SUNY State University Construction Fund	**Policy Title: Directive 1B-2, Net Zero Carbon New Buildings and Deep Energy Retrofits of Existing Buildings** **Responsible Office: Design & Construction** **Last Revised Date: April 2021**

1. Purpose

The purpose of this Directive is to define and identify goals for Net Zero Carbon (NZC) new buildings, Deep Energy Retrofits of existing buildings and partial building renovations or system/component replacements to advance SUNY's energy and carbon reduction goals and New York State's Climate Leadership and Community Protection Act (CLCPA).

The CLCPA mandates:

- NYS Greenhouse gas emissions reductions of 40% by 2030 & 85% by 2050
- NYS Energy reduction of 185 trillion Btu's from the forecasted usage of 2025
- 70% of NY's electricity to be generated from zero emissions sources by 2030 & 100% by 2040

2. NYStretch Energy Code

All projects are required to comply with the NYStretch Energy Code – 2020, the compliance paths shall be limited to the ASHRAE 90.1 options. In addition to the NYStretch Energy Code the applicable requirements in the sections below shall also be met.

3. Net Zero Carbon New Buildings

Design all new construction building projects to achieve SUNY's goals of NZC buildings. It is recognized that project funding may not be able to include on-site renewable energy capable of supplying carbon-free energy sources. In those cases, the design goal will be to design the building as NZC capable where the design achieves the energy use intensity (EUI) targets listed in the table below.

Building systems and equipment (HVAC, DHW, etc.) must be electrically powered. On-site combustion of fossil fuel and biofuels is prohibited, except for emergency back-up power and emergency heat, and other special cases (i.e. laboratory process loads, kilns, kitchen equipment) which are submitted for approval to the SUCF Project Coordinator.

The intent is for central plants to be electrified or powered by carbon-free sources. New connections to existing fossil fuel central plants may only occur if there is an energy master plan detailing how the campus will meet the goals of the CLCPA or a commitment to decarbonize the central plant prior to 2050 is documented.

Performance goals:
Maximum Allowable Site Energy Use Intensity (EUI) Values, (kBtu/sf/yr)

Net Zero Carbon Building Site EUI Targets

Building/Space Type	EUI
Theater, Performing Arts, Sports Arena	22
Gymnasium, Field House, Fitness Center, Multipurpose/assembly space, Student Activities Center, Broadcasting Studio	26
Ice Rink, Pool	130
Office	29
Classroom	30
Residence Hall	35
Clinic/Outpatient Facility	41
Preschool/daycare	44
Public Safety/ Campus PD, Library	58
Coffee Shop, Cafe	79
Hospital/Inpatient Health	113
Lab: Physics/Geology	128
Kitchen with dining area	144
Lab: Bio/Chem (wet)	160

For projects with multiple use types see calculations section for further clarification how to determine EUI targets. For any unique building types or other conditions that are not addressed by the directive, coordinate with the SUCF Project Coordinator to determine an approved EUI target.

4. Deep Energy Retrofits of Existing Buildings

Design existing building projects, which are identified as building major renovations (single or multi-phased) to achieve SUNY's goal for Deep Energy Retrofits. Projects must achieve the energy use intensity targets listed in the table below. Some building types i.e. historic buildings may not be able to due to limitations on the type of work that is possible or appropriate to be performed on these buildings. Historic buildings or other exemptions to the EUI targets must be approved by SUCF.

A holistic building design approach and analysis is critical to maximizing the reduction of energy used and strong consideration should be given to interactive energy efficiency of combining the replacement or upgrade of multiple building systems (including building envelope) in order to achieve greater energy use reduction in a more cost-effective manner. Holistic design can reduce first costs and operational costs, providing the first cost budget for systems that may not otherwise be considered. Cost/benefit evaluations of energy conservation measures should consider interactive effects of those measures on all building systems (e.g., building envelope improvements typically enable capacity reductions for HVAC equipment).

Replacement building systems and equipment (HVAC, DHW, etc.) must be electrically powered. On-site combustion of fossil fuel and biofuels is prohibited, except for emergency back-up power and emergency heat, and other special cases (i.e. laboratory process loads, kilns, kitchen equipment) which are submitted for approval to the SUCF Project Coordinator.

The intent is for central plants to be electrified or powered by carbon-free sources. New connections or existing connections to existing fossil fuel central plants may only occur or remain if there is an

energy master plan detailing how the campus will meet the goals of the CLCPA or a commitment to decarbonize the central plant prior to 2050 is documented.

Performance goal:
Maximum Allowable Site Energy Use Intensity (EUI) Values, (kBtu/sf/yr)

Deep Energy Retrofit Building Site EUI Targets (On-site HVAC equipment)

Building/Space Type	EUI
Theater, Performing Arts, Sports Arena	24
Gymnasium, Field House, Fitness Center, Multipurpose/assembly space, Student Activities Center, Broadcasting Studio	30
Ice Rink, Pool	143
Office	36
Classroom	38
Clinic/Outpatient Facility	47
Residence Hall	45
Preschool/daycare	50
Public Safety/ Campus PD, Library	65
Coffee Shop, Cafe	89
Hospital/Inpatient Health	127
Lab: Physics/Geology	167
Kitchen with dining area	162
Lab: Bio/Chem (wet)	208

Deep Energy Retrofit Building Site EUI Targets (HVAC served from central plant)

Building/Space Type	EUI
Theater, Performing Arts, Sports Arena	27
Gymnasium, Field House, Fitness Center, Multipurpose/assembly space, Student Activities Center, Broadcasting Studio	33
Ice Rink, Pool	157
Office	41
Classroom	44
Clinic/Outpatient Facility	52
Residence Hall	50
Preschool/daycare	55
Public Safety/ Campus PD, Library	72
Coffee Shop, Cafe	99
Hospital/Inpatient Health	141
Lab: Physics/Geology	185
Kitchen with dining area	180
Lab: Bio/Chem (wet)	231

The EUI calculation for buildings connected to a central plant should exclude the efficiency of the central plant equipment and represent metered chilled water and hot water loads.

For projects with multiple use types see calculations section for further clarification how to determine EUI targets. For any unique building types or other conditions that are not addressed by the directive, coordinate with the SUCF Project Coordinator to determine an approved EUI target.

5. Partial Buildings Renovations or System/Component Replacements

When the project scope does not fall into either the Net Zero Carbon or the Deep Energy Retrofit category it shall fall under this category which requires it to comply with the requirements of the NYStretch Energy Code - 2020. If the project consists of a component replacement of fossil fuel powered equipment it must be replaced with electrically powered alternatives.

Provide the projected energy saving calculations for all energy efficiency measures at the completion of Pre-bid phase, utilize the methods as outlined in the NYS Technical Resource Manual.

6. Calculations

EUI Sample Calculations

- For projects with multiple use types, use a weighted EUI target.
- When the individual use type constitutes less than 10% of the total building gross floor area classify them the same as majority use type of the building.
- For projects that include additions to existing buildings, use a weighted average to identify the project's EUI target.

$EUI_t = (A_1\% \times EUI_1) + (A_2\% \times EUI_2) + (A_\#\% \times EUI_\#)$

Where:
EUI_t = EUI target
$A_\#$ = Area for use type
$EUI_\#$ = EUI target from applicable tables

Emission Calculations

All projects shall include GHC site emission calculations, the following factors are to be used as the basis for these calculations:

Energy Type	Emissions Rate
Electricity Upstate	253.1 lbs./MWH
Electricity NYC/Westchester	586.4 lbs./MWH
Electricity Long Island	1,184.2 lbs./MWH
Natural Gas	121.0 lbs./MMBTU
#2 Fuel Oil	161.3 lbs./MMBTU
Propane	138.2 lbs./MMBTU
District Chilled Water Natural Gas Absorber	163.0 lbs./MMBTU
District Chilled Water Electric Driven	116.0 lbs./MMBTU
District Steam / Hot Water	146.0 lbs./MMBTU

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