Initial Thoughts on Draft Green Building Policy

The inclusion of Energy Use Intensity (EUI) as the metric for evaluating building performance marks a major step forward in the new Green Building Policy (GBP). EUI is clear, measurable, and avoids the weaknesses of point-based systems that can be gamed. Like MPG for cars or FAR for zoning, it communicates performance simply and objectively. This approach will save time for City staff and money for developers.

I also support the GBP's requirements for all-electric buildings, onsite renewable energy, and EV readiness. These are foundational elements of a sound climate policy. Similarly, its measures addressing water conservation, healthy materials, and air quality are essential for sustainable and equitable growth.

However, to meet the Council's stated goal of a 50% emissions reduction from 2008 levels by 2030, the current draft policy does not go far enough. Specifically, two areas need strengthening:

1. **More Ambitious EUI Benchmarks**
2. **Design Requirements that Enable Scalable Solar and Battery Storage**

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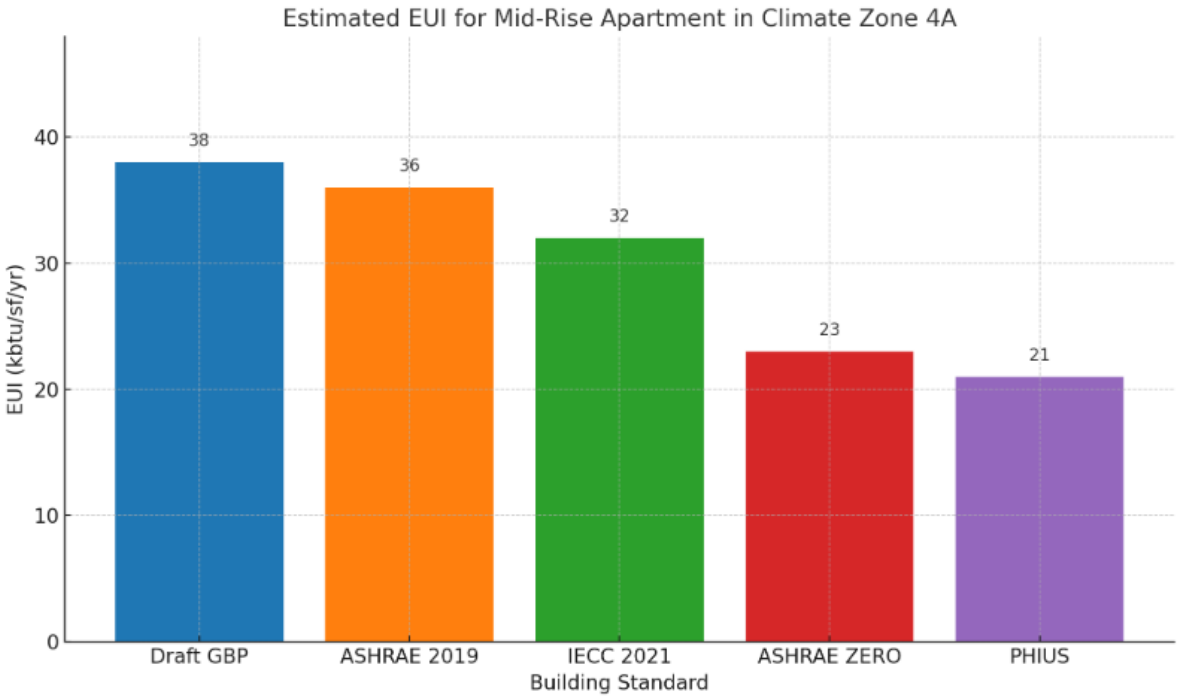
1. The EUI Benchmark Must Be Lower

As you can see from the chart below, the proposed EUI target of 38 kBtu/sf/yr for multifamily housing sets a weaker energy performance standard than what is already required for multifamily buildings under Virginia's current energy code (which allows compliance through ASHRAE 90.1-2019 or IECC 2021).



The bases for the EUI numbers in the graph are studies by DOE and Pacific Northwest National Labs. These can be found here on pages ix and x. While my comments here specifically address multifamily housing, they are just as relevant to EUI's for other building types.

The rationale for the 38 EUI multifamily housingtarget appears to come from Cadmus, the City's sustainability consultant, who estimated a 4.27% cost premium to meet a 31 EUI standard. The chart below shows their method in reaching this estimate.

Table 9. Phase 2. GBP Analysis - Multifamily Measure Packages

Multifamily Measure Package	Measures included	Energy Use Intensity (EUI in kBtu/sq ft)	Percent Reduction from Baseline	Incremental Cost of Measure Package ($/sq ft)
Baseline	New Construction standard per local code	42.00	0%	N/A(average baseline cost of $350)-
Good	Increase roof insulation by 30%, Increase exterior wall insulation by 30%, Improve window's U-Value to 1.2 and Solar Heat Gain Coefficient (SHGC) to 0.25, Increase cooling COP to 4.5, and Increase motor efficiency to 96%	38.50	8%	$3.37 (1%)
Better	All improvements in the Good Package, plus Reduce elevator load by 10%, Install daylight sensors in corridors, Electrify Space Heating	35.70	15%	$9.31 (3.6)
Best	Increase roof insulation by 30%, Increase exterior wall insulation by 30%, Increase motor efficiency to 96%, Electrify Domestic Hot Water with Heat Pump Water Heater	30.98	26%	$2.28 (4.27)

Good: First 10% site energy use reduction target
Better: Second target with fully electrified space heat (includes all measures from "Good" package)
Best: Third target with fully electrified DHW (three efficiency measures + DHW electrification)

The "add-on" design method they use—starting with a standard building and incrementally improving it until you get it to the desired performance level—is flawed and suggests a lack of familiarity with well-established industry best practices. High-performance buildings are not designed this way. Instead, designers start with the

performance goal and develop an optimized, cost-effective solution from the beginning. That is the beauty of the Passive House approach and of the EUI approach: you give the developers the goal and let them figure out how to get there. They will always find the most affordable way. This is borne out by actual cost and performance results from numerous completed small and large Passive residential buildings. The results cited below from webinars hosted by *Build Our Future* and from public cost data on Passive House construction belie Cadmus's 4.27% figure and point to a far lower cost premium.

- In **Massachusetts**, eight affordable multifamily projects (541 units) showed an average cost increase of **2.21%**. An additional four Boston projects averaged just **1.15%**. (Source: Passive House Network Report of 2023)
- In **New York**, 33 Passive House projects (3,234 units) averaged a **3.7–4%** increase. The city now has two of the largest Passive House affordable housing projects in North America: the 34-story Sendero Verde (**1.5%** cost increase over standard construction) and 26-story 425 Grand Concourse (**2.2%** higher). Both are covered in the BOF webinar *Tall Buildings, Small Energy Bills: Passive House at Scale*.
- In **Pennsylvania**, cost premiums dropped from 5.8% to **1.6%** after one year. In subsequent years some Passive projects even cost **less than code-compliant buildings**. This is fully detailed in the 2022 BOF webinar *Affordable Housing: The Case for Passive House Design and Net Zero Energy*.

Because of the relatively minor cost hurdle involved to achieve Passive House level performance, **there is no reason not to impose the more stringent EUI of 31 kBtu/sf/yr in 2025, stepping that down incrementally to 23 kBtu/sf/yr by 2030**. The final 2030 level is consistent with best practices and aligns with performance levels from the ASHRAE Advanced Energy Design Guide and the PHIUS standard. Most importantly, it aligns with the City's 2030 goal that new construction adhere to net-zero energy performance.

A lower EUI will bring us not just more efficient buildings; it will generate buildings that are ready for the future energy landscape. That future is already visible:

- The energy system will be **electric**;
- The cost of **onsite solar** will fall below the bare transmission cost of centralized power;
- **Battery storage** costs will continue to decline in the same fashion;
- **Electric and autonomous vehicles** will replace internal combustion engines.

These changes are being driven by economics, not ideology, and they are underway globally. **Low EUI buildings allow owners and occupants to take greater advantage of the coming economies of solar generation.** The simplest example: a solar roof that can cover 20% of a building's needs at 40 EUI could cover 40% or more at 20 EUI. That difference will matter deeply, particularly to the pocketbooks of low-income residents—and to the grid. This leads to my second recommendation.

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2. Buildings Must Be Designed for Future Solar + Battery Readiness

As the new energy landscape emerges, and solar and battery costs continue to decline, the economics of local, onsite energy generation will only strengthen. But developers, who typically do not operate the buildings they build, have no financial incentive to plan for these shifts. That's where City policy must step in.

I recommend the following solar-readiness provisions for all new construction:

- **10% minimum onsite energy generation at occupancy**
- **60% of total roof area available for future solar installation**
- **Designated onsite space for battery storage corresponding to that solar capacity**
- **Required conduit and grid interconnection infrastructure to support these systems**

Developers' concerns about rooftop space conflicts between mechanical systems, terraces and green roofs are solvable. Solar canopies are now being deployed above HVAC systems, terraces, and even over green roofs. The point is not to require full solar buildout immediately, but to **preserve the future option**—at low cost and high benefit to residents, the City, and the utility.

3. Side benefits

The co-benefit of making high performance, affordable low EUI buildings is health. To achieve sub-30 levels of EUI, buildings must be airtight and extremely well-ventilated. This eliminates condensation-induced mold and other particulates and translates into healthier buildings with far lower incidences of childhood asthma and other respiratory diseases. A current study by the National Center for Healthy Housing is now quantifying these exact benefits in affordable multifamily housing.

The co-benefit of making high performance low EUI buildings with robust onsite solar energy generation and storage is resilience. "Passive survivability" is a term that has come into use with the growing appreciation of how well low-EUI buildings perform when the grid goes down. Because of their increased insulation, they stay warm longer in the winter and cool longer in the summer, and ride out blackouts, heat waves and winter storms. And with onsite solar and battery storage powering critical electrical circuits they can endure such events indefinitely.

In Summary, A Policy That Plans for the Future

The worldwide energy trends are clear, regardless of who occupies the White House, and our Green Building Policy must align with those trends. If we allow developers to continue building to today's standards—without preparing for what's coming—our residents will be left behind, unable to participate in the coming energy economy. By adopting a truly future-focused Green Building Policy, the City can deliver lower costs, healthier and more efficient buildings, and greater energy resilience to all its citizens.

David Peabody