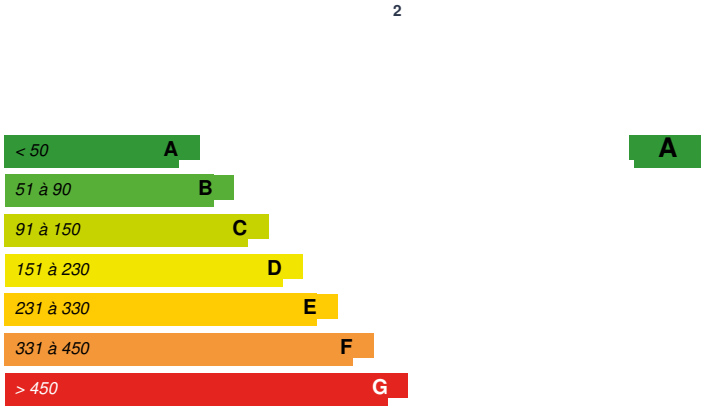
Eco-Renovation headquarters of KTR France



Building Type : Office building < 28m
Construction Year : 1970
Delivery year : 2018
Address 1 - street : 5 Chemin de la Brocardière 69570 DARDILLY, France
Climate zone : [Cfb] Marine Mild Winter, warm summer, no dry season.

Net Floor Area : 854 m^2
Construction/refurbishment cost : 1 500 000 €
Number of Work station : 40 Work station
Cost/m2 : 1756.44 €/m^2

General information

Ktr France is a German industrial group specializing in mechanical transmission. The KTR group is focused on innovation. It designs and manufactures high technology products. KTR is very attached to the well being of its collaborators.
In 2017, KTR acquired a 70s building in western Lyon to transfer its head office in France. Diagonale Concept proposes to KTR France to carry out an exemplary eco-renovation in line with the group's values and image.
At the beginning of 2017, Marc Campesi, head of Diagonale Concept, proposes to Pierre Martin, France Director of KTR, to select 7 priority objectives:
- A first tertiary renovation with positive energy and more: Make an uncomfortable building of the 70s, a building that produces more energy than it consumes and tends towards energy autonomy. It is not always easy to insulate and quench a building under renovation. Assuming there is a limit to reducing consumption without reducing comfort (eg reduce openings), the idea of the project was to benefit from a maximum of free renewable energy to offset losses.
The building is equipped with a process that stores solar thermal energy in the rock at 150 m depth via a battery of 4 probes. It is a producer of electrical energy thanks to a photovoltaic power station, part of which is in the process of self-consumption. The self-consumption PV panels ensure, as a priority, the operation of the thermal process (supply of the pumps), supply a storage battery (no more power failure and inverter) and charging sockets for electric vehicles. Some figures: Production 42MWh / Consumption 26 MWh (values estimated regulatory uses by fluids BET in year N + 2). The set is equipped with a monitoring. The first figures consolidate the estimates. All purpose, the building remains positive.

- A low carbon approach: The use of biobased or recycled (and / or recyclable) materials guided the choice of products implemented as well as the life cycle analysis (LCA). French hemp and cork for insulation, products from recycling on the ground, exterior wood joinery, cladding made from compressed Kraft or reconstituted wood. And of course a positive energy building with self-consumption. Local businesses for limited travel.
- An intelligent building connected to the service of user comfort and quality of use. With my smartphone, I have access to all shutter closing

functions, external gates, security systems ... The building performances are displayed live (positive energy, autonomy, co2). The building is equipped with a GTB that tracks the information of nearly 80 sensors.
-Quality of life at work and sanitary quality: Ensure that this building is pleasant to live and that it contributes to the wellbeing and the health of users. The facilities were the subject of prior consultation with users with the intervention of an ergonomist. Each workstation is equipped with an electric desk to alternate between standing and sitting (blood circulation). The building is largely glazed (+ 20% compared to the building reference system RT2012), it is bright. The interior views were neat, and the planted workspaces including some acoustic panels. Artificial lighting partly self-dimming according to daylight. The sanitary quality of the frame has been studied with care until the door handles of the toilets which are bactericidal. A consultant air quality and sanitary quality accompanied the companies during the works for the choice of materials without VOC and the systems of air treatment. Indoor air quality monitoring was set up for 2 months after reception. CO2 and hygrometry in the premises are monitored daily with a display per room. In summer, the building is not air conditioned but equipped with a cooling floor connected to the geothermal probes. With the accompaniment of a facilitator, the kitchen gardens contribute to the good living together as the picking of the first fruits and vegetables from the garden and fruit trees planted in the spring of 2018 ...

Sustainable development approach of the project owner

The aim was to create a building that reflects our company and its values: an innovative building with excellent working conditions for our employees. KTR is an independent company that does not depend on financial groups, the new building should also tend towards a form of autonomy particularly energy plan.

The group has already built high-performance buildings in Germany and Europe, particularly from an energy point of view. The idea was to renovate the Dardilly building with a high level of energy performance and a comfortable and ergonomic work environment for our employees and customers. Marc Campesi of Diagonale Concept has proposed to go further and to integrate a more global eco-responsible dimension to the project while involving the employees of the company. The final result is very satisfactory, the renovation was completed in less than 11 months with a very positive dynamic on the site. The building has become a reference in the KTR group. Careful detailing and finishing were particularly appreciated during the inauguration of the building in the presence of the leaders of the group and all the world directorates.

Architectural description

The desire to integrate the building in a very gentle way in the landscape has naturally imposed itself from the design. As a renovation work on the envelope and landscaping allowed us to melt the building in its environment by combining mineral and vegetable in the building elements. The bioclimatic design guided the work on the envelope especially the free inputs via large windows in the South and West. The presence of awning to the south (terrace) and to the west (photovoltaic panels) is complemented by sun breezes that punctuate the façade and protect the occupants from summer overheating. . The removal of bitumen from the car park, the vegetal reinforcement on the exteriors and the roofs will contribute to the thermal comfort in summer. The all-season comfort is reinforced by the quality of biosourced insulation and cladding that contribute to the thermal phase shift and hygro-regulation. In terms of spatial organization, the initial consultation work conducted with the users made it possible to respond to collective and individual expectations.

Building users opinion

After the break-in and adaptation phase to change of site and organization of workstations, the level of satisfaction is very good. A consultation work 2 months after integration has revealed corrective actions to be conducted including the desired individual control of Led pavers. Some LED luminaires are to be replaced because they are considered too dazzling despite a UGr <19.
Humidity sensors and occupants reported high humidity in the morning. This hygrometry is due to a late morning start of the central dual flow of air treatment to reduce electrical consumption and probably wastewater site. This moisture supply of building materials (screeds etc ..) will be evacuated within a few months
For the rest not back since the activation of home automation and handling systems.

If you had to do it again?

The constraint of passage of the networks must be well evaluated in renovation. Theoretical plots are not always simple to implement. The connected building component is complex with a multitude of communication protocols, closed systems and businesses that have had trouble communicating with the digital world and GTB or home automation. If it were to be redone, it would be necessary to reinforce the work of consultation upstream between the integrators of the GTB, the companies, the industrialists and the users.

See more details about this project

Stakeholders

Contractor

Name : KTR France
Contact : Pierre Martin ~ 06 80 68 73 14 ~p.martin@ktr.com ~ 5 chemin de la Brocardiere, Dardilly (69)
https://www.ktr.com/fr

Construction Manager

Name : Diagonale Concept
Contact : Marc Campesi ~ tel 06 33 04 18 04 ~m.campesi@eospace.fr ~ 12, rue Cavenne 69007, Lyon
http://www.diagonaleconcept.com/projects

Stakeholders

Function : Designer
Ressources green Building (Ingénieur bâtiment et architecte d'intérieur) Marc Campesi & Sophie Sturlese

Marc Campesi tel 06 33 04 18 04 m.campesi@eospace.fr

Programming, technical and architectural study, space design

Function : Thermal consultancy agency
Amstein et Walthert

Corentin Maucoronel Tel. 06 20 91 22 79, corentin.maucoronel@amstein-walthert.fr

http://www.amstein-walthert.ch/fr/
Fluid study, thermal and air quality

Function : Company
Terre et Lac

Thierry Franck +33 6 13 32 69 79

http://solaire.terreetlac.com/
Study and installation photovoltaic power plant

Function : Manufacturer
dualsun

Jean Marie Drap +33 6 66 84 70 47 jm.drap@dualsun.fr

http://dualsun.fr/
supply hybrid panels

Function : Manufacturer
Biofib

Olivier Merle 0619300417 o.merle@biofib.com

http://www.biofib.com
supply hemp insulation

Function : Manufacturer
Mapei

CORALIE DUCHER T. 06 75 94 51 09 emailc.ducher@mapei.fr

http://www.mapei.com/FR-FR/
supply floor resin / air quality group

Function : Manufacturer
Sonepar

Melkonian Gilbert 06 82 64 20 46 gilbert.melkonian@sonepar.fr

http://www.sonepar.com/fr
supply and advice lighting / home automation / digital

Contracting method

General Contractor

Type of market

Table 'c21_belgium.rex_market_type' doesn't exist

Energy

Energy consumption

Primary energy need : 67,00 kWhep/m^2.an
Primary energy need for standard building : 221,00 kWhep/m^2.an
Calculation method :
CEEB : 0.0001
Breakdown for energy consumption : heating and cooling 8.3 KWHEF / m2 DHW 3.5 KWHEF / m2 VENTILATION 3.9 KWHEF / m2 LIGHTING 7.2 KWHEF / m2 HYDRAULIC AUXILIARIES (probes and floor) 3.5 KWHEF / m2 (not including office automation 12 KWEF / m2 in primary energy consumption) Not taken into account in the CEP (not deducted) and the final energy consumption - Photovoltaic production: - 48 KWHEF / m2 - PV self-consumption: - 10 KWHEF / m2 To be deduced = 58 KWHEP / m2
Initial consumption : 363,00 kWhep/m^2.an

Real final energy consumption

Final Energy : 38,00 kWhef/m^2.an
Real final energy consumption/m2 : 4,00 kWhef/m^2.an

Year of the real energy consumption :2 019

Envelope performance

More information :
Wall 0,17w / m2.k
Low floor 0.33
Roof 0.11
Joinery 1.40 (aluminum wood)

Indicator : I4
Air Tightness Value : 1,31

More information

Calculation method: IDA 6 ICE dynamic thermal simulation of EQUAA (Sweden) method CEN 13791 / IDA-ICE has been validated on the IEA Task 12 BESTEST envelope, the IEA Task 22 RADTEST and the method CEN 13791. The all-purpose building produces more energy than it consumes. Self-consumption covers most of the day and inter-season needs (without heating or cooling) and open windows (all windows open)

Renewables & systems

Systems

Heating system :
- Geothermal heat pump
- Low temperature floor heating

Hot water system :
- Individual electric boiler

Cooling system :
- Geothermal heat pump

Ventilation system :
- Double flow heat exchanger

Renewable systems :
- Solar photovoltaic
- Solar Thermal
- Heat Pump on geothermal probes
- Heat pump

Renewable energy production : 160,00 %

Other information on HVAC :
Thermal energy storage in 4 geothermal probes. Thermal energy is produced by hybrid panels of Dualsun (PV + solar) on the roof. The energy is "stored" in the rock at -150 depth (Swiss 2sol system). Stored energy covers the needs of a season. The power of the Pac is weak. The reversible heating floor of multi-concrete with its hot laying avoids the snail poses to tighten the tubes ready cold walls (better temperature gradients in the rooms and less manual action on thermostats). the regulation is done by room.
The ventilation is provided by a double flow with a flow to reduce the effects of discomfort of convection.

Photovoltaic panels:

- 88 High Efficiency Sunpower Monocrystalline (210 m2) high efficiency maxeon gen2 modules (25 year warranty) - Efficiency> 2.5% compared to conventional multicrystalline modules.
Yield at 25 years 87%. Recycle end of life: PV cycle adhesion, factory in Rousset (13)

- Dualsun Hybrid Panels: 25 modules of 280 wc, the world's first certified hybrid solar panel (1220 W) that provides both electricity and hot water. Made in France and patented internationally. Hot water is introduced into the geothermal probes to form the caloric reservoir in the rock. Adhering to PV CYCLE, DualSun panels can be recycled up to 80% after an average life of 30 years.

- Self-consumption (Sunbreaker):
25 modules Solarworld PV single crystal 280 Wc glass, transparency for use in sunlight

Smart Building

BMS :
The building is connected and equipped with a Newron supervisor.
The entire building is monitored: production and energy consumption, CO2 and hygrometry

Comfort: Smartphone or PC controls: site gateways and closing commands as well as video security surveillance and alarm systems.

Pedagogical function and control: Consumption monitoring (display of building performances for visitors on a monitor).

Collaborative functions and quality of use: the HD monitors for projections are equipped with wireless connection system from laptop or smart phone.

Environment

Urban environment

Land plot area : 3 450,00 m^2
Built-up area : 980,00 %
Industrial and tertiary zone of West Lyonnais. Presence of green spaces. Services and shops +> 1km

Products

Product

hybrid panels

dualsun

Jean Marie Drap +33 6 66 84 70 47 jm.drap@dualsun.fr

https://dualsun.fr/
Product category : Génie climatique, électricité / Chauffage, eau chaude
Hybrid PV panels and hot water

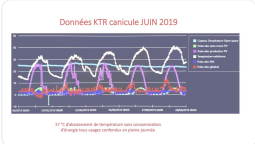
Water cools the panels and increases the efficiency of the V

Modules SUNPOWER (France)

Terre et lac

Christophe Paris / Terre et lac /c.paris@terreetlac.com / tel 06 89 86 07 59

http://www.terreetlac.com/
Product category : Second œuvre / Equipements électriques (courants forts/faibles)
Output is about 2.5% higher than other multicrystalline modules.



96 Monocrystalline cells Maxeon Gen. II

Product warranty 25 years,

Power Curve: 95% over the first 5 years, -0.4% per year until the year 25 (87% at 25 years)

Updated PV CYCLE membership (recycling of the modules included in the installation - Rousset plant (13))

Costs

Construction and exploitation costs

Renewable energy systems cost : 170 000,00 €
Cost of studies : 150 000 €
Total cost of the building : 1 500 000 €
Subsidies : 24 000 €

Health and comfort

Water management

Rainwater is stored partly on the roof by the greening of the terraces.
The water cycle has been respected with the removal of bitumens (outside the workshop area) for direct penetration of water in the natural environment
No automatic arosae plantations. Choice of species requiring low irrigation

Indoor Air quality

An **air quality** and **sanitary quality** consultant accompanied the companies during the works for the choice of materials without VOC and air treatment systems. **Quality indoor air monitoring** was set up for 2 months after reception.**The CO2 and hygrometry in the premises** are monitored daily with a display per room

Comfort

Health & comfort :
The facilities were the subject of prior **consultation** with users with the intervention of an ergonomist. Each workstation is equipped with an **electrical desk** to alternate between standing and sitting (blood circulation). The building is **largely glazed** (+ 20% compared to the reference of buildings RT2012), it is bright. The **interior views** have been treated, and the **planted** workspaces including some acoustic panels. In summer, the building **is not air conditioned** but it is equipped with a **refreshing** plumbing **connected to the probes.** With the accompaniment of a host, **the gardenspotagers contribute to the good living together** as the picking of the first fruits and vegetables of the garden and fruit trees planted in spring 2018 ...

Measured indoor CO2 concentration :
Le CO2 et l'hygrométrie dans les locaux font l'objet d'un suivi quotidien avec un affichage par pièce.

Acoustic comfort :
The presence of hemp in the partitions and doubling reinforces the already very satisfactory acoustic quality with ceiling slabs with an alpha coefficient of 1.

The soft floors absorb the sound of footsteps. The noisy equipment is in an isolated room (example photocopier) Green panels are equipped with acoustic absorbers. The exterior joinery is phonic.

Carbon

GHG emissions

GHG in use : 1,00 $KgCO_2/m^2$/an
GHG before use : 11,00 $KgCO_2$ /m^2
Building lifetime : 50,00 année(s)
, ie xx in use years : 11
Not taking into account the C02 gain of the photovoltaic panels 968kgco2eq / year, ie -1.12 KGco2eq / m2an (excluding the C02 impact of the manufacture of the PV panels), the building is neutral or slightly negative in emission of co2 all uses combined.

Life Cycle Analysis

Eco-design material :
- insulation wall and ceiling hemp & linen of biofib

- Insulation under basement ext in cork - Carpentry wood / alu - cladding of neolife out of composite wood (90% of wood) - terrace pine and edging carpark wood

Contest

Reasons for participating in the competition(s)

Energy and temperate climates

- **1st tertiary energy renovation with all-purpose positive energy, storage of solar and electric thermal energy**
- **Self-consumption of photovoltaic energy: I consume on site the electricity produced, I charge my electric car ...**
- **42 MWh production including 7.2 MWh (auto power consumption) / consumption 26 MWh (estimated values for regulatory purposes)**

Low carbon

- In terms of all-purpose consumption (regulatory + office automation) the building absorbs more CO2 than it emits thanks to the production of PV. We only talk about the exploitation, the life cycle of the PV and their impact C0 2 in manufacturing is not understood.
- The use of bio-sourced or recycled materials (and / or recyclable): example hemp and cork insulation
- Awareness of the LCA companies and companions on site to limit carbon impacts (manufacturing and transport) with a competition organized for industrialists on site.
- Positive energy building only with renewable energies (solar, photovoltaic, PV solar hybrid panels, geothermal probes)
- Local businesses

Health and comfort:

- Ergonomics study: electrical offices, quality of use, comfort of the seats, concerted design before and after installation
- Internal mobility of workstations by creating multipurpose spaces (meeting and break room).
- Air quality approach with **business training and** premises **monitoring** (VOC, TVOC, CO2, hygrometry)
- Very glazed, vegetated work spaces with selected exterior views

- Neat and comfortable break area (possibility to lie down) -sports room
- Vegetable gardens with training in outdoor space with a positive biodiversity approach

Building candidate in the category

Prix tertiaire & industriel

Ière édition

Trophées

Bâtiments résilients

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