Brandeis | OFFICE OF SUSTAINABILITY

Brandeis University Green Building Standard

As a signatory to the Carbon Commitment, which recognizes the need for a drastic societal shift to combat the urgent threat of climate change, and acknowledging that our buildings' energy usage is responsible for nearly all of our campus greenhouse gas emissions, Brandeis is setting forth a new building standard for new construction and renovations.

Beginning in fiscal year 2021, all newly constructed buildings and substantial building renovations must follow these guidelines:

For non-laboratory academic buildings and residence halls:

- New construction will strive to meet Passive House standards for energy consumption, and must make every effort to meet the inclusive Passive House standard.
- Significant, non-cosmetic renovations will strive to meet Passive House EnerPHit standards for energy consumption.
- Project teams are encouraged to develop an energy model of the building based on design/construction documents and then recalibrate once the project is completed. This model would be turned over to the owner at the end for any future M&V programs or LCC exercises.
- Projects must be designed with 100% LED lighting throughout. This includes emergency lighting, exterior lighting, specialty lighting, and any subsequent FF&E packages. Occupancy/vacancy sensors should be incorporated wherever possible and daylight harvesting should be considered where appropriate.
- Projects should leverage building controls to design intelligent and flexible HVAC systems that provide traditional occupant comfort with enhanced operational capabilities to reduce ventilation rates, HW/CHW circulation, and other unnecessary energy consumption during daytime unoccupancy and after hours/extended closures. The control should be as granular as feasible; by floor or even to the terminal equipment level.

For laboratory buildings:

- New construction and significant non-cosmetic renovations will strive to incorporate Passive House principles.
- All new construction and major renovation will require energy modeling to be done at various iterations of the project including during design, after construction documents are issued, after

substantial completion of the project, and after 1 year of occupancy. The final energy model will be turned over to the owner without restrictions.

- Projects must use 100% LED lighting as with non-lab buildings. Opportunities for occupancy, vacancy, and daylighting controls should be explored.
- Projects should look to design laboratory equipment systems holistically and as integrated with the base-building systems as possible and to specify the most efficient energy consuming pieces of equipment available. This includes, but is not limited to, fume hoods with integrated CFM setback controls, refrigeration that utilizes building chilled water systems, etc.
- Similarly to non-lab projects, HVAC controls should be considered a critical component of the design to provide leverage to achieve efficient energy use.

For all building types, new construction and substantial renovations must also meet the criteria below.

- Full-building new construction or renovation projects must demonstrate, via energy modeling, the following savings below ASHRAE 90.1-2013 or IECC 2015 baselines based on energy reductions:
    - 30% - Full-building new construction for any non-laboratory use[1]
    - 19.5%- Full-building new construction of a laboratory
    - 18% - Full-building renovations of existing buildings of any type
  - The project should provide a continuous commissioning plan complete with automated reports of building system activity and submetered energy points created by the ATC contractor and leveraging the in-house expertise of the owner.
- Buildings must achieve net-zero energy.
  - The building must incorporate enough renewable energy to generate as much energy as it uses over the course of a year. If this is not feasible, the University may purchase renewable energy certificates (RECs) from off-site renewables or carbon offsets, as long as those RECs or offsets meet University standards as defined in the Brandeis Climate Action Plan. This cost should be included in the construction budget.
- To the maximum extent possible, buildings should be electrified.[2]
  - Ground- and air-source heat pumps shall be considered as part of any relevant design.
  - Natural gas infrastructure shall not be required in newly constructed buildings, nor should it be extended to any system or device within a building for which an equivalent all-electric system or design is available.
  - To the extent that natural gas infrastructure is granted, newly constructed buildings shall be required to have sufficient electric capacity and conduit to facilitate full building electrification in the future.
  - Projects are exempt from the electrification requirement if:
    - It is not physically feasible to construct the building without natural gas infrastructure.

[1] This energy reduction was achieved by Skyline.

[2] The UNEP recommends new construction electrification policies in its most recent report: SEI, IISD, ODI, Climate Analytics, CICERO, and UNEP. (2019). The Production Gap: The discrepancy between countries' planned fossil fuel production and global production levels consistent with limiting warming to 1.5°C or 2°C. http://productiongap.org/

        - Backup power and redundancy are compromised to the extent that the project is not financially feasible.
- Project financial estimates must include long-term cost scenarios of energy demand, demonstrating not only up-front costs, but also utilities estimates with a shadow cost of carbon at $100/ton. The shadow cost will be used as a decision-making tool, but will not incur any actual cost.
    - In addition to hard costs, projects must model how energy demand, total energy use, and campus emissions change based on value engineering decisions.
    - Requests for proposals and contracts must include life cycle cost analysis (LCCA) in core elements of the project design.
    - Carbon analysis shall not only include emissions from energy use, but also for embodied carbon as it relates to construction materials and methods.
    - The shadow price calculation will not, in isolation, influence decision-making. Upfront cost, life-cycle cost, and the shadow cost of carbon all require consideration.
- Projects should consider present and future climate conditions in assessing project environmental impacts, including carbon emissions from building operations; and building performance in extreme precipitation, flooding, extreme heat and cold, and other impacts as outlined in the National Climate Assessment.
    - Projects should identify building strategies that mitigate adverse impacts including those due to changing climate conditions, and that optimize the ability for the building and its occupants to recover from extreme climate events. Projects may use the Boston Climate Resiliency Guidelines and Checklist, the LEED Resilient Design pilot credits, or another set of guidelines mutually agreed upon by Brandeis.

We will revisit these guidelines with each new construction project and revise the recommended standards.