



January 22, 2011

Dr. E. Christian Wells, Director
Office of Sustainability
University of South Florida
4202 E. Fowler Avenue, LIB122
Tampa, FL 33620

Dear Dr. Wells:

This letter confirms the University of South Florida's participation in the 2011 Solar Decathlon. The University of South Florida is leading a team selected to participate in the U.S. Department of Energy Solar Decathlon which will be held in Washington, D.C. in the fall of 2011. Teammates include Florida State University, the University of Central Florida and the University of Florida under the banner "Team Florida."

Team Florida is an interdisciplinary group of students and faculty led by USF School of Architecture & Community Design professors Stanley Russell and Mark Weston and SACD student Mario Rodriguez. Team Florida includes the USF Colleges of Engineering, Arts and Sciences, and Business, the FSU School of Engineering, the UF School of Building Construction and Interior Design, and the UCF Florida Solar Energy Center. The competition pits selected teams of college and university students from throughout the United States and the world against each other to design, build and operate the most efficient and affordable zero energy house. There are 20 teams from five countries on four continents representing a diverse range of climates, regions, building technologies and design approaches.

The house will be constructed in Tampa and shipped to Washington D.C. to take part in ten contests. Each contest is worth 100 points and can be scored either by jury or by specific measurements. The 10 contests are: Architecture (juried), Market Appeal (juried), Engineering (juried), Communications (juried), Affordability (juried), Comfort Zone, (measured), Hot Water (measured), Appliances (measured), Home Entertainment (measured and juried), and Energy Balance (measured). Team Florida's entry, Flex House, is a flexible, modular building system designed for a young, moderate-income couple. The house will be uniquely adapted to the hot, humid Florida climate and include time-tested passive solar strategies as well as cutting edge renewable energy systems, building components, appliances and mechanical systems.



Design

Flex House is a net zero energy prototype designed and constructed in a climatically responsive process that is both practical and affordable and which illustrates the belief that the marriage of technology and carefully designed human centered architectural space can produce a building that transcends the traditional notions of sustainability and livability. FLeX House is a flexible, modular, pre-fabricated building system with a contemporary minimal aesthetic that can adapt easily to different site situations and client needs. The key factor shaping the design approach is Florida's mild climate and the opportunity for an indoor outdoor lifestyle. FLeX House combines the wisdom of vernacular Florida houses with clean contemporary design and cutting edge technologies to make a state of the art ZEH. The following are some of the key features of FLeX House:

Affordability

Affordable, good design is achieved by the prefabrication process that maximizes efficiency and quality control and eliminates waste. Once fabricated, the main body of the house is shipped to the site on a single truck minimizing transportation costs. The main body contains sliding modules that are deployed from the main body to complete setup at the site quickly with a minimum use of equipment and labor. The house is placed on an economical, isolated pier footing system. The number and location of modules is customizable according to the wants and needs of the client and the site situation.

Indoor/Outdoor Lifestyle

The plan is laid out on the east west axis to maximize shading and natural ventilation and minimize direct solar gain. Because of the hot climate, the living spaces focus on the cooler, north side of the site. The entire north wall, composed of sliding glass panels can be opened combining the interior living spaces, the exterior deck and the garden into one continuous indoor/outdoor space. The interior space can be left open with a continuous flow from the kitchen to the master suite/office area, or it can be partitioned to separate the living and bedroom areas for privacy and to create two separate thermal zones for energy conservation.

Sustainability

Building Envelope. Designing an envelope that works equally well throughout the year combining an optimum level of insulation, resistance to air infiltration, transparency for daylight, and flexibility, is a challenge in Florida's hot humid climate. Flex house incorporates a double skin system.



The outer skin or “umbrella” is composed of cypress [a locally grown wood] louvers that provide complete shade for the building envelope for most of the year and allow the sun in for passive heating on a selective basis. The umbrella is also the support structure for the solar array that consists of Photovoltaic panels for electrical generation and solar thermal panels for water heating. The inner skin, the building envelope, is composed of structural insulated panels with a corrugated metal exterior finish. Metal is an ideal material for this climate because of its high reflectivity and low thermal mass. Because the umbrella provides complete shade and there is a relatively low average indoor-outdoor temperature differential in Florida, the envelope is relatively thin with a modest insulation value. All of the glazed surfaces are double pane, low e glass insulating glass.

Clean Renewable Energy. As a net zero energy house FLeX House utilizes Photovoltaic panels for site based, clean renewable energy generation. The grid tied 4.5 kW array will send electricity back to the municipal electric utility grid during peak hours of generation and FLeX House will take electricity from the grid in the evening or on cloudy days. Over the course of a year the net consumption from the grid will equal zero.

Water conservation and collection. Flex House is equipped with low flow fixtures to conserve water. Rain water is diverted from the roof into a cistern where it is stored and used for irrigating the organic vegetable garden.

Energy efficiency. To keep energy consumption to a minimum FLeX House includes all energy star rated, smart grid appliances that talk to each other to prevent multiple high draw appliances from turning on at the same time, reducing spikes in demand on the grid. To reduce the amount of energy required for lighting, FLeX House was designed to make the best use of natural day light for its interior spaces with large glazed areas on the north and south facades and light colored interior finishes that reflect the light and brighten the interior spaces. At night highly efficient LED and compact fluorescent lights will provide illumination. Shading devices are designed to control the amount of direct sunlight that hits the glazing system reducing heat gain through windows and doors. Energy efficiency is also related to the operation and monitoring of building systems. The house employs whole building systems control and diagnostic software that monitors more than 35 channels of data (i.e. temperature, humidity, power, occupancy schedules, window operation incidences, etc.) to make the owners aware of when and



where energy is being used and when systems are malfunctioning resulting in excessive energy usage.

Mechanical Systems. The HVAC system consists of a heat pump and solar thermal panels that circulate chilled or heated water to two interior fan coils to cool or heat the house. The energy recovery ventilator [ERV], by precooling the outside supply air, allows the chilled water system to run more efficiently. The ERV combined with a liquid desiccant dehumidifying system allows the fan coil temperatures to exceed the dew point while still maintaining good indoor air quality.

Durability

Flex house is designed to meet Florida's demanding hurricane code. All exterior finish materials have been tested for impact in hurricane winds and have obtained the required Florida product approvals. The building skin is durable, galvanized corrugated metal and the wood lovers are made from cypress which has a natural resistance to rotting and intrusion from insects. In the off season the bedroom and entry modules can be slid back into the main body of the house and the entire exterior can be shuttered to protect the house from the weather and vandalism.

Sincerely,

Stan Russell

A handwritten signature in black ink that reads "Stan Russell". The signature is fluid and cursive, with the first name "Stan" being more prominent than the last name "Russell".

Stanley Russell

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