


Star Innovation Center passive factory project

by Camille Sifferlen / 2019-06-13 10:55:01 / International / 5756 / EN

Extension + refurbishment



Primary energy need :

344 kWhpe/m².year

(Calculation method : Other)

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 : Factories
Construction Year : 1970
Delivery year : 2016
Address 1 - street : Colombo 0000 COLOMBO - KATUNAYAKE, Sri Lanka
Climate zone : [Am] Tropical Monsoonal

Net Floor Area : 3 675 m² Other
Construction/refurbishment cost : 2 400 000 €
Cost/m2 : 653.06 €/m²

Certifications :



General information

The Star Innovation Center is a product development facility located outside of Colombo in Katunayake, Sri Lanka. Intended to be a **global model for the entire garment industry, the project sets a new high bar for sustainability, energy efficiency and worker comfort.**

By choosing to **renovate an obsolete building to Passive House standards**, the project dramatically reduces the waste, carbon emissions and fossil fuels typically required for demolition and a new build, and promotes the client's commitment to maintain **high standards in social, environmental, ethical and safety compliance within the global fashion industry.**

It is the first Passive House project in South Asia, and one of only two certified Passive House factory buildings in the world. **Annual energy consumption will be cut by over 60%** compared to a conventional "efficient" modern industrial building. and a payback period of 6-7 years is expected. This project also includes cutting-edge sustainable technologies, like a **"heat pipe" system that reduces dehumidification energy use by 90%.**

The project is a pioneer in **applying Passive House technology to a tropical monsoon climate**, which features steady warm temperatures year round but extremely high relative humidity. Careful design and engineering of the building systems and enclosure ensures that workers enjoy year-round comfort in a workspace that provides **abundant natural light, low humidity, filtered fresh air, and maintains temperatures near a constant 24°C (77°F)**.

Because the Star Innovation Center is a milestone in industrial energy efficient retrofitting in a tropical monsoon climate, the Passive House Institute awarded the EnerPHit Pilot Project Certification. Thorough testing of the airtightness and remote monitoring of the ongoing energy usage provide quantitative confirmation of the building performance, confirming projected **operational cost savings for the client and vastly upgraded workplace environmental standards for the employees**.

From the outset the idea was to assemble **an integrated project team including local architects, engineers, fabricators and builders to encourage technology transfer and demonstrate the feasibility of high performance building in the region**. By promoting the project and inspiring the local building industry there is a clear path to both reducing carbon emissions and putting an end to worker "sweatshop" conditions.

See more details about this project

https://passivehouse-database.org/index.php?lang=en#d_6030

Photo credit

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Stakeholders

Contractor

Name : Star Garment Group / Komar Brands

<https://www.star.lk/>

Construction Manager

Name : Jordan Parnass Digital Architecture

<http://www.jpda.net/>

Stakeholders

Function : Thermal consultancy agency

Steven Winter Associates

<https://www.swinter.com/>

Function : Certification company

Passive House Institute

Dragos Arnautu email: dragos.arnautu@passiv.de address: Rheinstrasse 44-46, 64283 Darmstadt, Germany

<https://passivehouse.com/>

Function : Designer

Vinod Jayasingh Architects

Energy

Energy consumption

Primary energy need : 344,00 kWhpe/m².year

Primary energy need for standard building : 680,00 kWhpe/m².year

Calculation method : Other

CEEB : 0.0001

Breakdown for energy consumption : The following values represent the renovated building's performance: Cooling and dehumidification demand: 183 kWh/(m²a) Cooling load: 21 W/m² Calculated according to PHPP The primary energy demand of 344kWh/m²a includes cooling, dehumidification, auxiliary and household electricity as well as domestic hot water, and is divided as below: - 27% cooling (sensible) - 20% Lighting - 20% Sewing Process Loads - 16% PCs / Office equipment - 7% Cooling (latent) - 6% Aux. elec & Summer ventilation - 4% Domestic Hot Water A breakdown of the energy consumptions before the renovation is not available. Only the final (260 kWh/m²a) and primary energy (680 kWh/m²a) demands could be verified and presented.

Initial consumption : 260,00 kWhpe/m².year

Envelope performance

More information :

Exterior wall: U-value = 0.329 W/(m²K)
Basement floor / floor slab: U-value = 5.795 W/(m²K)
Roof: U-value 0.182 W/(m²K)
Frame: Gutmann F50, 1,81
U w-value = 1.81 W/(m²K)
Glazing: U g-value = 1.2 W/(m²K) - g -value = 22 %
Entrance door: U d-value = 1.14 W/(m²K)

Indicator : n50

Air Tightness Value : 0,78

Real final energy consumption

Final Energy : 120,00 kWh/m².year
Real final energy consumption/m² : 110,00 kWh/m².year
Year of the real energy consumption : 2 018

Renewables & systems

Systems

Heating system :

- No heating system

Hot water system :

- Individual electric boiler

Cooling system :

- Fan coil

Ventilation system :

- Double flow heat exchanger

Renewable systems :

- Solar photovoltaic

Renewable energy production : 10,00 %

Other information on HVAC :

5 units with heat and humidity recovery

Average for all 5 ventilation units:

72% heat recovery

70% humidity recovery

0.7Wh/m³ electric efficiency

Manufacturer: DESICCANT ROTORS INTERNATIONAL PVT LTD., ARCTIC INDIA HOUSE, 20, RAJPUR ROAD, DELHI - 110054 (INDIA)

Additional cooling and dehumidification (after the ERV) is being done via fan coil units which cool the air to a very low temperature in order to dehumidify it. The air is then reheated using Heat pipes with Heat Recovery. The heat pipes work in collaboration with the solar panels on the roof which save costs in comparison with the classic electrical reheat systems.

Generation of renewable energy: 48340 kWh/a which is 19 kWh/(m²a) based on the projected area of 2549 m²

Renewable energy demand (PER demand according to PHPP): 164 kWh/(m²a) based on the used area on cooling/dehumidification installation, domestic hot water, household electricity and auxiliary electricity

Environment

Urban environment

The project is located in a low-rise industrial park adjacent to the airport.

Trees provide some shade but the majority of the building is exposed to the sun.

Products

Product

Gutmann F50, 1,81

Gutmann

<https://www.gutmann.de>

Product category : Finishing work / Exterior joinery - Doors and Windows

Passive house curtain wall system with 50 mm or 60 mm face width.

Passive house viability in accordance with IFT directive WA-15/2, in combination with the required service ability

Identical profiles for mullion and transom, straight cutting, no transom profile notching: minimal off-cuts, rational manufacture and installation

- Joint connector technology for gap-free connection between transom and mullion
- Identical width of inner glass gaskets at mullions and transoms
- Low edge radius for visually flawless transom connection
- Maximum glass loads up to 600 kg, depending on wind loads

This product was well accepted.



Costs

Construction and exploitation costs

Total cost of the building : 2 400 000 €

Health and comfort

Comfort

Health & comfort : Careful design and engineering of the building systems and enclosure ensures that workers enjoy year-round comfort in a workspace that provides **abundant natural light, low humidity, filtered fresh air, and maintains temperatures near a constant 24°C (77°F).**

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Carbon

GHG emissions

GHG in use : 70,00 KgCO₂/m²/year

Methodology used :

CO₂ factors GEMIS 4.6

Contest

Reasons for participating in the competition(s)

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Building candidate in the category



Energy & Hot Climates

Low Carbon

Health & Comfort

Users' Choice

