

DC DEVELOPER USES PASSIVE HOUSE TO ACHIEVE NZE

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When Appendix Z becomes the District of Columbia base energy code in the next decade, all new construction will be required to be designed to net-zero standards. This means all new buildings will use only as much energy as they produce through local renewable energy resources. Developers wanting to differentiate themselves in this highly competitive market will benefit from researching and experimenting now.

“We have to be a hurry to building everything net-zero tomorrow...and even when you decide that you want to build to net-zero, it takes a long time to get it built,” said John Miller, co-owner of Flywheel Development. Flywheel’s most recent [Stack Eight](#) project won a DC Department of Housing and Community Development (DCHCP) request for proposals (RFP) as part of a major redevelopment of the St. Elizabeth hospital site. Miller credits the net-zero aspect of their bid for winning the RFP. DCHCP gives preference points to developers for Living Building Challenge Passive House and net-zero energy (NZE).

Stack Eight will be a 25,000 square-foot, 18-unit housing complex full of three and four-bedroom units available for low-income families to purchase. By perfecting a method to construct ultra-low energy multifamily housing with costs on par with conventional construction, Flywheel anticipates Stack Eight will be developed for \$210 per square foot. Costs are minimized through a few key tactics:

- **Integrated design process** – The process of a full project team collaborating to focus on the design, construction, operation and occupancy of a building over its complete life-cycle.
- **Modular construction** – Constructing a building off-site, under controlled conditions and assembling on-site.
- **Passive House standard** – A voluntary standard that focuses on optimizing thermal performance of the building envelope resulting in ultra-low energy buildings that require little energy for space heating or cooling.
- **Power purchase agreements** – A process where a third-party developer arranges for the design, permitting, financing and installation

of a solar system on a customer's property at little to no cost and the energy is sold back to the customers at a price below utility rates.

- **Replicable approaches** – Repeating the same basic design or approach across multiple projects, refining to become more efficient.

The integrated design process naturally serves modular construction because the design must be thoroughly considered before construction. Stack Eight's team, including Flywheel, Peter Henry Architecture, Moody Graham, Huska Consulting, Lu+Smith Engineers, Consulting Engineers Corp, CertiPHlers Cooperative, Civic Solar, are working side-by-side to create an energy-efficient approach for NZE multifamily housing. As an integrated group, they are able to quickly address issues that would impact the performance of the design and the budget.

“In Passive House design you are frequently creating construction details that touch multiple trades. You have a need to thermally break components from other components or from the ground. For example, you have a footer sitting on high density EPS [expanded polystyrene]. That sort of conversation requires the architectural and structural to be in the same room with the contractor to talk through that,” said Miller.

Along with net-zero, Passive House is an alternative compliance path for the DC Green Code. The Passive House standard promotes building energy efficiency by focusing on a thick thermal envelope that is extremely airtight. Other Passive House principles encourage high performance windows and doors, solar heat gain management, and balanced heat and moisture with recovery ventilation. These strategies lead to a reduced need for heating and cooling, which majorly reduces energy use from heating, cooling, and ventilation.

In addition to other energy-saving strategies, Stack Eight will continue reducing upfront costs by engaging in a power purchase agreement (PPA), under which a third-party developer will install a 76-kilowatt solar energy system on the St. Elizabeth site at little to no cost to Flywheel and DCHCP. The PPA will allow a developer will sell the generated onsite power to Stack Eight residents at a fixed rate that is typically lower than the utility's electricity rate. Tenants will use 80% less energy that they would in a convention unit and over a 30-year mortgage, can expect to save over \$100,000 (not accounting for inflation). As Miller puts it, "It's an amazing opportunity to build equity or wealth for families. Whether they are buying or renting. We can change the economics for families."