Werner Sobek Stuttgart's rendering of the Plus Energy House.

Plus Energ

Thorsten Klaus' award-winning design may change the way homes are built.

Thorsten Klaus (MASc 9T5) was one of the three principal designers of a concept house that has won a federal German design award.

The building is inconventional, to say the least.

Rather than seeing the sizable amount of technical equipment needed to heat, cool, and power the house as an inconvenient volume to be hidden somewhere in the building, he decided to make it a prominent feature, and set it out in plain view behind the street-facing glass facade.

This creates an eye-catching public display from the outside while simultaneously offering a layer of privacy to the inside, and it even allows equipment maintenance to be performed from the carport without technicians having to enter the house.

It also generates enough of its own energy to power itself and a microfleet of urban electric vehicles that sit outside.

The house generates energy exclusively through photovoltaic and solar thermal arrays.

The front and rear portions of the roof incorporate high-efficiency monocrystalline PV arrays, while the middle portion above the "energy core" of the building features a row of solar vacuum tube collectors for warm water heating.

To further boost the electrical generating capacity, the south-west facade is made up of thin-film solar modules, which are less efficient than the panels on the roof, but blend seamlessly into the house's appearance, and contribute nearly 20% of the total annual power supply.

Heating and cooling is handled almost entirely using an air-source heat pump powered by the solar array.

This type of heat pump uses the outside air as the heat source and heat sink, much like a refrigerator.

Heat is distributed within the house by water flowing through low-temperature heating and cooling surfaces in the ceilings.

The walls consist of highly insulated prefabricated engineered wood modules designed to minimize thermal bridging, and the large window areas are kept as efficient as possible by using inert-gas-filled triple-glazing with a very small framing area.

Also key to energy efficiency is energy management.

The house features an automated control system coupled to a monitoring network of sensors to ensure that the energy collected is used in the most efficient way possible, depending on many factors such as the time of day, whether the occupants are home, and whether the electric cars need to be charged.

There are two aspects to the recyclability of the building - the recyclability of the individual materials, and the ability to dismantle the building components to those constituent materials.

By sticking to materials such as glass, steel, aluminum, and plastics, and avoiding such materials as drywall, plaster, and laminates, he ensured that all components were recyclable on a material level.

The house will be built in Berlin in the summer of 2011.

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