

# Interface of Rules, Codes or Standards with Green Best Practices & Technologies

## Background Information

<p><b><u>Facilities Investigated</u></b></p> <ul style="list-style-type: none"> <li>• Hospitals</li> <li>• Nursing Homes</li> </ul> <p><b><u>Applicable rules, codes &amp; standards—Hospitals</u></b></p> <ul style="list-style-type: none"> <li>• <b>10A NCAC 13B</b></li> <li>• <b>North Carolina State Building Codes (NCSBC)</b></li> <li>• <b>Multiple National Fire Protection Association (NFPA) codes and standards—latest edition (2009 NFPA 101 Life Safety Code (LSC))</b></li> <li>• <b>American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) HVAC Applications latest edition</b></li> <li>• <b>10A NCAC for ambulatory surgery centers</b></li> <li>• <b>Certification - NFPA 101 LSC 2000 edition</b></li> </ul> <p><b><u>Applicable rules, codes and standards—Nursing Home</u></b></p> <ul style="list-style-type: none"> <li>• <b>10A NCAC 13D</b></li> <li>• <b>North Carolina State Building Codes</b></li> <li>• <b>ASHRAE Guide edition</b></li> <li>• <b>NFPA 90A Install. of Air Cond. &amp; Vent. Systems-latest edition</b></li> <li>• <b>Certification - NFPA 101 2000 edition</b></li> </ul>	<p><b><u>Green Best Practices Investigated</u></b></p> <ul style="list-style-type: none"> <li>• Energy Efficiency</li> <li>• Water Efficiency</li> </ul> <p><b><u>Resources</u></b></p> <ul style="list-style-type: none"> <li>• Green Guide to Healthcare (GGHC) <a href="http://www.gghc.org/Best_practices_guide_for_healthy_and_sustainable_building_design,_construction,_and_operations_for_the_healthcare_industry">http://www.gghc.org/Best_practices_guide_for_healthy_and_sustainable_building_design,_construction,_and_operations_for_the_healthcare_industry</a>.</li> <li>• ASHE (American Society of Health Care Engineers) Healthcare Energy Guide Book – <a href="http://www.ashe.org/e2c/resources.html">http://www.ashe.org/e2c/resources.html</a></li> <li>• Practice Greenhealth <a href="http://practicegreenhealth.org/">http://practicegreenhealth.org/</a></li> </ul> <p><b><u>GGHC—Categories</u></b></p> <ul style="list-style-type: none"> <li>• Water Efficiency (WE)</li> <li>• Energy and Atmosphere (EA) - (Did not investigate any green practices for atmosphere.)</li> </ul>
	<p><b><u>Construction Section Mission</u></b></p> <p>To ensure that the construction and operation of buildings regulated by the Division provide a safe, healthy and suitable environment for residents, patients, and inmates using those facilities.</p>

### **Hospital Rule 10A NCAC 13B .6103 (5) & Nursing Home Rule 10A NCAC 13D .3102 (5)**

Equivalency: Alternate methods, procedures, design criteria, and functional variations from the physical plant requirements, because of extraordinary circumstances, new programs, or unusual conditions, may be approved by the Division when the facility can effectively demonstrate to the Division's satisfaction, that the intent of the physical plant requirements are met and that the variation does not reduce the safety or operational effectiveness of the facility.

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## Interface with rules, codes or standards

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## 2012 NCSBC: Energy Conservation Code

**1**

If future SMFP policy or rules are created to implement energy efficiency in hospitals and nursing homes, they may conflict with 2012 NCSBC: Energy Conservation Code.

In addition, the enforcement of the policy or rules may result in conflicts between the CON and Construction Section and the local code officials.

- Compliance with this code provides 30% improved energy efficiency compared to the 2006 International Energy Conservation Code which is the base code for the 2009 NCSBC: Energy Conservation Code.
- Chapter 5 Commercial Energy Efficiency requires that buildings comply with the requirements of this chapter or comply with the ASHRAE Standard 90.1 and exceed the minimum level of energy efficiency ASHRAE Standard 90.1 prescribes by 20% following the procedures in Appendix G.
- This code will be implemented and enforced by local code officials.

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<p><b>HL Rule .6225, .6226, .6227</b> Mechanical, Plumbing and Electrical Req.</p> <p><b>NH Rules SECTION .3400</b> Mechanical, Plumbing and Electrical.</p> <p><b>North Carolina State Building Codes (NCSBC)</b> – final authority local building officials for certain code required systems needing special inspections and commissioning (example smoke control system in high-rise buildings Section 909).</p> <p><b>HL Rules .6102 &amp; Medicare Certified facilities NFPA</b> standards and their requirements for system testing and certification.</p>	<p><b>EA Prereq. 1 Fundamental Commissioning of building energy systems –</b>  <i>At a minimum commission the following systems: heating, ventilating air conditioning and refrigeration (HVAC &amp; R) systems; lighting and daylighting controls; domestic hot water systems; renewable energy systems; building envelope systems.</i></p> <p><b>EA Credit 3 Enhanced Commissioning</b>  <i>Implement the following additional commissioning: designate an independent commissioning authority (CA) to lead, review and oversee the commissioning process. CA shall conduct at least one commissioning design review at mid-construction document phase; check for incorporation of review comments in design documents; review contractor submittals and review building operation within 10 months of substantial completion.</i></p>
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**Commissioning** – quality assurance process that verifies and documents that building components and systems operate in accordance to the owner’s project requirements.

*Commissioning verifies the efficient and effective operations of a building’s mechanical and electrical systems. It ensures compliance with energy performance goals and indoor air quality and thermal comfort design criteria. The benefits of commissioning lessen dependence on natural resources, resulting in improved outdoor air quality and reduced greenhouse gas emissions. GGHC v2.2 2007*

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**HL Rule .6225, .6226, .6227** Mechanical, Plumbing and Electrical requirements. **NH Rules SECTION .3400** Mechanical, Plumbing and Electrical requirements.

Examples of possible interface with rules cited above -  
 Hot water capacity requirements per bed.

**HL Rule .6225 (f) (4)**

Facility design considerations shall include recognized energy saving measures. When using variable air volume systems within the facility special care shall be taken to assure that minimum ventilation rates and pressure relationships between various departments are maintained.

**HL Rule .6225 (5) Table 1**

Patient room design temp. maintained to range of 70-75 degrees F. For ORs, must maintain positive air pressure relationship w/adjacent areas even during nighttime setback.

**NH Rule .3401 (2)** room temperature maintained in heating season -72 degrees. F. cooling season-81 degrees. F.

**NFPA 101 Life Safety Code & NCSBC** requirements for atriums (vertical openings) for daylighting.

**SMFP NH-8 Innovation in Nursing Facility Designs.** This policy encourages less institutional designs in a more home-like setting. Possibly smaller buildings housing 12 to 16 residents as opposed to one large facility housing 100 residents. Multiple smaller buildings may be less energy efficient than one large building housing the same number of residents.

**EA Prereq. 2 Minimum Energy Performance of proposed building and systems.**

**EA Credits 1.1 – 1.10 Optimize Energy Performance Compared to ASHRAE 90.1 -2004 reduce design energy cost by 10.5% to 42%**

**Potential Strategies and Technologies -**

*Use ground source heat pumps; Provide daylighting; Install high efficiency chillers; Use low leakage air handling units; Use heat recovery from kitchen and laundry operations; Provide a cooling system with at least two cooling loops operated at different temperatures. This can be accomplished with separate chillers (or direct tower cooling). Reduce outside airflow during unoccupied periods. Provide occupancy sensors to control all lighting in administration areas, equipment rooms, storage rooms, med prep rooms, offices, lounges, break rooms, public toilets, and other similar spaces; Install fluorescent lamps rated for high efficiency.*

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**4** **General Statute 66-25**  
 All electrical materials, devices, appliances and equipment must be third party certified listed/labeled for use (NC Department of Insurance approved qualified testing labor. NC Department of Insurance Engineering and Codes Division approves.

In order to avoid the hazards listed below, these systems would need to be installed and maintained as per the **HL Rule .6102 & NH Rule.3101, NCSBC, NFPA codes and standards, OSHA.**

Hazards that are common to both thermal system and photovoltaic systems include; tripping and slipping hazards; structural collapse due to extra weight; flame spread; and inhalation hazards from exposure of toxic smoke. Thermal systems also present scalding hazards from hot fluids. Photovoltaic systems present electric shock and battery hazards.

**EA Credit 2.1 to 2.3 On-Site Renewable Energy**  
**Potential Technologies & Strategies**  
*Assess the project for on-site non-polluting and renewable energy potential including:*

- *Solar: Photovoltaic and active thermal systems*
- *Wind*
- *Bio-fuel- and biogas- based electrical systems (including biodiesel)*
- *Geothermal heating systems*
- *Geothermal electric systems*
- *Low-impact hydro electric power systems*
- *Wave and tidal power systems*

*When applying these strategies, take advantage of "net metering" with the local utility if possible.*

*Ineligible On-Site Renewable Energy Systems:*  
*Architectural features; Passive solar strategies (included under EA Credit 1 calculation); Daylighting strategies; Geo-exchange systems (ground source heat pumps); Renewable or Green-power from off-site sources.*

**5** No apparent interface or conflict with rules or codes.

**EA Credit 6.1 to 6.4 Green Power provided at 20%, 50%, 80%, or 100% of annual electrical energy use**  
**Potential Technologies & Strategies**  
*Determine the energy needs of the building and investigate opportunities to engage in a green power contract.*  
*Green power is derived from solar, wind, geothermal, biomass or low-impact hydro sources. Visit <http://www.green-e.org> for details about the Green-e program. The power product purchased to comply with credit requirements need not be Green-e certified.*

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<p><b>6</b> No apparent interface or conflict with rules or codes.</p>	<p><b>EA Credit 5 Measurement and Verification of Building Energy Consumption</b>  <i>Model the energy systems to predict savings;</i>  <i>Develop and implement a Measurement and Verification Plan evaluating building and/or energy system performance;</i>  <i>Sub-meter electric systems;</i>  <i>Use measured system data to analyze the performance of electrically driven equipment and systems.</i>  <i>At a minimum, provide metering for the following electrical and mechanical systems (as applicable to the scope of the project):</i></p> <ul style="list-style-type: none"> <li>• <i>Lighting system power and controls</i></li> <li>• <i>Motor loads (including air compressors, vacuum pumps and boiler systems)</i></li> <li>• <i>Chillers &amp; Data Centers</i></li> <li>• <i>Critical Equipment Electrical Distribution Systems</i></li> <li>• <i>Air distribution systems.</i></li> </ul>
<p><b>7</b> <b><u>General Statute 66-25</u></b>  All electrical materials, devices, appliances and equipment must be third party certified listed/labeled for use (NC Department of Insurance approved qualified testing labor. NC Department of Insurance Engineering and Codes Division approves.</p>	<p><b>EA Credit 7 Equipment Efficiency</b>  <b><i>Purchase computers, related electronics, and office equipment that carry the Energy Star label.</i></b>  <i>Examples of these include: Computers, Monitors Printers &amp; Scanners; Copiers; DVD Products;</i>  <i>Exit Signs; Refrigerators and Freezers; TVs &amp; VCRs; Water Coolers.</i>  <b><i>Investigate the availability of Energy Star qualified products for medical equipment purchases</i></b>  <i>Diagnostic imaging equipment (x-rays, MRIs, etc)</i>  <i>Sterilization equipment</i>  <i>Physiological monitoring; Laundry; Dietary.</i></p>

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8	<p>No apparent interface or conflict with rules or codes.</p>	<p><b>WE Prereq 1 Eliminate potable water use for medical equipment cooling.</b>  <i>Use closed-loop cooling water for medical equipment cooling instead of open-loop (once-through). When using closed-loop cooling systems for critical applications information, or other owners should utilize multiple pieces of cooling equipment (n+1 redundancy). Where this is not possible, an owner may elect to use potable water in an open-loop.</i></p>
9	<p>No apparent interface or conflict with rules or codes.</p>	<p><b>WE Credit 1 Water Efficient Landscaping: No Potable Water Use or No Irrigation.</b>  <i>Use only captured rainwater, recycled wastewater, recycled grey-water, or water treated and conveyed by a public agency specifically for non-potable uses for irrigation. OR Install landscaping that does not require permanent irrigation systems.</i></p>
10	<p>No apparent interface or conflict with rules or codes.</p>	<p><b>WE Credit 2.1 Potable Water Use Reduction: Measurement &amp; Verification. Use measured system data to identify opportunities for reduced use of potable water.</b>  <i>Meter the following water uses (as applicable to the project):</i></p> <ul style="list-style-type: none"> <li>• <i>Water use in laboratory, dietary department, central sterile and processing department, laundry, radiology and imaging department, surgical suite, Purified water system (reverse osmosis and/or de-ionized) and filter backwash water, Outdoor irrigation systems, Cooling tower make-up and filter backwash water, Steam boiler system make-up water, Cold-water make up for hot water system.</i></li> </ul>

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**HL Rule .6226 Plumbing and Other Piping Systems**  
 HL Rule .6226 (c) (2) hand free trim on faucets used by staff and patients. Sensors –OK but may be equipped with re-chargeable battery cartridges. DHSR reminds owners to have spare cartridges available.

**Hospital’s Infection Control Plan.** Laminar flow spray heads are typically used instead of aerated spray heads for clinical handwashing. Aerated spray head draws ambient air into the water stream introducing airborne bacteria. Laminar flow heads operate at 2.2 gpm.

**WE Credit 2.2 & 2.3 Potable Water Use Reduction: Domestic Water**  
**Credit 2.2** Equip all urinals (but not toilets or bed pan washers) with sensor operators. Equip all handwash sinks (but not housekeeping sinks, or sinks in toilet rooms for inpatient bed rooms) with sensor operators.  
**Credit 2.3** Use low-flow fixtures or control fixture flows to achieve the following maximum water flows: lavatories - 1.5 gpm; showers - 1.8 gpm; urinals - 1 gallon/flush; and use 1.6 gpm/1.1 gpm flushometers for all toilets.

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**HL Rule .6225 & NH Rule .3401**  
 Installation and performance of building systems must conform to the approved design.

**WE Credit 2.4 & 2.5 Potable Water Use Reduction: Process Water & Building System Equipment**  
**Credit 2.4**

- *Reduce cooling tower blowdown rate (in GPM) by at least 20%.*
- *Use no potable water for vacuum pumps, air compressors, or mechanical seals on pumps.*
- *Eliminate the discharge of potable water to drain for equipment cooling using methods such as closed loop cooling condensate discharge for sterilizers.*

**Credit 2.5**

- *Provide a system to capture air handling system condensate for use in non-potable applications such as cooling tower makeup or irrigation. Re-use cooling tower and boiler blowdown water for other suitable purposes based on chemical properties of the blowdown water (generally make-up or irrigation).*

OR

- *Use municipality-provided non-potable water for all non-potable process water applications.*