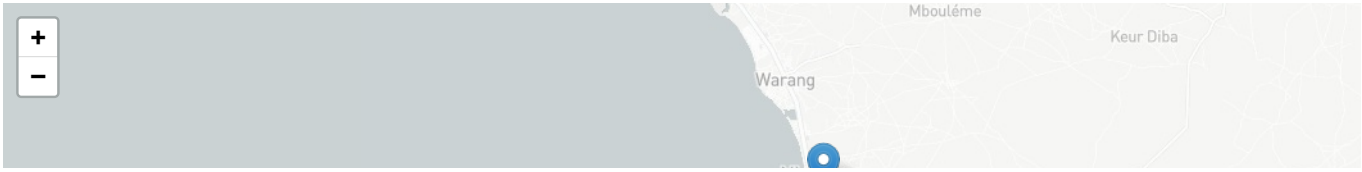
Reasons for participating in the competition(s)

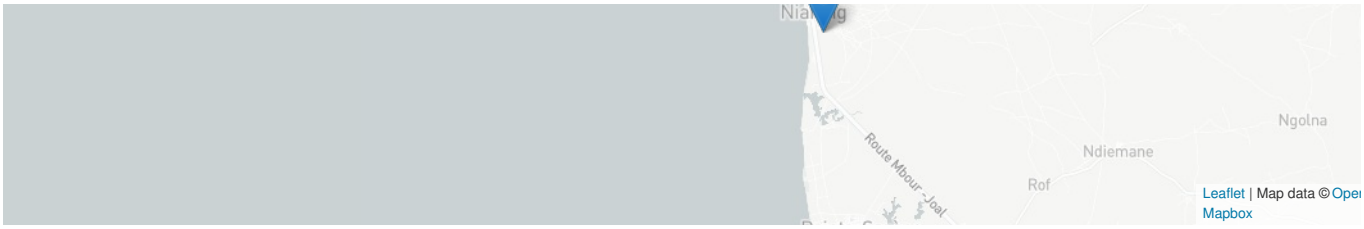
Creation of passive natural ventilation by the bell tower to ensure the freshness of the building and avoid the use of electric fans and air conditioners.

Building candidate in the category

Energie & Climats Chauds

Prix du public





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