Texas A&M University

The Texas A&M Solar Decathlon entry, which is called groHome, is designed to be responsive to the present and future needs of the American family. The home won a national design competition from the Environmental Protection Agency, referred to as *Design for Disassembly*. The team feels that groHome satisfies the dynamic needs of the modern household and the environmental impacts that are looming, and also sets the stage to become compliant to manufacturing protocols that might help advance the housing industry.

What's Different?

- The house is designed as an open flexible building system, which ranges from a basic component—groJoint—to the potential for a complete community—groCommunity—with incremental building scales and evolving renewable energy systems between these two extremes.
- The design includes an Energy Port Garage for the future V2G and G2V hybrid car attachable to every American home; groWalls, which are fat-wall attachments for interior space efficiency; groEnergy for expandable PV and solar thermal arrays; groDeck for enhanced use of exterior space; and a base unit referred to as goHome for fast delivery of a completed starter unit.
- The design concept includes preliminary efforts into open-source protocols and building information modeling, which provide a means of advancing the state of the building industry so it can match the advancements in the automotive, computer electronic, and space industries.
- The design concept includes a procedure using life-cycle balancing of resource use in terms of energy, water, and food, which fosters behavioral responsibility by reconnecting humans to the natural cycles that support them, while reducing the building's carbon footprint.

Architecture, Interior Comfort

- The architecture is adaptable in style, spatial, and climatic needs. The team has developed preliminary designs for urban infill; a mixed-use community in New Orleans' 9th Ward; and a grow-neighborhood demonstration model for the National Mall itself.
- By using the age-old principle of thermally zonable space, the system of modularity can attain thermal comfort by curtaining off whole modules of three-dimensional spaces and exterior surfaces (reducing surface by 50% and volume by 40%).
- The design connects to nature by using large super-insulated windows, opening up the view to a landscaped and functional backyard.
- The manner in which the landscape is planned borrows from the historical precedent of the soon-to-be World Heritage site of the Aseguia drainage system between missions in San Antonio Texas; the system is depicted at the house between the patio modules in the form of a river stone drainage pattern.

Heating and Cooling Systems

- A plug-and-play, off-the-shelf energy system includes a heat recovery ventilator, solar-assisted heat pump, and dehumidification units.
- A solar thermal fence, which can be adapted in size according to climate, functions as a landscape spatial unit while protecting from the north wind.
- The reflection pond can act as a heat sink and as a psychological relief in the summer.
- Operable clearstory windows enable ventilation of the warmest air and provide a light wing/breeze wing that deflects breezes gently into and out of the space.

Lighting (including Daylighting)

- Clerestory windows at the tops of the walls provide daylight by supplying the adjustable light wing for even light distribution north and south while also providing breeze deflection.
- The large thermally sophisticated north glazing wall provides a spectrally cool northern light source without glare.

- Angle-adjustable LED lights at the base of the clerestory windows use the same light wing to project an even illumination at night, while enabling area-specific lighting when needed.

PV and Solar Thermal
- There are three different building-integrated photovoltaic (BIPV) system module types (all of which are Suntech MSK systems): (1) the rooftop BIPV system, which is pitched and un-pitched (taking advantage of summer and winter); (2) the pitched translucent BIPV system over the south clerestory, which acts as daylight modulator, thus gently shading the harsh southern light; and (3) the easy-to-install, vertical, see-through BIPV system, which enables a slight shading to the south wall without sacrificing view.
- A solar thermal fence made up of "Abacus" evacuated tube collectors is a heating-optimized, solar heat source that is separate from the actual structure. It enables better thermal control of the space without depending extensively on direct gain, thus gaining more predictable thermal comfort.

Communications
- Fundamental to the design are life-cycle event icons that serve as constant playful reminders, both to the user and to the public, of the solar, water, and food cycles.
- The communication panels use backlit film mounted on the windows, which use a daylight-enhanced graphic film during the day and a light sheet called Ceelite on the exterior of the glazing at night.

Budget
- The total cost was $550,000.
- Fundamental to the Texas A&M concept is that the groHome has a start-out budget that evolves as needs change, for a pay-as-you-grow approach to housing.

Future Plans
- Based on the evolutionary nature of the groHome/groCommunity concept, the Ecuadorian government has approached the team and is considering purchasing the entire entry as an evolutionary research community and then shipping it via Navy frigate to the very location where the concept of evolution began via Darwin himself—the Galapagos Islands.
- HVAC companies, including GE and Trane, have expressed interest in further testing and commercializing the team's innovative solar-assisted heat pump.

Kid's Corner
- This house features a scavenger hunt delving into the way things work and a room dedicated to crafts and games—a place to explore and learn while having fun.
- The game room includes not only a Bevo (the Texas A&M mascot) dartboard, but also a "working model" of a groCommunity.

Team Information
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