Universidad Politécnica de Madrid

The home from the Universidad Politécnica de Madrid is designed to go a step beyond the typical industrial production of houses and incorporate cutting-edge, state-of-the art technologies. This includes using a "smart" foundation and phase-change materials to supply thermal mass and substance to a light construction project. Rationalization comes into the design to achieve a pleasant, fluid space based on a well-insulated envelope, energy efficiency, and recycled materials—which is to say "sustainability."

What´s Different?

- The house, “Casa Solar,” is a small part of a major research project. The goal is to raise the level of industrial production of houses and to improve their sustainability via both energy efficiency and recycled materials—and even study the possibility of recycling every part of the house.
- The house is built to allow easy disassembly (into five major parts) and transporting.
- When it arrives at its destination, the house can be located on poor-quality ground thanks to its system of smart foundations that reacts automatically to any settling of its foundation steel plates.

Architecture, Interior Comfort

- First, the project attempts to create a pleasant, temperate space to live in that has the simplicity of one major space surrounded by different areas rationally located to enrich this space and serve the homeowner's usual needs and activities. So the bathroom and kitchen are designed in a compact way in one area (the north side), which makes it easier and more cost efficient to install and maintain the plumbing facilities. On the south side, a wide expanse of glazing opens to an exterior wooden deck.
- The interior layout is conceived to provide a flowing space to achieve the sensation of being larger than it actually is. The north wall couples with a technical block that houses plumbing, mechanical, and electrical systems. From the inside, this mean that the bathroom and kitchen are designed in a compact way, but in a way allows separate passages from bathroom to bedroom and kitchen to dining room.
- The south façade also helps to expand the interior space by providing wide views and natural light, while still staying warm and comfortable because of the façade's a double-skin configuration. Clerestory windows on the north façade also help to make the space look larger and brighter.

Heating and Cooling systems

- An HVAC unit provides heating and cooling. Ventilation control and well-insulated walls reduce the energy consumption.
- The double-skinned, glazed south façade provides additional solar gain in winter. Cool or warm air is allowed to enter or is exhausted, depending on the conditioning needs.

Lighting (including Daylighting)

- The south glazed façade along with the clerestory windows on the north façade provide a generous amount of natural light, which brightens the interior space even on cloudy days.
- An LED lighting system will work in harmony with conventional low-energy-consuming lighting.

PV and Solar Thermal

- The PV system, which is rated at 9.6 kW, is from Isofoton, a Spanish company that is Europe's largest manufacturer of PV modules. The rooftop system is pitched based on the team's study of the Washington, D.C., area's annual solar incident radiation, to optimize solar energy generation throughout the annual cycle.
- The house is equipped with a solar thermal system to produce hot water for various uses. The system of evacuated vacuum tubes is located both horizontally on the roof and vertically on the south façade, which gives an attractive, high-tech look to the facade.

Communications

- The team envisions communications not only as one of the Decathlon's ten contests, but as a unique opportunity to encourage everyday people to find out more and to use renewable energy sources, especially solar ones.

Budget

- The total cost for materials, construction, and transportation is estimated to be around $1 million.

Future plans

- The house will probably be shipped to Beijing, China, and installed as part of China's Future House project to show Spain’s ultimate technology in the housing field.

Team Information

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