



Achieving Net Zero Energy at Scale
Flywheel Development
November 15, 2017

Agenda

About Flywheel Development

Perry Street Townhouses

- State of the market in Maryland

Taking Net Zero to Scale

- Working with local government and design community
- Using Passivhaus to get to net zero
- Modular and prefab construction for scale and affordability
- Incentive and policy ideas

Flywheel Development Overview

Completed Projects



Perry Street Townhomes

Development Approach

- Flywheel's Development approach relies on:
 - **Great product:** Design comes first
 - **Sustainability:** Sustainable design is better design. From savings on utility bills, insulation from outside noise, better indoor air quality, and lower environmental impact, the Passivhaus & Net Zero energy standards create a more comfortable and healthy building
 - **Community:** building consensus improves outcomes for developer and community

Upcoming Projects

Stack Eight

- 16 townhouse style stacked flats in DC's Congress Heights neighborhood will achieve Passivhaus, Net Zero, and Living Building Challenge Petal Certification
- 100% Affordable
- Groundbreaking 2018



Stack Eight

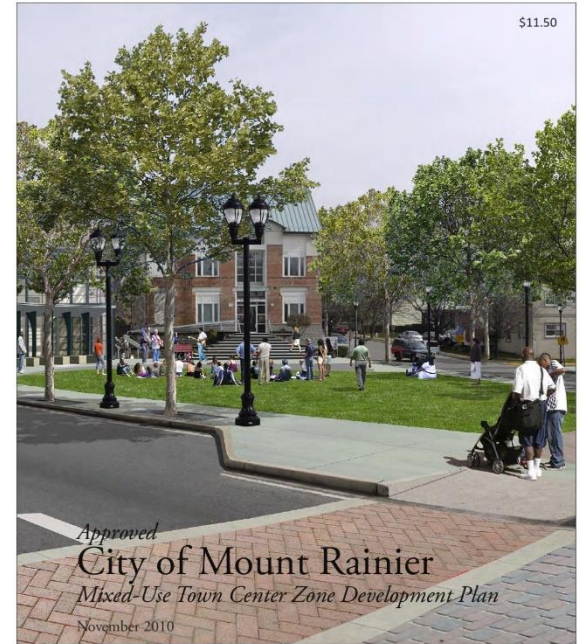
Cycle House

- 15 apartments over a family-friendly restaurant in DC's Truxton Circle Neighborhood will achieve Net Zero and LEED Gold Certification
- 100% Affordable
- Groundbreaking 2019



Cycle House

Vision for Perry Street Townhomes



The Maryland-National Capital Park and Planning Commission
www.mnccpc.org

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State of the Market in Maryland

Maryland, Prince George's County

- **State Support:** Maryland Department of Housing and Community Development (DHCD) has a Net Zero Energy Loan program. Smart Growth and Community Legacy funds can also be used for net zero energy projects
- **County Support:** Prince George's County embraced net zero construction on the Perry Street project. Flywheel had significant assistance from Prince George's County DPIE, which has since changed its inspection process for modular projects
- **Education:** County plan review and inspection staff used our project site and the modular production facility as training opportunities for ongoing education
- **Community:** local community support for high performance net zero buildings is strong

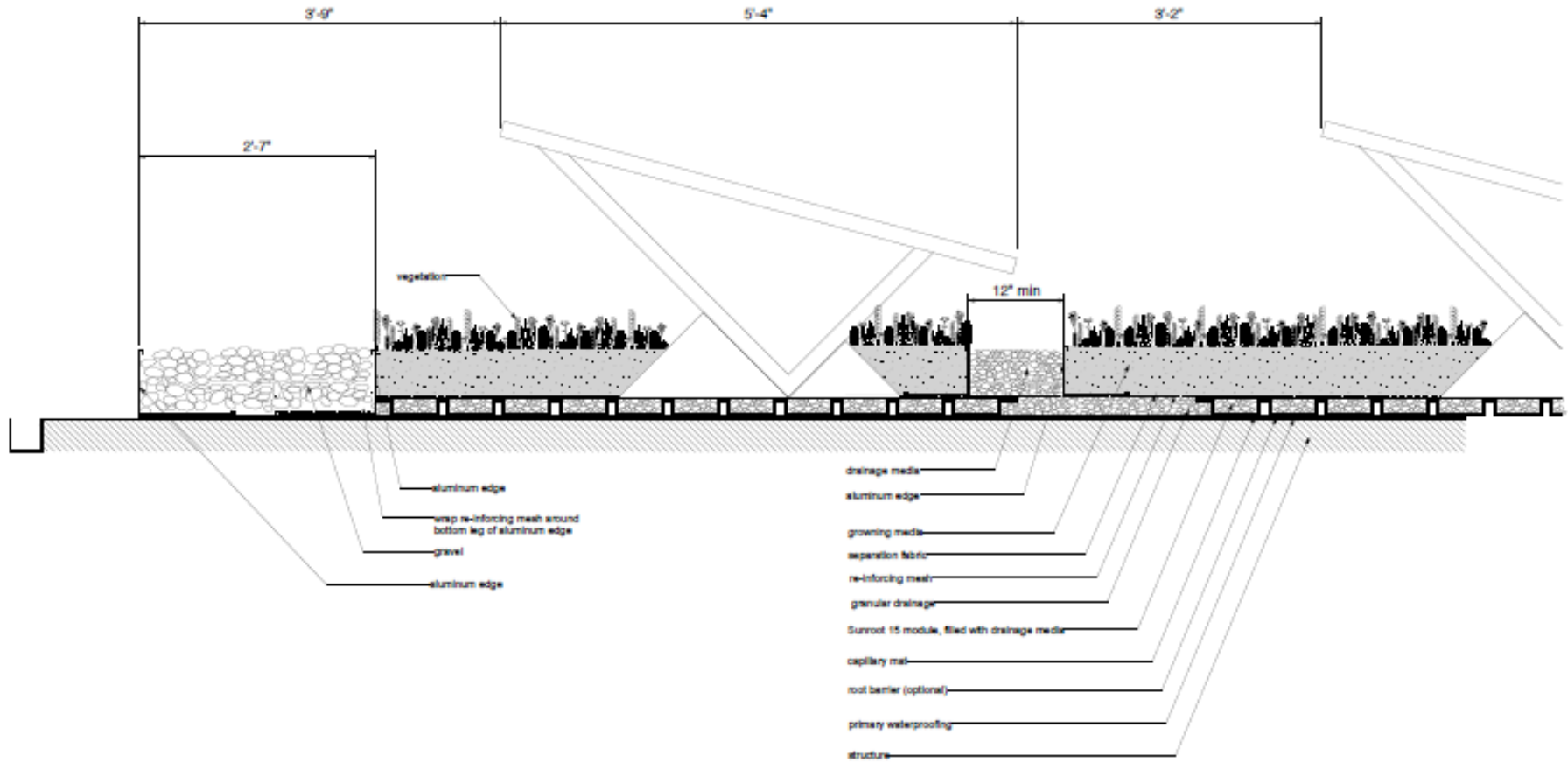
Overcoming Challenges to Achieve Scale

- Design and Permitting:
 - Working with Local Government
 - Architect/Designer Education
- Hitting the Target:
 - Using Passivhaus to get to Net Zero
- Modular Construction
 - Speed and Affordability

Getting to Scale: Working with Local Government



Green Roof + Solar (1/2)



Green Roof + Solar (2/2)



FLYWHEEL DEVELOPMENT

Positioning Local Jurisdictions as Leaders



Energy

BY TED CUSHMAN

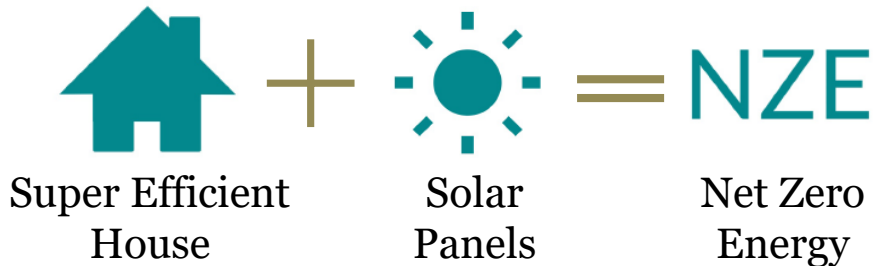


A New Way to Meet the Energy Code

Ever since the Home Energy Rating System (HERS) index was introduced by the Residential Energy Services Network (RESNET), people have been talking about whether builders should be able to use HERS as a way to comply with the building code. In some states, that's starting to happen. The International Code Council (ICC) voted in 2013 to create an Energy Rating Index (ERI) pathway to code compliance, based on the HERS index. To allow its inclusion in the

Getting to Scale with Passivhaus: a net-zero energy home standard that allows for better living

What are Net Zero & Passivhaus?



A net zero energy building produces at least the energy it consumes each year. Passivhaus is how we get to NZE, by reducing our energy consumption vs code by 80-85%

It achieves this net zero energy usage via:

- **Less consumption:** insulation, airtightness, triple-paned windows and efficient equipment
- **Generation of energy:** Solar panels to offset what little energy is consumed: HVAC, plug load, lights, appliances

Benefits of Passivhaus Design

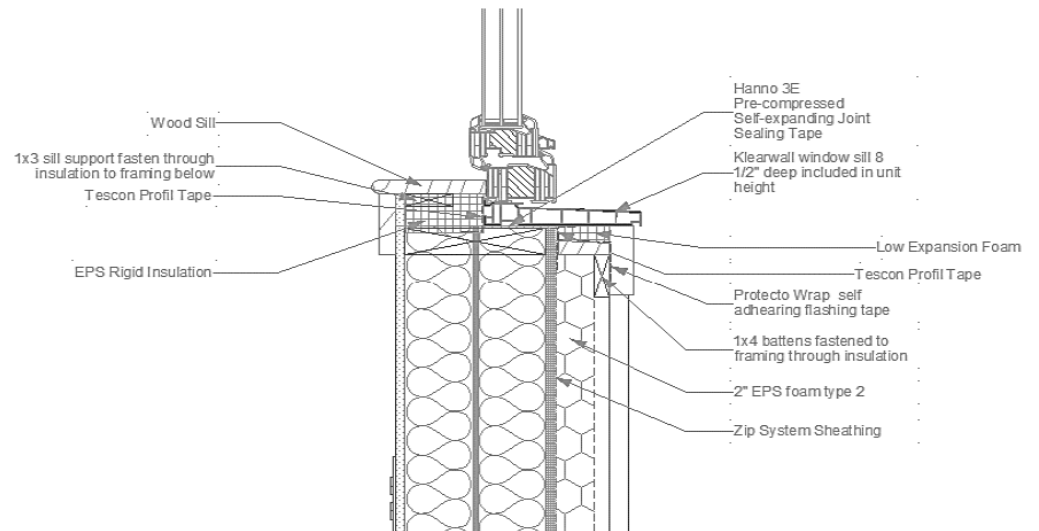
- **Lower energy bills:** With its high-quality, airtight construction, Passivhaus energy bills are typically 90% less than those of normal homes
- **Cleaner indoor air:** In our climate zone, Passivhaus requires an energy recovery ventilator, which brings in filtered outdoor air. That's important because the EPA has found that air indoors can be up to 3x more harmful than outdoor air
- **Reduced noise:** Triple paned windows and airtight walls mean less noise
- **Higher value:** Passivhaus can sell or rent for more than equivalent ordinary homes, in part because of inherently lower energy bills
- **Lower carbon emissions:** At the end of the day, Passivhaus dwellers know they're doing their part to protect our environment

How Passivhaus works: windows and wall assemblies

Thermal Bridge Analysis



Envelope Details



Getting to Scale: Modular Construction



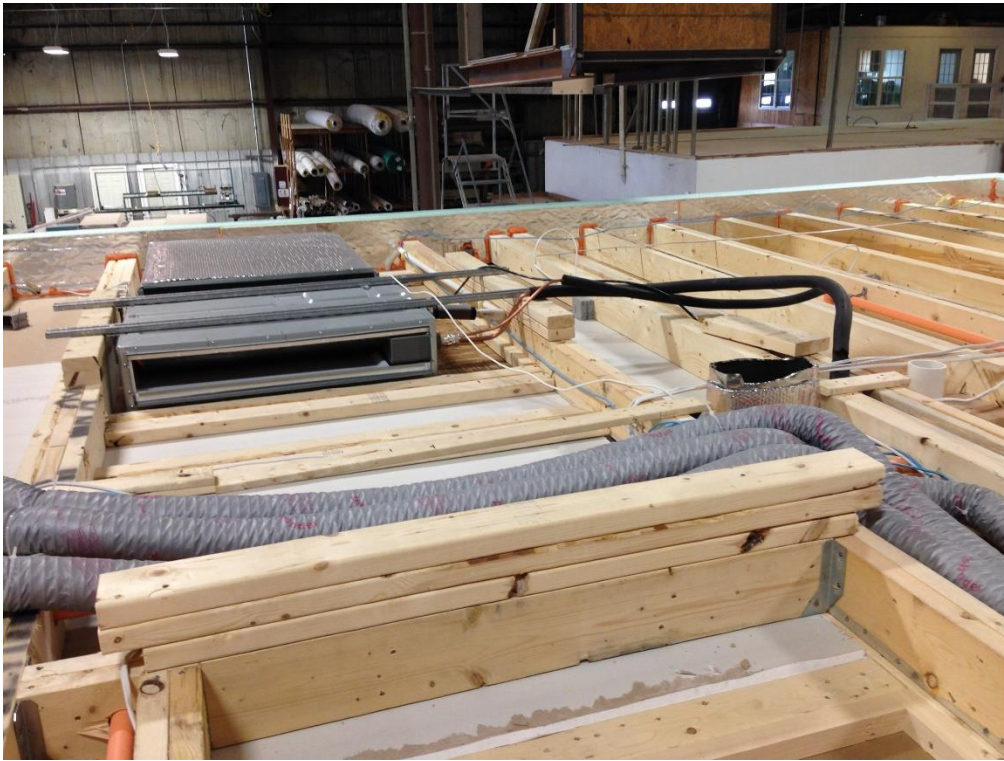
How does modular construction impact the development process?

- **Higher quality:** construction of building components off-site allows for quality control
- **Cost Control:** A large percentage of the project becomes a product purchase order
- **Speed:** Modular projects of this type can shave 30-40% of time off the construction schedule – but more work is done up front before the shovel goes in ground

Factory Construction



HVAC



Key Incentives and Policies for Scale and Affordability

- **Permit Fast Tracking:** *meaningful permit fast tracking is unquestionably the most valuable incentive that can be offered to developers.* Additional regulatory fast tracking and a champion in the department focused on moving net zero projects would also help
- **Tweaking the Capital Stack:** Maryland DHCD, DCPACE, pending DC Green Bank, and others can help lower first costs
- **Property Tax Abatements linked to observable energy performance:** Reward actual performance vs. peer buildings using dynamic baseline
- **Create Net Zero Energy Construction Codes and Standards**
- **Change Building Area calculations for Passivhaus:** current DC regulations measure building area (which is often a multiple of FAR) to the exterior of wall, penalizing high-performance wall assemblies, which are usually thicker. Measure to interior of wall on Passivhaus submittals, then verify they are built as designed
- **Require rooftop mechanical features to be minimized or grouped to facilitate solar deployment:** passing electric submetering laws for multifamily buildings would help clear out condenser farms
- **Add Passivhaus and Net Zero Energy preference points on competitive solicitations**

Questions

See more on our blog:
www.flywheeldevelopment.com/angular-momentum-1