

THE SHARE: Net Zero Energy, Cross Laminated Timber Urban Housing Prototype

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Cross Laminated Timber is emerging as a revolutionary material in the development of midrise urban housing. Transformational thinking about energy and project delivery systems is quickly changing the how we approach energy, health, affordability, and construction.

This project is part of a growing body of work under development in our research group that is connected to fully integrated building delivery models, from land acquisition, through project delivery, occupation and life cycle management.

This prototype is situated on a ¼ typical city block, in this case Seattle or Atlanta. Its structure is fabricated using C.L.T, a low impact, prefabricated, lightweight and very strong material that generates almost no waste onsite. Also, this material has proven to be a great alternative to the traditional materials on which construction has been based for years, like precast.

This work informs our architecture and engineering based design studio pedagogy, and is directly connected to our Institute's internationally recognized Ph.D and M.S. programs in High Performance Building. These highly structured advanced studios are tailored to different levels of complexity and focus areas, creating new opportunities for the application of building physics and building technology, always with sustained emphasis on design.

When paired with localized or district scaled renewable energy packages, highly advanced urban housing prototypes emerge which address a variety of key questions technical, environmental and social challenges, including:

1. Consistent use of highly renewable, local, and recyclable products, especially in the southeast U.S., where high quality timber is readily available.
2. Collaborative consumption models allow occupants to share key lifestyle needs like kitchens, workspace, internet, maintenance, resulting in a deliberate approach to affordability. The three main building masses are

conceived as a free plan that allow multiple configurations according to the user's needs and can be subdivided into housing 'shares' from 400 – 4000 sf.

3. In many sunbelt cities, parking is still part of the housing equation. Here, CLT is used for medium span autonomous vehicle parking, optimizing circulation and space for users helping to reduce energy needs and material costs. In fact, these concepts have resulted into an ambitious combination which tries to foresee and analyze the change on needs and behaviors of buildings based on its users.
4. Energy chase system partners with vertical circulation to create maximum flexibility in the plan for a variety of scaled living and working units. Outline system as follows (see diagrams)
 - Ground source Heat Pump and Energy Pilings
 - Radiant Floor Heating and Cooling
 - Energy Recovery Ventilators to manage condensate
 - On site energy generation PV panels – the energy veil
 - BIPV integrated into shading devices

Sustained efforts in the area of market rate, carbon neutral, energy positive energy consuming market rate urban housing will lead to:

- advances in interdisciplinary educational models
- community engagement and debate around 21st century housing, energy and affordability
- advances in what constitutes the public realm in urban areas with increasing density
- inquiry into innovative materials and construction methods
- advances in dialogues around design and energy delivery

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- Collaborative consumption models allow occupants to share key lifestyle needs like kitchens, workshop, internet, maintenance, resulting in a deliberate approach to affordability. The three main building masses are conceived as a free plan that allow multiple configurations according to the user's needs and can be subdivided into housing 'shares' from 400 - 4000 sf.
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