In Focus – MIP Reduction:
Don't Create Risk by Using Cheap or Aggressive Energy Models

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In April, HUD implemented its Mortgage Insurance Premium(MIP) Reduction dropping the MIP to 25 basis points for green, energy-efficient multifamily(MF) properties. This ~40 basis point reduction in the MIP is a significant financial incentive and should be materially attractive to most developers. As we have commented before, this program has tremendous potential to advance green building and energy-efficiency practices in the multifamily sector.

HUD's Green MIP program requires both a green building certification as well as energy-efficient operation over the life of the loan (defined as an Energy Star Portfolio Manager benchmark score of at least 75 during building operation). Leveraging energy modeling and Energy Star's Statement of Energy Design Intent (SEDI) throughout the design process can help ensure that the property is tracking toward sufficient energy efficiency performance and mitigate project risk. The green building program's verifications also provide a control that safeguards the energy-efficient design during construction. At least, that's how it should work but there are risks that are important to understand.

First, Developers should declare their intent to pursue this program early in the project design. Architects and engineers will then have the most degrees of freedom to pursue the cost-efficient, energy-efficient solutions. Developers and lenders should ensure that the energy models and SEDI are performed by trained, certified modelers who have experience with multifamily residential units and use realistic inputs. Applicable certifications include HERS Raters and Certified Energy Managers.

While it's not essential for stakeholders to understand the considerable intricacies of building modeling, they should understand the key drivers and issues that could lead to an overly aggressive model that creates risk. Being conservative in the modeling phase is much better than missing the targeted operational energy performance which could require expensive energy upgrades a mere 15 months after construction.

Various building design, construction and operation parameters dramatically affect the energy forecast and that effect varies based on the building location. For instance, adjusting the cooling set-points on a well-sealed building in a mild climate is less likely to change the energy use forecast when compared to a poorly sealed building in a hot climate. To demonstrate how some parameters and modeling assumptions can affect

an energy forecast, we took an above-code Multifamily property in Virginia. Virginia's climate has a moderate number of heating degree days and cooling degree days, so we are not cherry-picking extremes. Geographic locations more northerly or southerly would be expected to exhibit amplified energy model variations when models are not properly completed or aggressive assumptions utilized during modeling.

Modeling Parameter	Change/Explanation	Impact on Forecasted Energy Use
Complete inclusion of Multifamily amenities (e.g. heated pools), common space (clubhouse), corridors, exterior lighting, etc	Examples: Missing the common space lighting, heating/cooling or systems such as ventilation, elevators or pools	Risk of missing up to 20% of the total property energy use
Unit Selection (Bottom/Middle/Top)	Middle floor units have conditioned space above and below and thus are more energy efficient. (4% different in this scenario)	A 3-story building that was modeled with just the middle floor unit would appear to be 2.7% more efficient than a model that more accurately reflected the difference between the levels
Construction Process (infiltration rates)	Aggressive modelers may assume that the air infiltration rates are uniformly better than averages. A conservative approach assumes 0.35 air changes per hour(ACH) but a more aggressive model could claim a 0.20ACH	Aggressive assumption forecasts 2.7% less energy use
Construction Process: Insulation Installation	Changing from a grade-3 installation to a grade-1 installation	More aggressive assumption forecasts 1.2% less energy use
Occupant Behavior (Temperature Set-points)	EPA suggests set points of 70 for Heating and 75 for Cooling. Even slightly more aggressive assumptions adjusting the set-points by 2 degrees to 68 for heating and 77 for cooling	More aggressive assumption forecasts 3.2% less energy use

Given the range of unit layouts in a MF property, it is impractical and costly to model every unit individually. So modelers typically select appropriate reference units to estimate the building energy usage. Experience plays a huge role in selecting the appropriate reference units because many design considerations could impact the accuracy of the model.

- In MF properties with considerable glazing (e.g. larger windows), the orientation of the unit can have a larger impact. If modelers were to select the most favorable orientation as the standard unit, they could easily overstate the energy-efficiency of the property.
- Many MF properties have a range of unit layouts (different location, size and bedrooms). Most modelers will select units that represent the most common configuration with the appropriate conservatism. For instance, in smaller MF buildings, basing the building consumption on interior units (i.e. surrounded by more conditioned space) when many of the units have more exterior walls would be overly aggressive. Basing models on one unit type and then assuming that energy intensity is consistent across all the units is also risky.
- Energy Star benchmark scoring is based on Energy Use Intensity (kbtu/sqft/yr) and therefore the scoring is sensitive to accurate square footages. Energy Star Portfolio Manager requires the gross floor area (GFA) to be defined as the total area measured from the outside surface of the exterior walls of the buildings. [(1)] Lobbies, common areas, meeting rooms, elevator shafts, stairwells, mechanical rooms all should be included. However, balconies, patios, loading docks, etc. should be excluded. Analysis that understates GFA would result in a lower Energy Star benchmark score while those that overstate the GFA would indicate a higher Energy Star score.

Some of these changes may not sound like much, but they can add up. An aggressive model might score as a 77 in Energy Star. However, if it used 5% more energy during occupancy because of infiltration rates, missed common area usage, tenant behavior, etc, the Energy Star score would fall to ~70. [(2)] This would leave the owner stuck behind the eight-ball. Recovering 5% energy efficiency in operation could require significantly more investment (e.g. replacing new equipment) than if they had just been more accurate in their modeling and more conservative in the design phase.

Summary:
Energy models can be a great investment and serve as effective insurance. When teams engage energy modelers in the design phase, the project team can identify the most cost-effective ways to support the energy efficient goals of the project. And most green building rating systems require energy models when the project pursues the energy performance path for certification. So for a limited investment, teams can capture great value.

No model perfectly predicts the future. However, experienced modelers can deliver more robust and conservative models that lessen the risk of missing the targeted performance. To manage this risk, owners will also need to monitor energy performance and appropriately maintain the building to meet the 75 Energy Star benchmark score over the long term.

D3G has been involved in energy modeling, benchmarking and scoring of the HUD assisted housing stock for greater than 9 years. Our experience with the M2M Green Initiative, the Green Retrofit Program, SPRAC, and RAD has built a highly skilled and qualified workforce at D3G. Please put our experience to use for the benefit of your borrowers and their tenants and let us help you meet these requirements and avoid missing out on these benefits.

Footnotes:

1. Source: Energy Star Portfolio Manager (https://portfoliomanager.energystar.gov/pm/glossary)
2. Energy Star benchmark scoring is non-linearly related to the energy use intensity (kBTU/sqft/yr). However, for Multifamily Energy Star benchmark scores between 32-80, a single point change in Energy Star Score is roughly equivalent to a 0.60-0.75% change in source energy use intensity (EUI). Thus a 5% change on the source EUI could move the Energy Star score ~6-7 points.