Sec. 16a-38k-6. Building standard strategies for schools

All building projects as defined in sections 16a-38k-2(c) and 16a-38k-2(d) of the Regulations of Connecticut State Agencies shall implement a minimum of twenty-eight of the fifty-nine strategies in subsections (a) through (f) of this section:

(a) **Energy efficiency and Renewable Energy- A minimum of one strategy in this subsection is required.**

(1) Same as in section 16a-38k-3(c) except that the percentage improvement over base is increased by three and one-half percent.

(2) Same as in section 16a-38k-3(c) except that the percentage improvement over base is increased by seven percent. Selection of this strategy shall count as implementing two strategies since it is inclusive of the strategy listed in subsection (a)(1) of this section.

(3) Same as in section 16a-38k-3(c) except that the percentage improvement over base is increased by ten and one-half percent. Selection of this strategy shall count as implementing three strategies since it is inclusive of the strategies listed in subsections (a)(1) and (a)(2) of this section.

(4) Same as in section 16a-38k-3(c) except that the percentage improvement over base is increased by fourteen percent. Selection of this strategy shall count as implementing four strategies since it is inclusive of the strategies listed in subsections (a)(1) through (a)(3) of this section.

(5) Same as in section 16a-38k-3(c) except that the percentage improvement over base is increased by seventeen and one-half percent. Selection of this strategy shall count as implementing five strategies since it is inclusive of the strategies listed in subsections (a)(1) through (a)(4) of this section.

(6) Same as in section 16a-38k-3(c) except that the percentage improvement over base is increased by twenty-one percent. Selection of this strategy shall count as implementing six strategies since it is inclusive of the strategies listed in subsections (a)(1) through (a)(5) of this section.

(7) The installation of on-site renewable energy shall provide at least three percent of the building energy needs based upon the most recent version of the U. S. Department of Energy Commercial Buildings Energy Consumption survey for estimated electricity usage or by using modeling software that is identified in the *Connecticut Building Standard Guidelines Compliance Manual for High Performance Buildings*.

(8) Same as in section 16a-38k-6(a)(7) except at least seven percent of the building energy needs are met through on-site renewable energy. Selection of this strategy shall count as implementing two strategies since it is inclusive of the strategy listed in subsection (a)(7) of this section.

(9) Same as in section 16a-38k-6(a)(7) except at least ten percent of building energy needs are met through on-site renewable energy. Selection of this strategy shall count as implementing three strategies since it is inclusive of strategies listed in subsections (a)(7) and (a)(8) of this section.

(10) The facility shall have a two-year contract to purchase at least thirty-five percent of the building's annual electricity consumption from a Class I renewable energy source. Alternately, the purchase may be in the form of New England Power Pool Generation Information System (NEPOOL-GIS) renewable energy credits (RECs); or if procuring

RECs outside of the NEPOOL-GIS, the RECs shall be equivalent to Class I renewable resources and certified by a nationally recognized certification organization as identified in the *Connecticut Building Standard Guidelines Compliance Manual for High Performance Buildings.* Baseline electric usage can be determined using either the most recent version of the U. S. Department of Energy Commercial Buildings Energy Consumption survey for estimated electricity usage or by using building modeling software that is identified in the *Connecticut Building Standard Guidelines Compliance Manual for High Performance Buildings.*

(11) Develop a measurement and verification plan for energy usage, to cover a period of at least one year after occupancy.

(b) **Indoor Environment- A minimum of two strategies in this subsection are required.**

(1) Install permanent indoor air monitoring systems to provide performance feedback on ventilation systems. Such monitoring systems, at minimum, shall include devices to measure temperature, relative humidity, carbon dioxide, and dew point. Carbon dioxide measurement sensors shall measure both interior and exterior levels of CO2.

(2) Provide increased outdoor ventilation by designing mechanical ventilation systems to exceed the minimum rates required by the current Connecticut State Building Code or the current version of the ASHRAE Standard 62.1, whichever is more stringent, by thirty percent.

(3) After construction ends and with all interior finishes installed but prior to building occupancy, flush the building continuously for at least ten days with outside air while maintaining an internal temperature between 60°F and 78°F and relative humidity no higher than 60%. Do not "bake out" the building by increasing the temperature of the space. Alternatively, use the following strategy: Flush out each space separately until 3,500 cubic feet of outside air per square foot of floor space has been delivered to that space. The space shall then be ventilated at the rate of 0.3 cubic feet per minute per square foot of floor space or the design minimum outside air rate, whichever is greater. This shall be performed for a minimum of three hours prior to occupancy and then during occupancy until a total of 14,000 cubic feet of outside air per square foot of floor area has been delivered to that space.

(4) All composite wood and agrifiber products used within the shell of the building shall meet the testing and product requirements of the California Department of Health Services *Standard Practice for the Testing of Volatile Organic Emissions From Various Sources Using Small-Scale Environmental Chambers,* including 2004 Addenda.

(5) For administrative offices and other regularly occupied spaces, allow for individual lighting control for ninety percent or more of the building occupants in workspaces to allow for adjustments to suit individual tasks and preferences. For classroom and core learning spaces, with the exception of chemistry laboratories, art and music rooms, shops, and gyms, install two modes of illumination: general illumination and audio visual illumination. General illumination mode shall achieve desk level illumination of 30-50 foot-candles; audio visual mode shall achieve a desk level illumination of 10 to 20 foot-candles while limiting vertical illumination at a projection screen of no more than seven foot-candles. All lighting fixtures shall include glare control features.

(6) Using the current version of the ASHRAE Standard 55, allow for individual thermal

comfort control in administrative areas for fifty percent or more of the building occupants to allow for adjustments to suit individual tasks and preferences and provide thermal system comfort controllability for all shared multi-occupant spaces such as classrooms, auditoriums, and gyms to enable adjustment that meets group needs and preferences.

(7) Building facility personnel, under direction of the building owner, shall administer an anonymous survey for building occupants within the first twelve months after initial occupancy to assess occupant satisfaction and implement corrective actions for recurrent issues. At minimum, the survey shall cover thermal building comfort, lighting, security issues, indoor air quality, functionality of space, and acoustics. If greater than 20% of the respondents express dissatisfaction with any specific issue, the building owner shall prepare a plan for remedial action.

(8) Demonstrate through computer software simulations or through recording of indoor light measurements that a minimum illumination level of twenty-five foot-candles has been achieved from daylight in at least seventy-five percent of all regularly occupied areas.

(9) There shall be a direct line of sight to the outdoor environment via window glazing between two and one-half to seven and one half feet above the finished floor for seventy percent of all regularly occupied areas.

(10) To prevent mold, heating, ventilating and air conditioning systems (HVAC) shall be designed to limit space relative humidity to 60% or less during load conditions whether the building is occupied or non-occupied; an ongoing indoor air quality management plan shall be implemented as required under section 10-220 of the Connecticut General Statutes, using the U. S. Environmental Protection Agency's (EPA) Indoor Air Quality *Tools for Schools* Program; and the criteria of sections 16a-38k-6(b)(6) and 16a-38k-6(b)(7) of the Regulations of Connecticut State Agencies shall be met.

(11) Student and teacher classroom chairs, desks, and tables manufactured, refurbished or refinished within one year prior to building occupancy and used within the building interior shall be certified for low chemical emissions by the certifying organization listed in the *Connecticut Building Standard Guidelines Compliance Manual for High Performance Buildings*.

(12) Where chemical use occurs, including housekeeping areas, chemical mixing areas, photo labs, science labs, art rooms, and copy/print rooms, use dedicated exhaust to ventilate the space at a minimum of 0.5 cubic feet per minute per square foot with adequate make-up air. No recirculation is permitted and such spaces shall have a negative air pressure of at least five pascal (.02 inches of water gauge) to a minimum of one pascal (0.004 inches of water gauge) when the doors are closed.

(13) Building design shall control entry of pollutants and excess moisture into buildings and later cross-contamination of regularly occupied areas at all high volume entryways and those adjacent to playing fields and locker rooms through the use of three-part walk-off systems and the proper placement of outside air intakes. Walk-off systems shall include a grate or grill outside the entryway for removing dirt and snow, a drop through mat system within the vestibule, and a fifteen foot interior walk-off mat.

(c) **Water efficiency- A minimum of one strategy in this subsection is required.**

(1) Same as in section 16a-38k-3(f), except that the conserving strategies use thirty percent less water in aggregate.

(2) Reduce by fifty percent the amount of water required for landscaping from a modeled, mid-summer baseline usage case. Reductions may be attributed to the use of captured rainwater, recycled waste (grey) water, efficiency of irrigation strategies, and use of drought resistant plant species. This strategy only applies to renovation projects.

(3) Use landscaping that does not require a permanent irrigation system or uses non-potable water for irrigation. Any system installed for irrigation using potable water shall only be utilized for plant establishment and be removed prior to one year of building occupancy.

(4) Reduce potable water use by half through water conserving fixtures and/or use of non-potable water using methodologies stated in the *Connecticut Building Standard Guidelines Compliance Manual for High Performance Buildings.* This strategy only applies to renovation projects.

(d) **Recycling, Reuse, and Sustainability-A minimum of two strategies in this subsection are required.**

(1) Retain at least seventy-five percent, by surface area, of an existing building structure, including structural floor and roof decking, exterior framing, and envelope surface, but excluding window assemblies and non-structural roofing material. This strategy only applies to renovation projects.

(2) Same as section 16a-38k-6(d)(1), except that a total of ninety-five percent of the building structure is retained. This strategy only applies to renovation projects. Selection of this strategy shall count as implementing two strategies since it is inclusive of the strategy listed in subsection (d) (1) of this section.

(3) Use existing non-structural elements such as interior walls, doors, floor coverings and ceiling systems in at least half (by square footage) of the completed building. This strategy only applies to renovation projects.

(4) Recycle or salvage at least half of non-hazardous construction and demolition debris.

(5) Same as section 16a-38k-6(d)(4), except that a total of seventy-five percent of non-hazardous construction and demolition debris is recycled or salvaged. Selection of this strategy shall count as implementing two strategies since it is inclusive of the strategy listed in subsection (d)(4) of this section.

(6) Use five percent of refurbished, salvaged, or reused materials, based on cost of the total value of materials on the project. Only permanently installed materials can by used in calculations.

(7) Same as section 16a-38k-6(d)(6), except that a total of ten percent of refurbished, salvaged, or reused materials, based on cost of the total value of materials on the project shall be used. Selection of this strategy shall count as implementing two strategies since it is inclusive of the strategy listed in subsection (d)(6) of this section.

(8) Use materials where the weighted average of recycled materials content is ten percent, based on cost, of the total value of the materials in the project. Recycled content value of a material assembly shall be determined by weight. The weighted average shall be determined using the following formula:

Weighted average of recycled materials equals the percentage of post consumer content plus one-half the percentage of pre-consumer content.

(9) Same as section 16a-38k-6(d)(8), except that the weighted average of recycled

materials shall constitute at least twenty percent, based on cost, of the total value of the materials in the project. Selection of this strategy shall count as implementing two strategies since it is inclusive of the strategy listed in subsection (d)(8) of this section.

(10) Use a minimum of ten percent of building materials extracted or manufactured within a five-hundred mile radius of the building site.

(11) Same as in section 16a-38k-6(d)(10), except that a minimum of twenty percent of building materials extracted or manufactured within a five-hundred mile radius of the building site shall be used. Selection of this strategy shall count as implementing two strategies since it is inclusive of the strategy listed in subsection (d)(10) of this section.

(12) Use building materials and products that are made from plants harvested in a ten-year or shorter cycle. Two and one-half percent of the total value of building materials and products, based on costs, must be used in the project.

(13) At least half of permanently installed wood and wood-based products shall be certified in accordance with the current Forest Stewardship Council (FSC) principles and criteria.

(e) **Site Selection and Development- A minimum of two strategies in this subsection are required.**

(1) Construct or renovate the building on a previously developed site and within one-half mile of a residential zone/neighborhood with an average density of ten units per acre net and within one half mile of a minimum of ten basic services as described in the *Connecticut Building Standard Guidelines Compliance Manual for High Performance Buildings* and with pedestrian access between the building and the services.

(2) Select a site that has access to public transportation. Public transportation is considered accessible if the site is located within one-third of a mile to an existing commuter rail station or located within one quarter mile of a public commuter bus line.

(3) Encourage bicycle transportation by providing secure bicycle racks or storage within five-hundred feet of a building entrance for a minimum of five percent of building users at peak times and shower and changing facilities must be provided in the building or within five-hundred feet of the building.

(4) Encourage the use of low-emitting and fuel efficient vehicles by providing preferred parking for low-emitting and fuel efficient vehicles for five percent of the total parking capacity at the site.

(5) Reduce pollution from single occupancy vehicle use by sizing parking capacity to meet, but not exceed minimum local zoning requirements; provide designated preferred parking for carpools or vanpools for five percent of the total provided parking spaces; and provide infrastructure and support programs to facilitate shared vehicle usage such as ride sharing bulletin boards and shuttle services to mass transit.

(6) Protect existing natural areas or restore damaged areas to promote biodiversity. Any site disturbances shall be limited to no more than forty feet beyond the building perimeter; ten feet beyond surface walkways, patios, surface parking and utilities less than twelve inches in diameter; fifteen feet beyond primary roadway curbs and main utility branch trenches; and twenty-five feet beyond constructed areas with permeable surfaces, such as playing fields, that require additional staging areas in order to limit compaction in the constructed area. For previously developed or graded sites, restore or protect to a minimum

of fifty percent of the site area, excluding the building footprint, to plant species indigenous to the locality or to cultivars of native plants adapted to the local climate conditions and not considered invasive species or noxious weeds. Except for playing fields and picnic areas, minimize lawn areas to less than ten percent of the building site landscape.

(7) Maximize open space at the site. Provide vegetated open space within the project boundary to exceed the local zoning's open space requirement by twenty-five percent; where there is no local zoning requirement, provide vegetated open space adjacent to the building that, at minimum, is equal to the building footprint.

(8) Design the site to minimize storm water runoff by implementing a storm water management plan that results in a twenty-five percent reduction in peak runoff rates for a two-year, twenty-four hour storm design from pre-construction to developed conditions; and implement a storm water management plan that results in a twenty-five percent decrease in run-off volume of storm water runoff from the one hundred-year, twenty-four hour storm design from existing to developed conditions.

(9) Design the site to minimize pollutants in storm water runoff by implementing a storm water management plan that reduces impervious cover, promotes infiltration, and redirects water to pervious areas or storage reservoirs that treats storm water runoff from ninety percent of the average annual rainfall.

(10) Reduce heat island effect at the site by utilizing any combination of the use of native shade species, paving materials with a solar reflectance index of at least twenty-nine, and/or an open grid pavement system for fifty percent or more of the site parking, sidewalk and road areas; or place at least fifty percent of parking spaces under a covering, such as the a deck, a roof, underground or the building itself. Any roof used to cover parking spaces must have a solar reflectance index of at least twenty-nine.

(11) Reduce heat island effect through roofing selection by either installing native vegetation on at least fifty percent of the roof area or by using a roofing material that has a solar reflectance index equal to or greater than the values in the following table on at least seventy-five percent of the roof surface:

Roof Type	Slope	Solar Reflectance Index
Low-Sloped Roof	≤ 2:12	78
Steep-Sloped Roof	> 2:12	29

(12) Reduce light pollution from the site. In addition to requirements mandated in Section 4b-16 of the Connecticut General Statutes, automatic controls to turn off lights during non-business hours shall be installed on all non-emergency interior lighting. Manual override capability may be provided for after hours use. Exterior lighting shall be provided only in areas where lighting is required for safety and comfort. Light fixtures shall not be installed where the main purpose is to light building facades or landscape features. Exterior building-mounted lighting fixtures that are only needed during building operation shall be controlled by a time-clock with an easily accessible manual control. Lighting of flags, signs, and monuments shall be limited to fifty watts per fixture and shall incorporate shielding devices to minimize light pollution. No more than two fixtures may be used for each flag, sign or

monument. Sports field lighting shall be controlled automatically for shutoff no later than eleven PM, with manual override to prevent disruption of school-sponsored events.

(13) Building orientation shall be such that the east/west glazing exposure is minimized. South windows shall have an external overhang to entirely shade adjacent windows during the summer solstice or shall utilize glazing with a solar heat gain coefficient of less than or equal to 0.4. Shading mechanisms or glazing with a solar heat gain coefficient less than or equal to 0.4 shall be installed at eastern and western exposure windows to minimize solar heat gain early and late in the day respectively.

(14) Buildings shall not be constructed on land that is lower than five feet above the elevation of the 100 year flood as defined by the Federal Emergency Management Agency or its successor agency; and buildings, roads, parking areas, sidewalks, or other impervious surfaces shall not be built in any area that is inconsistent with the applicable municipal plan of conservation and development prepared in accordance with section 8-23 of the Connecticut General Statutes.

(15) The school building shall be sited on land away from sources of unreasonable excess noise, such as highways, airport flight paths, and areas that are subject to unreasonable noise from agricultural or industrial equipment use.

(f) **Operations and Procedures/Innovation – No minimum number of strategies are required for this subsection.**

(1) Do not install fire suppression systems that contain chlorofluorocarbons (CFCs), hydro chlorofluorocarbon (HCFCs) or halons. Select refrigerants and heating, ventilating, air conditioning, and refrigeration (HVAC&R) systems that minimize or eliminate compounds contributing to ozone layer depletion and global warming. If refrigerants are used, the mechanical room shall have leak detection equipment installed.

(2) Utilize innovative high performance features or technologies that exceed any existing mandatory requirements as specified in sections 16a-38k-3 and 16a-38k-5 or optional measures within Section 16a-38k-6.

(3) Integrate the sustainable features of the school building into the educational curriculum within the first full year of school operation.

(Adopted effective September 2, 2009)