Solar Decathlon Europe 2014, Versailles

Created in 2002 by the U.S. Department of Energy, the Solar Decathlon is an international competition open to universities and institutions of higher education that has expanded to Europe and China and challenges students to design, build, and operate cost effective, energy-efficient and attractive solar-powered houses.

Each new competition is an opportunity to refine the requirements that the projects must meet. The goal of the Solar Decathlon is to improve the transmission of knowledge, research, experimentation in the field of solar energy.

The international dimension makes it possible to compare, assess and analyze how each participating team imagines, or in Team Réciprocité REC’s case, reimagines, designs, adapts, and builds an energy-independent home that is both reflective of their local context, yet can also be adapted to the various environments and socio-economic requirements in more global applications.

Participating Solar Decathlon Europe 2014 teams at workshop #2, Versailles, France.
Project Description

Team Réciprocité (REC) is the most recent endeavor and highlight of a 30 year partnership between Appalachian State University, Boone, North Carolina, USA and Université d'Angers, Angers, France. Team REC's entry, Maison Reciprocity, is a reimagined row house that will be showcased and staged as a solution to create effective urban density in Versailles, France during Solar Decathlon Europe 2014.

Embracing an integrative and holistic design approach has allowed Team REC to approach an urban solution through subtlety and detail without overt reference of "eco-design." Utilizing both passive and active systems to heat and cool the home, the team also employs passive and active educational systems for the tenants. Team REC's goal is to provide an adaptable, affordable, market-ready and community-centric solution and that encourages lasting change in homeowner's lifestyles. Understanding the reciprocal relationship between the house and the city plays a crucial role in a more sustainable future.

Team REC's vision is to create a replicable, sustainable equation for effective density in mid-rise cities to produce ecologically, economically, and socially maintainable communities. The question that Team REC seeks a solution to is: how do you create, not combat, density within an urban environment that does not suffer from overcrowding?
Concept

The Aspen tree colony is created from a single seed and can form miles of forest from this single seed. Aspens form a mid-rise colony that thrives in the sun and creates equal room for balanced growth so that each tree can thrive. Looking from the outside the viewer may see only a forest but in reality the colony is a network of shared resources. Modeling Maison Reciprocity after environmental principles of the Aspen colony has allowed for sustainable growth, balance, and adaptability to produce a naturally scaled environment.
Our House Notre maison

The two-story competition home, Maison Reciprocity, is built to emulate the balance and distribution of the Aspen tree through a trunk (CHORD), branches (Urban Shell), and canopy ("Living" Brise-Soleil). These three main components come together to create a reciprocal, living system when all six prefabricated modules come together to form the competition home.

The building is organized around the CHORD, or Container for High-performance Operation, Recirculation, and Distribution. The CHORD houses all mechanical, plumbing, and electrical systems, a staircase, two full bathrooms, laundry, galley kitchen, and mechanical spaces. Once on-site, the CHORD is fully prepared to power the home, allowing for six exposed offshoots (electrical) into the living spaces of the home. The CHORD module is platform framed, utilizing the cavity walls for electrical and plumbing runs. The CHORD, along with the rest of the structure, will be manufactured off-site per customer specifications, maximizing the benefits of modular design.

The Urban Shell, constructed of cross-laminated timber panels, or CLT, creates the structure/thermal envelope and flexible, habitable spaces of the home. Using continuous insulation consisting of rock wool and polyisocyanurate, the super-insulated home meets passive house standards.

The "Living" Brise-Soleil uses an acetylated wood as an exterior façade, rain screen and sun-shading louvers, a vegetated roof, solar thermal system, solar air collector, and photovoltaic panels to protect, provide, and produce for the home.
Why a Row House and How Is It Being Reimagined?
Pourquoi une maison mitoyenne ? Comment nous l'avons réimagine.

Team REC chose the row house building typology because it has proven its effectiveness as a solution to urban density, spanning generations and cultures. Its effectiveness is due to its zero lot lines, its shared, adiabatic walls, minimally exposed exterior surface area, adaptability, and low-rise height. Its ability to densely, yet comfortably house residents, while also creating space for communal amenities such as parks, leisure areas and places for employment is unrivaled. Team REC is reimagining by applying service component-based design through prefabricated construction methods, market-ready, affordable technologies, and healthy, sustainable materials.