

Insights from North Carolina Hospital Engineers Association members

Approximately two weeks ago, I emailed the following to over 600 NCHEA members:

Fellow NCHEA Members

I have been asked to serve on FEES (Facility Energy Efficiency and Sustainability) Work Group. This work group has been commissioned by the Governor to accomplish the following objective:

Objective Statement: *Establish policy guidelines to assure the development of energy efficient and sustainable design and construction for healthcare facilities applying to Certificate of Need for renovation or new construction of healthcare facilities in the state of North Carolina.*

The website link is: www.ncdhhs.gov/dhsr/mfp/meetings.html

I will be acting as the representative of the North Carolina Healthcare Engineers Association.

Having only been apart of this group now for one meeting, I am not sure where this is headed. I do know that the goal is to move hospitals and LTC into more energy efficient designs and operations. How we get there is up for discussion.

I would love to hear your ideas on strategies you think would help hospitals become more "green" (for a lack of a better word).

Can it be legislated (like Senate Bill 668 – requires all State buildings to be 30% more efficient than 2004 code)? Should it be left to the free market? Are there legislative road blocks that keep hospitals from moving forward? Should it be left up to the building codes?

What single thing could we do that would really help accomplish the stated task without overburdening the State or hospitals?

I know that I am not smart enough to figure this out, so I thought I would ask the people I know that are.

Please give this some thought and let me know your ideas. I would also like to hear any successful or not-so-successful "green stories" you may have.

A draft statement, titled Gen-4, from this committee has been included in the proposed changes for the 2011 State Medical Facilities Plan.

<http://www.dhhs.state.nc.us/dhsr/ncsmfp/2011/proposed2011.pdf> (page 44)

Thank you.

Bill Payne
Dir of Engineering
336-538-7775

I received many responses from our vendor members who wanted to explain why their product should be

incorporated in plan. Monday of this week, I sent out a second email to just the hospital engineers.

Fellow hospital engineers:

WAKE UP! I need your help.

I really need you to send me a response on this email. I have been asked to present the feedback (from the email I send out earlier) I received from our association to the Work Group this Thursday. I have received many emails from vendors suggesting why their product is going to save us all...but I have received very few emails from actual hospital engineers.

I do not want to tell the group that only two engineers replied so we really don't care what happens.

Please read the GEN4 draft and REPLY with a few comments. I have also included a memo from NCHA to the CEO of your hospital. I would truly appreciate not just a list of why this will never work, but some ideas on what would work. We have an opportunity to craft a position that will help each of our hospitals become more energy efficient than we are now and may even save our utility budgets along the way.

I have had one hospital tell me that they tried to design in energy efficient equipment into their building; however, DHRS forced them back into a more traditional systems. Have you had this experience?

If you could do any energy efficiency upgrade to your facility, what would it be? Why are you not doing it now? Is there anything that should put in to this bill that would help you accomplish your goal? (If you don't know what you would do, that is an acceptable answer as well. If you need to brush up on your energy management skills, please let me know that as well for I am the Program Chairman next year.)

I need some coffee.

Bill Payne
336-538-7775

The following are the email response I received from hospital engineers. I have made some modifications to their answers to protect their identity.

Bill, we can give you our view from a planning and construction standpoint. Some of this will echo the concerns in the FEES Workgroup minutes.

- A large number, probably the majority, of renovation projects over \$2m will have minimal to no effect on energy efficiency and water conservation. These projects will offer no opportunity to incrementally improve energy efficiency and water use.
- Item #1 says that there must be a plan, and reductions in energy and water use must be quantified. If the reductions are zero, would the plan be rejected?
- Every expansion project will increase energy and water use. Some renovations, such as replacing old bed units and ORs, will increase energy use when they are upgraded to meet

- current HVAC requirements..
- If requirements are not specific we could be subject to widely varying interpretations that could be extremely costly. Would a project with no HVAC changes be forced to include a new, more efficient air handler? Would a project with no lighting changes be forced to replace the lighting?
 - A definition of the measurement of annual percent reduction in energy use must be established.
 - Who would define compliance, and who would enforce compliance?
 - The pre-filing conference in item #3 will generate additional fees from design professionals and fees from the state agencies. The state agencies don't have enough people to attend the number of conferences that this will generate.
 - Ms Carol Hutchison should ask for more information from the six states who said they have green policies or energy goals in their CON programs, and provide details to the committee and our hospital community.
 - The net effect of all of the requirements is that healthcare projects will be more expensive, and that will add to the upward pressure on healthcare costs. Energy and water cost savings will not be enough to pay for these added costs.

I think it is a great idea to conserve energy. However, from what I have seen in construction for healthcare the building is designed around patient care not energy efficiency. I am new to management in healthcare but looking back as an electrician I think the way to make buildings more efficient is to mandate the use of efficient products. Ex. Going from T12 lamps to T8 lamps T12 lamps are being phased out by all suppliers, if it is an option to have a water reclaiming system on your condensate drains or spend the money on better medical equipment, the money will always be spent on the patient. If in the code it is mandated to reclaim condensate drain water then it will be included. I am not sure if this helps but if anything it is food for thought.

In our last project here, an 18 million dollar Med/Surg-ICU wing with renovations to the Cafeteria, Administration, Med. Records and some other small areas we did almost all the items mention on the list(GEN4) in our due diligence with our Architect and Engineering firm. Of course we mentioned none of this to DHSR and the CON section. However, when it came time to look at the actual cost of construction we had to scale back on our "green" efforts only doing some in the areas of: building envelope, water efficient fixtures, chiller efficiency, windows enclosures and digital controls for our environmental systems. We could not afford the additional cost of other items. As for the energy data that they have request (and also our architect and engineer) we had access to the data. It took additional time and effort with my staff to put this together and look at the pros and cons but I believe that it was worthwhile to do this. In my opinion, if I was now starting a new project of any size, I believe that having this information would be beneficial, however I believe that with the current economic conditions getting any hospital board to go along with all the "green" efforts proposed would be a significant challenge and to require it as part of the submittal for the CON could be detrimental to the project.

Bill we have always worked to make sure that we get the most energy efficiency equipment that we can and try to stay as close the energy star as we can. I have change out a lot of equipment in the past 10 years and in turn has helped keep our power cost down. We have been working on water changing out faucets to the automatic type to reduce water this is something that we do as we go long. We are for saving in any way that we can but there are time that you just can't do it. On the other side of it.

We look at the sustainability and energy efficiency when we are having projects designed but many times the additional upfront cost cannot be absorbed into the project. This would be very expensive for small hospitals like us and if small hospitals have to start putting this on the front line then that we cut from what can be used to better the patient care for our area.

Bill,
I have reviewed GEN-4 and have several comments.

1. Most healthcare facilities change so frequently that 3 years of energy history would show not information. Buildings expand, census changes, building use changes and systems changes very quickly.
 2. It is almost impossible to get DHSR to review drawings in a timely manner how will they find time to meet to review energy data. What makes them experts on energy usage?
 3. Hospitals usually are landlocked and have little choice on building orientation.
 4. If we are changing out major radiology or linear accelerators we could spent \$2,000,000 quickly and not even impact the building systems.
 5. We need to consider Emergency Preparedness and patient safety when designing systems and that is hard to consider these when merely looking at numbers.
 6. Healthcare systems are struggling t now and with new financing changes every penny will be important and might determine if a project to service the communities moves forward or is stopped.
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Two million is not a large capital project. I'm looking at adding a 2nd MRI and would expect it to run around the 2 million number. Since it would be an addition would I have to bring the whole building up? Not sure how we would do the day lighting and other items on the list.

I'm concerned it will add time and dollars to the projects.

I know CONs are competitive and they squeeze out every nickel. Most of the green I've seen is more expensive.

Thank you for an additional opportunity to make comment on this proposal. I agree that it would be very difficult for many healthcare facility related renovation to accurately quantify energy conservation achieved as many time the renovation does include installation of more equipment.

During the smaller renovations that were performed, all under the two million dollar mark, I have tried to focus as many "green" aspects (T12 to T8 lighting, 3.6 to 1.5 gpf toilets, low VOC paints, etc) as possible, providing our marketing group a tool putting us in better light with the public without actually putting a number on the savings.

I think somehow being able to provide a financial incentive (ROIs comparable with income tax rebates for the private sector), would help justify expenditures to some of the CFO and Finance Boards that we all must make in competing with our revenue generating counterparts from that same funding pool. That could be as simple as providing a way for a service provider to claim the rebate in their tax return, and allowing the savings to go back to the facilities, or having a grant request process.

For new construction, I don't think there should be any reason not to provide and require the most efficient structures and utilities by code. If you leave any gap to "value engineer" down then the lowest cost route will be the most used. If DHSR does not allow and actively pursue alternative concepts, then there must be a way to get a compromise solution discussion between these parties to bring the new ideas

to an expert forum helping lead us in new directions.

I believe our greatest energy efficiencies are already build, and it is imperative that NCHA partner with NCHEA in pushing current administrations and boards in funding initiatives to bring current facilities up to higher levels through, lighting retrofits, occupancy sensors, and mandatory environmental comfort ranges for temperatures.

My energy management skills are somewhat limited so it is difficult for me to make any specific suggestions about what should be included in this bill. However, the requirements outlined are onerous and will likely greatly increase the cost of design. Perhaps in some cases energy efficiencies will eventually recapture this additional expense, but this bill appears the continue to upward spiral of healthcare construction and renovation costs resulting from increasing regulatory requirements. I remember thinking that the program presentation from the Spring Seminar concerning the UNC Hillsborough Hospital would be onerous if applied to all healthcare construction. We have begun working with Duke Energy on some additional projects related to energy efficiency improvements. Let me know what I might be able to do to assist you. I appreciate your efforts to help shape these regulatory requirements in a way that is practical and maximizes benefits that will be received for our healthcare facilities.

I have a lot of mixed feelings on this issue. I am not a supporter of larger government and feel that a lot of these things, if not directly connected to safety of the occupants, should be left to the market. Usually, code mandated items do not offer reasonable pay back cycles that we as private facilities need to achieve for justification. The government usually relies on a 20 year pay back which is un heard of in the private world. I feel the "Green" word is highly over rated and usually creates a market for added expense to the end consumers that is not necessary. I also feel attaching the process to LEED and its points accumulation process would not be preferable. Mandating more day lighting of a building may not make it more economical to build and operate. More glass usually equals more heat loss/gain...what more economical, heating/cooling a building or lighting it?

If I could any energy conservation project I would want to do a total lighting control system with occupancy sensors and external light level sensors. Why am I not doing it??? Even in a smaller facility like mine (250K sq ft) it requires a lot of devices which means more control wiring (the ceilings are full now), more items to maintain in inventory, more items to maintain period. Switching out toilets/flush valves with low volume valves would be another low hanging opportunity but I am not confident that the low volume valves provide adequate flow for solid waste.

Policy GEN-4 sounds like an attempt by the NC Governor to place healthcare facilities in the same category as colleges, universities and state office buildings. As healthcare engineers, we all know that our buildings are occupied 24 hours a day versus 8-10 hours per day in non clinical buildings. We are also governed by stricter guidelines, such as AIA, NFPA, CDC , that do not apply to non clinical areas (and sub sequentially cause us to be larger consumers of energy and water) .

With that being said, I also believe that our Architects and Engineers have been remiss in the past as far as applying energy conservation thoughts and designs to our projects. This lack of energy conservation design was the result of relatively cheap energy in past years. It is my belief that Architects and especially Engineers have got to be re educated in the application of relatively inexpensive and practical energy and water conservation methods. Item 1 of Gen-4 will force the design Architects and Engineers into providing healthcare engineers with the additional tools needed to conserve finite supplies of energy and also upgrade existing buildings with this same intent. I do believe that Item 1 of GEN-4 does indeed have

some merit.

I see no need for Item 2 listed in GEN-4. Knowing previous use of energy and water will have little or no bearing on these usages in a new building or renovated area. This appears to be additional work being placed on an already taxed facilities engineering department.

I agree with Mike Vicario's comment on Item 3 of GEN-4: The potential impact would not only affect smaller facilities such as nursing homes and ambulatory care facilities, but also on all other construction and renovation projects, such as \$100 million additions. Item 3 could be included as part of the submission under Part 1 and save the high costs and time of everyone requested to be involved.

Hi Bill, I recently completed a new addition to the original hospital building. Although I believe the engineers did utilize energy efficient lighting, I do believe they could have done a better job with water conservation. We did just approve 5 lighting retrofit projects for our facility's upcoming capital budget with paybacks being 5 or less years. Our buildings range from 1934 to present and not all buildings have separate electric meters which make it difficult to monitor or provide load shedding equipment. I believe that government be it state or federal, will have to mandate energy efficiency requirements as most facilities will not spend the money unless it does pay for itself within 5 years and some hospitals may not have the capital to do so even with justification. Not sure if this helps you at all but I do think we need to become more efficient in more ways than utilities.

We felt that there are obvious challenges with aggressive statistical requirements for energy efficiency and water consumption if the latest ASHRAE goals are going to be looked at as a guideline. But, particular to the page of GEN4drft which you've requested comment I have the following comments:

- In the opening paragraph it mentions applicability to capital expenditures exceeding \$2M. Is that referring to the total CON budget (including FF&E) or is it referring to the cost of construction only? If the policy is referring to total CON budget then this policy would apply to an enormous amount of healthcare projects. I would be concerned with the states ability to review those additional submissions.
- Item 1 main paragraph – Because the CON process is so early in design often the proposed orientation and site plan for a building at the CON stage is changed to meet county and local requirements. I see this creating yet another instance of contradicting regulatory requirements and preferences. I am in a local jurisdiction that is very particular about site layout where that preference can often be a moving target. If information is provided pursuant to this policy as part of CON approval and the county or local authority requires revisions how would that be handled to ensure the CON is still complied with?
- Item 1.a. – Again, since the CON process is so early in design and often all that is done is site planning and conceptual design it is difficult for a system to stipulate quantifiable percent reductions and measured results. I have great reservations about the CON application requiring energy efficiency and water consumption quantifiable information regarding building performance and site efficiency so early in design. Would the CON process allow a deviation of X% from the stated performance data as they due with CON budgets? Will CON cost overruns be approved if due to adherence to energy and water efficiency costs? Will the quantifiable stats in the CON application be determined in approval of competing CON's? If so, how will the approved CON be held accountable if the final building does not meet performance criteria?
- Item 1.b. – This verbiage may provide a vast loop hole if challenged.

Our major concerns are

- 1) How will it impact the CON approval process?
- 2) In a competitive CON, how will the CON process ensure that the application can be reasonably achieved and isn't used in gamesmanship to present attractive performance data in an effort to gain approval over a competing CON?

- 3) What parameters and deviation will the project be allowed considering that the CON submission process does not allow full design documents to be complete prior to applying for CON approval?
- 4) We would like to see the capital expenditure threshold increased to \$5M of the cost of construction. That is the range in which energy and water efficiency systems can be reasonably achieved within the project budget without significant cost increases.
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I think this will work if most facilities and systems look at the past, present and future. Installing something now because it's cheap won't necessarily save you money down the road, chances are it will become an energy hog. I have a 660 ton chiller that was engineered for redundancy with total fit out of our hospital in mind. Good idea right, we won't reach total fit out for 20+ years! Our energy costs just went out the window.

Bill, if it is truly a guideline, then you don't want it legislated or in the building code. You sure don't want it in the licensure rules. If it is a guideline, it is voluntary and driven by marketing and peer pressure. If it has to be a requirement, then it ought to be in the building code. Legislation gets out of control or unrealistic. The building code is much easier for designers and owners to reference. Whether guideline or requirement, it should use an existing guide as a starting point.

[name removed]. is correct about us adding Preconditioning units to our new NC hospitals even though DFS would not give us credit in the design which would have allowed us to lower HVAC assets and cost. In other words, we had to bear the whole cost of units as additional capital allocation that takes up some of our 15% allowed CON cost overrun. It would have been acceptable design to reduce chiller and boiler capacities (and asset costs) to account for reduction in HVAC supply due to energy recovered, but DFS said the units were "risky" and might fail so we had to design full backup. As we are using bond money to finance project, we pretty much have to do what DFS (overseer of bond money) wants.

I am always skeptical about these types of government initiated programs. A great deal of legislation and codes that negatively affect hospitals have come from well intentioned people that do not have a clue. My only suggestion is that whatever recommendations etc. that come out of this are science based with sufficient evidence it is the thing to do, and that it is truly cost effective.

Bill,

Sorry for the tardy response but my wife had our 2nd child last week and I have been out of the office ever since. Any way some of my thoughts or info follows as well as some comments/questions on the Gen4 are included but am afraid with my lack of sleep that they may appear random.

- I do not think it should require a senate bill to force hospitals to meet requirements for sustainability when there is probably no agency in the state able to properly "police" this bill.
- It is very important that trying to save energy and providing more sustainable facilities does not get caught up in the politics of being "green". It is still a problem with LEED and other groups setting these green policies that being green does not mean that you will save energy. Though the latest version of LEED does take a step forward in focusing more on energy savings, many of the requirements in fact use more energy.
- We have a policy that projects must try to meet LEED Silver ratings on all new projects and must be at least LEED Certified. We have found throughout this process that many of the ideas being proposed in the design are done more to meet a LEED point requirement than to actually save energy or even to be worth while using life cycle cost analysis. This has been the case for the use of solar, the use of low voltage lighting control (especially daylighting with the high dollar ballasts and all the controls), photovoltaic panels, and other concepts. It is also worth noting that

many of these systems are not maintenance friendly and in fact would require considerable additional staff to keep the systems functioning that it is unlikely administration would ever approve that many FTEs.

- We would be very leery of getting on board with LEED as many states and other groups have been moving away from LEED due to the recognition that the cost of LEED certification is not worth it to have a plaque in the lobby. Many though try to use the guidelines as a road map in designing their buildings and we have no issue with that.
- The Maryland policy seems more the direction to go then the Massachusetts policy.
- The NC state energy policy requiring a percentage target below ASHRAE 90.1 for state building is a good guideline as it at least uses energy modeling and life cycle cost analysis and does need put all it's eggs in the LEED basket. Meeting the targets though in hospitals is not an easy proposition due to the 24/7 usage, code requirements, etc. and would need to be rewritten to be applicable to hospitals.
- We have had the experience with DHSR pushing us back to more traditional systems at times. One example is that DHSR did not support the use of heat wheels in ORs and other areas due to their concern still with cross contamination. We have had to remove this concepts from several past projects.

Well, hope this helps a little. I can tell you that the small rural hospitals will be the most impacted by these changes and I am afraid will be at the mercy of many other parties to try and meet any requirement thrown at them.

Bill,

I just got back from the ASHRAE annual meeting. At this time, activities regarding sustainability that I know of there are:

1. Standard 189.2 Energy Efficiency in Healthcare is starting a manual
2. The Std-62 committee is passing guidelines/regs regarding energy in hospitals
3. Std 90.1 is doing the same
4. There is also the Green Bldg Council doing something
5. Assoc of Energy Engineers has an accreditation program and tons of guides and classes
6. DOE/ASHRAE have just published the Advanced Energy Guide for Small Healthcare Facilities
7. Same group as above is talking about a guide for large healthcare facilities
8. EPA Energy Star program is trying to gather hospital energy use data
9. Lawrence Berkeley Lab has a contract with DOE to do the same as above in California
10. I will be the editor of the 2nd Ed of HVAC Design Manual for Hospitals and Clinics. It will have a major chapter on sustainability
11. ASHRAE has a MAJOR push on for sustainability. I'll bet 1/3 of all presentations at the meeting were on this topic
12. John Roberts made a presentation of the results of energy audits of 4 military hospitals, which we did
13. All the consulting engineers (incl me) agree that sustainability gets a lot of lip service but falls out when budgets get tight – and they always do
14. After all the blather, only lighting and HVAC controls improvements have acceptable paybacks
15. Every vendor is pushing energy efficiency, but some systems don't seem to be such good ideas for hospitals eg. Chilled beams

One point which was made very clear is that there is no good baseline data and it is not easy to get. So regs mandating x% reduction will be impossible to enforce. LBL is spending a ton of \$ to try to gather some data; with little success so far.

In short, I strongly urge your committee to plug into one or more of the above and not invent another guide/code/reg. Let the hospitals implement measures when/if they are cost effective, no legislation is needed. ASHE, ASHRAE and all of us are keenly aware of the desire to be green.

