RECOMMENDED ENERGY PERFORMANCE REQUIREMENTS FOR WEST FALLS CHURCH ECONOMIC DEVELOPMENT PROJECT

The following text was provided to the City of Falls Church Environmental Sustainability Council on June 1, 2018 by Seventhwave through its Accelerate Performance program, a U.S. Department of Energy funded program that advances energy performance goals for the procurement of high performance buildings.

This document represents model language for procuring highly energy efficient buildings. This document is reference in the Request for Design Proposals for the West Falls Church Economic Development Project, RFP No.: [0615-18-GMHS-WFC (George Mason High School-West Falls Church].

Additional elements of this document may be referenced in the forthcoming Exclusive Rights Agreement and Comprehensive Agreement, milestones described in the RFP.

Energy Performance Requirements

In addition to the Project Requirements detailed in 0501-18-GMHS-WFC Section 2.1, the Selected Developer shall commit to delivering a set of sustainable performance requirements using the framework described herein. These requirements guide the respondent to prioritize their focus on real, measurable, outcomes that are directly related to cost of living, environmental impact, community and quality of life.

1. **Performance Guarantee**

   The Selected Developer shall provide the City of Falls Church with a Performance Guarantee for the Project as set forth in a separate contract which the Parties agree to negotiate in good faith within 90 days of the Agreement Date. The Selected Developer, in mutual agreement with the City of Falls Church, shall devise a method of performance assurance, based on the framework described herein, and a detailed plan to measure, review, and administer the guarantee.

   Selected Developer shall pay the City of Falls Church a non-performance payment of [$3,000,000] if after 24 months of operation, the agreed upon Sustainable Performance Requirements have not been achieved for the site.

2. **Sustainable Performance Requirements**

   [Refer to RFP for additional Sustainable Performance Requirements.]

   Energy Performance Requirements. The Selected Developer shall commit to delivering all the Mission Critical requirements and as many of the Desired Requirements as can be included within the scope of work, then shall report on compliance with these requirements throughout design, construction, and operation.

   A. Mission Critical: these are deemed critical to project success.
      i. Maximum Energy Use Intensity (EUI) Performance Target for each building type (or major space use type for mixed-use buildings). Designers are encouraged to meet these targets through passive, proven, low-complexity, low-maintenance, and low-risk design solutions[i]:

1. Multi-family	50 kBtu/gsf.year
2. Hotel	66 kBtu/gsf.year
3. Office	40 kBtu/gsf.year
4. Retail (non-refrigerated, non-restaurant)	45 kBtu/gsf.year
5. Public Assembly	45 kBtu/gsf.year
6. Enclosed Parking	30 kBtu/gsf.year

      The energy performance of spaces not listed shall meet applicable energy codes and shall contribute to the other goals listed herein. The units of energy discussed herein are thousand British thermal units per gross square feet (kBtu/gsf) of total building area as measured at the site.
      ii. Meet standard of care for ventilation (design to ASHRAE 62.1 – 2016). Provide kitchen exhaust hoods vented to outdoors for all residential units.

iii. Execute a measurement and verification (M&V) plan including, at minimum:
   1. Install and commission whole-building energy metering for electric, gas, water, and any other major fuel source. Include master meters on main feeds to buildings that contain residential units and other tenant spaces. Integrate with electronic utility meters or provide separate meters as required to acquire energy use data.
   2. Provide an automated electronic system that aggregates energy meter data to a central data repository for the site. The data repository shall track, at minimum, Energy Performance (kBtu/gsf) on an ongoing basis for a minimum period of 5 years.
   3. Provide a report detailing building performance and compliance with these requirements to the City of Falls Church on an annual basis or more frequently.

B. Desired: these are a high priority for the project.
   i. Add to the above measurement and verification (M&V) plan:
      1. Separate sub meters for all major equipment and special areas (common area lights, common area plug loads, air handlers, boilers, exterior lights, etc.) Record sub meter data as described above.
      2. Install an automatic fault detection and diagnostics system. Incorporate control system points, meter and sub meter data, and weather data to help identify and repair building system performance issues. Provide means to access the system from a remote location.
      3. Provide a public dashboard or web-accessible interface for residents and the general public to observe sustainable performance metrics.

2. **Substantiation of Energy Performance Target:** This project shall meet at least the site EUI stated in the project goals list. This requirement shall be delivered by the design and construction teams through the use of any variety of permanent energy efficiency measures utilizing on-site equipment. Renewable energy systems (solar panels, etc) and purchased renewable energy credits shall not contribute to meeting the performance targets, though they may be considered independently. The design and construction team shall be responsible for demonstrating that the goal has been achieved using at least one of the following methods:
   A. *Metered Energy Use Method*: The real whole-building energy use will be measured at each building footprint for a 12-month period. It includes all loads in the building, including lighting, HVAC, plug loads, and other miscellaneous equipment connected through the building (such as elevators, distribution transformers, control systems, sump pumps, and servers). It also includes any façade lighting and outside lighting connected through the building, and the transformers. The building site energy use intensity (kBtu/gsf) is calculated by the site energy use divided by the gross building floor area, as

defined by Deru and Torcellini[1]. The 12-month data collection period will begin after initial commissioning and after the building is at least 70% occupied, but shall not start more than 4 months after project completion. The building operator will be responsible for tracking occupancy and other changes to building use that may affect energy use. The design and construction team shall deliver a report indicating whether the performance target has been achieved; if the target is not achieved, the report shall provide a comprehensive correction plan for improving performance.

B. *As-built Energy Model Method*: The design and construction team shall deliver to the owner energy models that accurately reflects the as-built condition of each facility at the time of project turnover. The as-built models may be similar to a LEED energy model but must include all changes to the design that occur during construction (such as changes to insulation materials, glazing products, light fixtures, HVAC equipment, or control systems). The as-built energy model shall assume that leasable tenant spaces are designed and operated according to assumptions agreed upon during the planning phase. The design and construction team shall deliver a report indicating whether the performance target has been achieved; if the target is not achieved, the report shall provide recommendations for improving performance.

3. **Measurement and Verification Plan Overview and Intent:** A measurement and verification plan will be crucial in later phases to demonstrate that the buildings meet the performance goals and to maintain high levels of performance over the life of the project. An M&V narrative is required for the Final Plans. This narrative will outline:
    A. Key assumptions and methodologies for tracking performance during the design and operation, including a list of data points to be collected during the M&V phase.
    B. In the instance that a building is not meeting the required EUI, the M&V outputs should clearly highlight which end uses are not meeting expectations. In this scenario the M&V plan will also call for a correction plan to be created.
    C. Responsible parties during the design, construction, and operation of building.
    D. Approval of the final energy performance measurement system will take place at substantial completion.

4. **Schedule and Deliverables:** The following schedule and associated deliverables have been developed for this project. The deliverables for each review period are included below.
    A. The proposal shall clearly define the Sustainable Performance Requirements that will be included in the scope of work. The proposal shall outline the design approach, site features, architectural design, and MEP systems that will meet the energy performance requirements. Further, the team should attach concept energy modeling studies,

[1] Deru, M.; Torcellini, P. (2005). Standard Definitions of Building Geometry for Energy Evaluation Purposes. Technical Report NREL/TP-550-38600. Golden, CO: National Renewable Energy Laboratory http://www.nrel.gov/docs/fy06osti/38600.pdf

performed by an experienced energy analyst, that demonstrate compliance with the agreed upon energy performance targets.

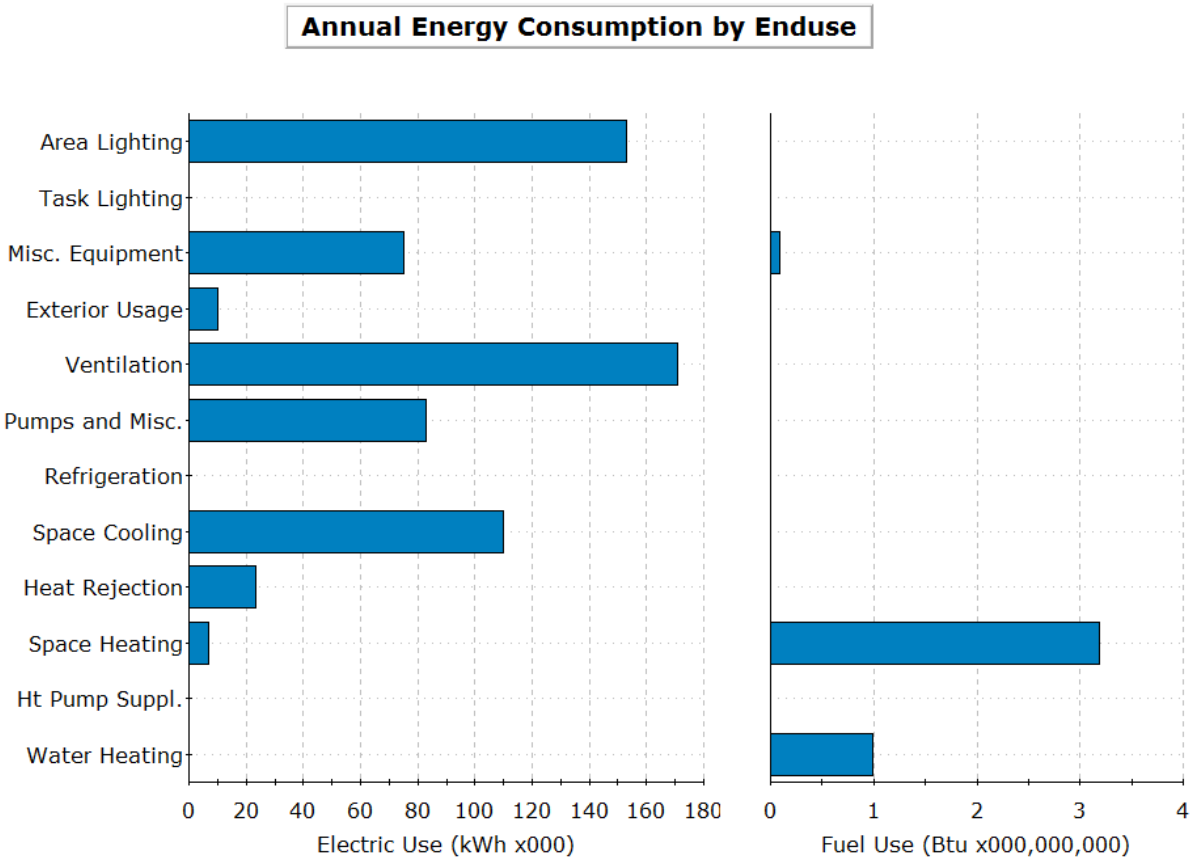
B. The owner will meet with the design team to review progress at project team kickoff, 50% DD, 100% CD, Substantial completion, 12 months' post-occupancy (at a minimum). These meetings are anticipated to review the following: energy analysis update, updated design EUI, project budget, project schedule, measurement and verification update.
C. At each progress review meeting, the design team shall provide or update the following documents:
    i. One-page narrative of the intended approach to meet the energy performance target; provide potential EUI range with this approach.
    ii. Proposed energy efficiency measures (see below).
    iii. Predicted energy consumption by end use and by fuel type (see below).
    iv. Measurement and Verification plan narrative and scope of responsibility.
    v. Actual energy consumption (after substantial completion).
D. Representatives from the design team shall also attend construction progress meetings and provide prompt feedback on the potential impact of design adjustments and material substitutions on the performance goals.

The design team will be responsible for presenting and maintaining up-to-date documents that summarize the means of achieving the project performance goals. The tables and figures below are provided for reference as examples.

Table 1: Proposed energy efficiency measures

Category	Proposed energy efficiency measure: brief list of improvements
Envelope	*e.g. Final Wall and Roof thermal properties, building shape and orientation, etc.*
Windows	*e.g. Final window to wall ratio, Window U value and shading coefficient, shading, etc.*
Lighting	*e.g. Lighting power density target, daylighting controls, occupancy sensors, etc.*
HVAC - Airside	*e.g. Static pressure reduction, energy recovery, demand control ventilation, radiant heating and cooling, etc.*
Heating Plant	*e.g. Supply water temperature reduction and reset, condensing boiler, etc.*
Cooling Plant	*e.g. Water temperature reset, improved EER, chiller and tower VFD, etc.*

Figure 1: Annual energy consumption by end use for each building



[i] Note on source of EUI targets:

The source of energy performance targets is a combination of benchmarking data and conceptual energy models.

The benchmarking tool used is publicly available: https://seventhwave.tools/eui-analyzer
I primarily used the Washington DC Benchmarking data set but supplemented with nearby areas where data was sparse.

The concept models were run with Sterling, VA weather data based on some simple “box” type models in DOE2 software using ASHRAE default use schedules. These start as IECC 2015 compliant buildings then a set of common energy upgrades (insulation, equipment, and controls) was applied to each building type to inform the opportunity for savings.

The targets listed contain some engineering judgement to combine the benchmarking and concept model results. The intent was to propose moderately aggressive targets that can be achieved through the

application of commonly available equipment and proven design strategies. These same strategies will contribute to meeting other project goals, such as LEED certification.

As we discussed, these targets need not be rigidly applied in all cases. If a developer proposed a revision it would be a positive sign that they put serious thought and analysis into solutions. Ultimately, you want to bring them in as partner in setting the final requirements and making it happen in the physical world.

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