

Haystack Crossing – Energy Narrative

Per conclusion 22 of the preliminary plat approval, this narrative describes Haystack Crossing’s compliance with the standards of Section 3.6 of the Hinesburg Zoning Regulations (HZR) and Section 5.1.12 of the Hinesburg Subdivision Regulations (HSR).

***HZR Section 3.6 Village Northwest District (excerpt)** - Development in this district shall be designed, sited, and constructed to take advantage of passive and/or active solar energy resources (e.g., south facing buildings & windows, photo voltaics) as well as other compatible renewables (e.g., wind, geothermal, etc.).*

***HSR 5.1.12 Energy Conservation** - Whether the proposed development promotes energy conservation by encouraging compact patterns of development and through orientation of structures on a site to gain maximum benefit from solar access and wind protection. Projects should be sited and designed to take maximum advantage of solar gain – to ensure passive solar gain and to allow for the use of photovoltaics now or in future. If this cannot be accomplished to the DRB’s satisfaction, the use of renewable energy technology (solar, wind, geothermal, etc.) or green building certification (LEED program for non-residential projects; “Green Home Certification” for residential projects – see definition) shall be employed as a substitute.*

Haystack Crossing is designed to take advantage of both passive and active solar energy resources. It meets the HZR and HSR criteria in numerous ways. In particular, two major elements of the development will support the intent of these items:

- 1) The layout and design of Haystack Crossing represents a compact pattern of development, with maximum residential density as encouraged by the HZR. Compact or smart growth development is arguably the most energy efficient and sustainable methods of development.
- 2) Haystack Crossing will provide a minimum of 25% of all residential energy demand through renewable energy, primarily, if not completely built within the development area.

In addition to compact development, several elements have been incorporated into the design to meet these requirements.

- Building Orientation for Solar Gain:
 - The majority of proposed structures are oriented with a primary facade within 15-degrees of south. Only 12 single-family units along the northern portion of Jenna Drive do not have a primary façade within 15-degrees of south.
 - As illustrated by the overall master plan (sheet L-100) and phasing plan (L-101), single-family detached units will be arranged with attached garages to the north and east sides of residences to guarantee exposure of living space along the southern facades and also western facades.

Building orientation also facilitates active rooftop solar. Active solar will be encouraged for all buildings within Haystack Crossing. Haystack has teamed with SunCommon to provide optional solar packages in coordination with the construction of single-family homes. Haystack will provide and promote cold climate heat pump packages for single-family homes. Most multifamily and mixed-use buildings will be

constructed with rooftop solar, as well as cold climate heat pumps as the primary heating and cooling mechanics. Elements to support active solar include:

- Building Orientation for rooftop solar
- Landscape design to avoid long term shading of roof tops (the landscape design avoids shade trees along southern and western facades that would shade rooftop solar in the future)
- Promotional packages for homeowner to incorporate rooftop solar and cold climate heat pumps
- Inclusion of rooftop solar on most multifamily and mixed-use buildings
- Additional ground mount solar options, including panels near the municipal well and potential parking lot canopies.

To meet the 25% renewable energy supply, table 1 is provided below and also within the density calculations. Haystack Crossing proposes to provide a minimum of 25% of all energy demand for residential uses as outline below:

TABLE 1 – RENEWABLE ENERGY CALCULATIONS

<u>Single-Family Residential*</u>			
Electric (no hot water / heat)	538 kWh / mo.	6,456 kWh / yr.	
Natural Gas (heat & hot water)		900 cCF	
Natural Gas Conversion to kWh Equivalent		26,370 kWh / yr.	
Average Energy Use per SFD Units		32,826 kWh / yr.	
Number of SFD Units		84 units	
Total SFD Energy Usage		2,757,384 kWh / yr.	
<u>Multi-Family Residential</u>			
General Electric Usage (no heat or hot water)	350 kWh / mo.	4,200 kWh / yr.	
Cold Climate Heat Pump	650 kWh / mo.	7,800 kWh / yr.	
Electric Hot Water	200 kWh / mo.	2,400 kWh / yr.	
Average Energy Use per Multi-Family Unit		14,400 kWh / yr.	
Number of Multifamily Units (Including HC I)		135 Units	
Total Multi-Family Energy Use		1,944,000 kWh / yr.	
Total Residential Energy Use		4,701,384 kWh / yr.	
Average Energy Generation per KW of Solar		1,150 kWh / yr.	
Solar Required for 25% of all residential energy use		1,022 kW	
Solar Required for 50% of all residential energy use		2,044 kW	
Solar Required for 75% of all residential energy use		3,066 kW	

*for the purposes of this calculation, 24 larger town house units are considered within the calculations of single-family units.

Table 2, outlines rooftop solar potential on multi-family residential and mixed-use building within the development and the attached Solar Energy Analysis provides a conceptual graphic of the layout of rooftop solar panels on these buildings.

TABLE 2 – Haystack Crossing Solar Generation Potential

	# Panels	Watts / Panel	kW(DC)	kW(AC)		Roof SF Rqrd.
Building A	69	400	27.60	26.22	kW	1,518
Building B	46	400	18.40	17.48	kW	1,012
Building C	65	400	26.00	24.70	kW	1,430
Building D	67	400	26.80	25.46	kW	1,474
Building E	300	400	120.00	114.00	kW	6,600
Building F	138	400	55.20	52.44	kW	3,036
Building G	144	400	57.60	54.72	kW	3,168
Building H	394	400	157.60	149.72	kW	8,668
Building I	162	400	64.80	61.56	kW	3,564
Building J	234	400	93.60	88.92	kW	5,148
Building K	105	400	42.00	39.90	kW	2,310
10-Plex	58	400	23.20	22.04	kW	1,276
10-Plex	68	400	27.20	25.84	kW	1,496
12-Plex	84	400	33.60	31.92	kW	1,848
Multi-Family & Non-Residential Rooftop Subtotal				734.92	kW	
Ground Array				150	kW	
Subtotal				885	kW	
Target Solar Generation for 25%				1,022	kW	
Total Additional Solar Generation needed for 25%				-137	kW	
SFD & SF-A Rooftop Average Array Size				8	kW	
Minimum Number of SFD / SF-A to meet requirement				18	Units	

Alternative / Additional Potential

Parking Canopy Option 1	158	400	63.2	60.04	kW	
Parking Canopy Option 2	158	400	63.2	60.04	kW	
Cottage Parking Sheds - 5 x 36 panels	180	400	72	68.40	kW	

Potential Optional Capacity

188.48

To meet the requirement of 25% renewable energy for all residential energy demand, there is sufficient capacity within the development portion of the Project. Haystack will commit to guaranteeing a minimum of one-third of all single-family detached residential units or 20 units will incorporate rooftop solar generation to contribute meeting these needs.

Lastly, all buildings within Haystack Crossing will be constructed with ‘solar ready’ roofs. All single-family homes will be constructed to support electric vehicles charging. Electric vehicle charging infrastructure will also be incorporated into multi-family garages and within off-street parking areas.

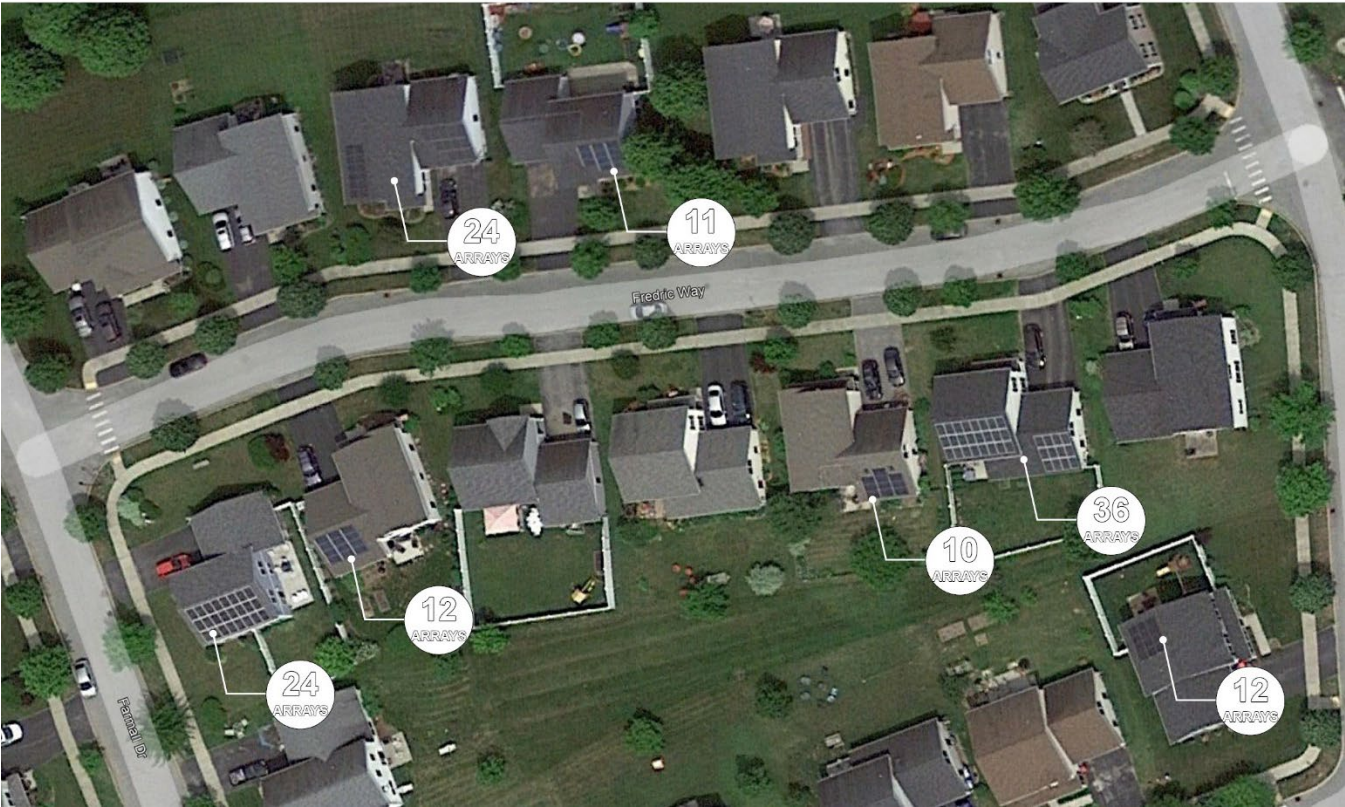


Figure 1: Creekside neighborhood to the south illustrating rooftop solar, including the number of panels.