BOSTON OFFICE

HEALTH CARE WITHOUT HARM-
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Date: January 10, 2011
Re: Improving Health Care Energy Efficiency and the MA EEAC 2013-15 Plan
To: Energy Efficiency Advisory Council
From:

Beth Israel Deaconess Medical Center	Mark	Lukitsch
Boston Medical Center	Leo	LaRosa
Brigham & Women's Hospital	George Player	Jim Turner
Cambridge Health Alliance	Barry	Hilts
Carney Hospital	Michael	Stack
Children's Hospital Boston	John	Connerty
Children's Hospital Boston	Paul	Williams
Dana Farber Cancer Institute	Rick	Malmstrom
Harvard Medical Collaborative	Orlando	Martinez
Heywood Hospital	Mike	Grimmer
Massachusetts Eye and Ear Infirmary	Steven	Chiavelli
Massachusetts General Hospital	Dennis	Villanueva
MetroWest Medical Center	Mark	Racicot
Partner's Health Care, and its 11 hospitals	John Messervy	Chai Srisirikul
St Elizabeth's Medical Center	Michael	Canning
Steward Health Care	Michael	Crowley
Tufts Medical Center	Robert	Loranger

January 10, 2012 spokespersons:

1) Mark Lukitsch, Energy & Utilities Manager, Beth Israel Deaconess Medical Center
2) James O. Turner, Utility Manager, Brigham & Women's Hospital

Facility leaders from all the major health systems in greater Boston have been meeting monthly since March, 2011, convened by the non-profit Health Care Without Harm, to advance energy efficiency in response to the emerging 2013-15 Plan, the Green Communities Act (GCA) and the Boston Green Ribbon Commission's Health Care sector Initiative.

Some important background:
Health care is, and will be on the front lines of the energy/climate issue due to our energy intensity, and because extreme weather events, air quality and other factors impact facility operations and clinical services at the same time we are reinventing ourselves to deliver care more effectively and efficiently. Ever more aggressive pursuit of energy savings is essential to an effective response. To reach a 25% reduction in GHG by 2020, a daunting challenge, we must push beyond current practices and collaborate with regulators and utilities to identify novel, persistent strategies we can share widely. We ask the Council to adopt our suggestions to enable "next generation" savings and help the Commonwealth reach its goals.

Healthcare's leverage is enormous and unique: immensely complex buildings and clinical equipment with 24/7 life and death operations, dedicated to "doing no harm." We are the Commonwealth and Boston's largest employers (454,000 / 100,000 respectively), and Boston's largest real estate holder with over 23 million owned square feet. Not counting significant leased space, we consume about 800 million kWh and about 36 million therms of natural gas annually, each roughly equivalent to 100,000 MA households. We're serious about energy/GHG reductions; a 10% energy reduction could save ½ a million tons CO2/year.

Energy efficiency and cost-effective clean energy are essential to the health and economic well-being of the Commonwealth, of its citizens, and to health care cost containment. Appendix 1 below shows the emissions reductions from the 2009-2011 statewide energy efficiency achievements are saving millions of dollars in health costs, and thousands fewer health incidents. We recommend the Council strongly encourage the DPU to adjust the Total Resource Cost Test to include such benefits. This will reduce environmental health burdens, which unequally impact our most disadvantaged, vulnerable populations. Health is energy efficiency's most important non-energy, strategic, and economic benefit.

As institutions at such scales, we support the GCA, and think the GCA/EEAC plans need to maintain an achievable, yet aggressive savings rate, reduce barriers and increase access, improve data collection to drive continuous program improvement, and position EE as a key strategy to improve the health of citizens of the Commonwealth, reduce loss of jobs and strengthen our economy.

From the public health and health care sector perspectives, energy efficiency and clean energy supply are essential components of a healthy and resilient society. As health institutions, we strive to mitigate the adverse health impacts of conventional energy use, to heal patients from unavoidable impacts, and to properly value in our business decisions the health benefits of energy efficiency. Health Care Without Harm has estimated the health benefits of the 2009-2011 statewide energy efficiency plans with their Healthcare Energy Impact Calculator, and found the health savings run into millions of dollars and thousands of individuals (see Appendix 1). As a result, we recommend the next 3 year plan consider such data in evaluating projects' cost effectiveness, and consider public health as perhaps the single most important non-energy benefit for the Commonwealth. We ask you urge the DPU to include such factors in a new Total Resource Cost Test.

We applaud the Council and the Utilities in your ongoing efforts to develop and implement increasingly sophisticated C&I approaches, e.g. multi-year, multi-utility MOUs. There are also needs to: 1) conduct "myth-busting" education for C&I customers on current and emerging offerings, and 2) to engage more customers in the programs at deeper levels.

We are the most cohesive, energy intensive, forward thinking sector you will find, with the ability to make the largest impact. We are ready to work intensively with you and the utilities. Specifically:

1) Programs should develop prescriptive specifications on sequences of equipment operation, and for key equipment.
Sophisticated energy conservation systems can be seriously compromised if the necessary synergistic sequence and/or behaviors of the system components aren't honored. Prescriptive equipment packages and incentives can assist integrated design, and neutralize "value engineering" tripwires, which can diminish lifecycle savings.

Prescriptive specifications and sequences must be linked to operational and maintenance best practices.

2) Programs should support better metering, software and monitoring as essential gateways to deeper savings. Most hospitals have only one or a few meters, obscuring details of how energy is utilized; the nearly 2M square foot Brigham is served by a single electric meter. We need data at a more granular level to integrate energy management and clinical needs so we can target our efforts, detect and correct aberrational usage, monitor and maintain conservation measures, and drive behavior change.

Standardized sub-metering, water and steam monitoring specifications and protocols should be developed to push vendors for lower cost, accurate systems that can be widely deployed. This will be valuable for all C&I sectors. As part of this effort, we need to **collaboratively determine both the key system attributes, and the extent to which such systems reliably identify new savings, so they can be considered for incentives in clearly defined circumstances.** Pilot efforts need to mature into more sophisticated and effective continuous commissioning and building energy management.

3) Implement deeper financing and incentives, especially for economically stressed institutions
Especially as healthcare reimbursement rates decline, hospitals lacking financial resources and/or depth in their facility departments need finance assistance, and to carry a smaller share of project costs. Such support can be tied to conditions such as utility/client MOUs, institutional energy master plans, finances, and adjusted lifecycle savings, perhaps with utility payback coming from later energy savings. Meeting such criteria would unlock support for scoping, Strategic Energy Master Plans and project implementation. Joint strategic MOU's, a single document addressing all relevant utilities, with the above will:

a. Broaden and deepen hospital participation
b. Optimize projects by integrating electrical, thermal, water, sewer and building shell improvements to achieve better first costs, lifetime savings and environmental benefits through honest evaluation of all synergies and interactions across fuel types.
c. Enable projects with longer returns on investment, by including installed costs and technology adjusted-lifecycle savings
d. Reduce barriers by minimizing the time needed to develop MOU's

4) Fourth and finally, programs should support a deep dive into energy efficient behavior change in health care, life sciences and other energy intensive situations, and publish the results
Quantification of the benefits and challenges of energy efficient behavior change in health care deserve a fresh, holistic, thorough effort due to our energy intensity and huge staff population, 454,000 statewide. Pilots could target areas like labs and imaging, and need to cut through the perceived "squishyness" of behavior change. We need strong protocols for benchmarking, evidence-based program design, and sustaining program gains. We see opportunities for sector-wide marketing materials, surveys, energy efficient product distribution, and studies of multiplier effects, i.e. workplace impact on behavior at home.

We can use these behavior change efforts in our work with Massachusetts Department Public Health and Boston Public Health Commission to advance clinician understanding of energy efficiency's role in mitigating climate change's huge threat to public health. It can help physicians, nurses etc. use their significant influence to promote energy efficient change at work, in their homes and communities.

Thank you for your time. Healthcare will work with you to advance energy efficiency programs in ways that keep the Commonwealth #1, nationwide.

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Appendix 1 of 1
Health Benefits of Green Communities Act/EEAC
Three Year 2009-2011 Energy Efficiency Goals

From the public health and health care sectors perspective, energy efficiency and clean energy supply are essential components of a healthy and resilient society. Many private, non-profit, federal and state policies, programs, initiatives, guidance documents and peer-reviewed publications strive to mitigate the adverse health impacts of conventional energy use. In support of the EEAC's efforts, the Global Warming Solutions Project asked Health Care Without Harm to use its Healthcare Energy Impact Calculator to provide a "first-pass" quantification some of the important health benefits of the GCA/EEAC 2009-2011 energy efficiency goals, which follow.

Since such estimates reflect the enormous value energy efficiency provides the Commonwealth, we recommend the EEAC and the next 3 year plan:

1) Consider such data in evaluating projects on cost effectiveness, and public health as perhaps the single most important non-energy benefit, that also returns important economic, job protecting/creating impacts.
2) Develop fully-vetted, utility-grade estimates of such positive impacts.

Methodology: What is the Health Care Energy Impact Calculator (EIC)?

The Health Care Energy Impact Calculator (EIC) is a free web-based, self-serve tool, created by the non-profit Health Care Without Harm[1], that estimates emissions and a handful of the resulting negative health impacts from power plant emissions (www.eichealth.org). The EIC uses data from the U.S. Environmental Protection Agency (EPA), U.S. Department of Energy (DOE), and other peer-reviewed literature to build conservative estimates[2]. EIC users enter their electric utility region and annual kWh consumption and the EIC displays:

- Estimated CO2, SO2, NOx and mercury emissions
- Number of health incidents for premature mortality, chronic bronchitis, hospital and emergency room visits, asthma attacks, respiratory symptoms, work loss days, and mercury-related health impacts
- Average health care facilities' costs for treating these incidents
- External societal costs for the incidents, based on the EPA's Clean Air Interstate Rule's "Willingness to Pay."

The Commonwealth's existing 3 year energy efficiency goals input to the EIC show the 2,625,600 MWH savings, if maintained, will yield estimated annual avoided emissions, health benefits and savings as follows.

#MORE#

[1] Health Care Without Harm (HCWH) is a coalition of more than 500 health-related organizations in 52 countries working to transform the health care sector, without compromising patient safety or care, so that it is ecologically sustainable and no longer a source of harm to public health and the environment.

[2] The late Dr. Paul Epstein of Harvard's Center for Global Health and the Environment, and author of "Full cost accounting for the life cycle of coal" (2011) and many other works, called the EIC estimates "extraordinarily conservative." –Lipke/Epstein personal communication

GCA/EEAC 3 Year Plan 2009-2011 - *a a - (000) 000-0000*

7: NEPP/NE Select from Map

Northeast Power Coordinating Council/ New England

kWh pe 2,625,600,000

Clean Energy Fraction: 0 %

Calculate

Pollutants	Annual Quantity	Pollutant Permit Costs	
SO2 (Tons):	3,779.44	$2,071,134	per year
NOx (Tons):	835.99	$2,466,157	per year
CO2 (Tons):	1,108,753.78	$19,957,568	EU Pricing
Mercury (lbs):	26.54	$1,725,295	per year

Incidents	Per Year	Societal Value	Direct Medical Costs
Premature Death:	11.75	$79,385,115	$3,520,298
Chronic Bronchitis:	7.48	$3,537,826	$905,072
Hospital Visit Incidents:	10.63	$139,859	$111,500
Asthma Attacks:	241.12	$14,507	$13,831
Respiratory Symptoms:	11,501.99	$418,374	$418,374
Work Loss Days:	2,122.08	$386,187	$359,223
Mercury Related:	N/A	$3,713,367	$3,713,367
Totals:	**N/A**	**$87,595,234**	**$9,041,664**
Unintended Impacts/kWh:		**0.03336**	**0.00344**

Furthermore, **the 30,884,096 lifetime MWh savings** would yield estimated avoided emissions and health benefits of:

GCA/EEAC 3 Year Plan 2009-2011 - *a a - (000) 000-0000*

7: NEPP/NE Select from Map

Northeast Power Coordinating Council/ New England

kWh per 30,884,096,000

Clean Energy Fraction: 0 %

Calculate

Pollutants	Annual Quantity	Pollutant Permit Costs	
SO2 (Tons):	44,456.37	$24,362,092	per year
NOx (Tons):	9,833.43	$29,008,622	per year
CO2 (Tons):	13,041,917.37	$234,754,513	EU Pricing
Mercury (lbs):	312.22	$20,294,101	per year

Incidents	Per Year	Societal Value	Direct Medical Costs
Premature Death:	138.18	$933,781,793	$41,408,141
Chronic Bronchitis:	87.97	$41,614,315	$10,646,066
Hospital Visit Incidents:	125.00	$1,645,118	$1,311,540
Asthma Attacks:	2,836.19	$170,638	$162,681
Respiratory Symptoms:	135,294.25	$4,921,193	$4,921,193
Work Loss Days:	24,961.32	$4,542,603	$4,225,428
Mercury Related:	N/A	$43,679,151	$43,679,151
Totals:	**N/A**	**$1,030,354,810**	**$106,354,199**
Unintended Impacts/kWh:		**0.03336**	**0.00344**

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What about thermal savings, in buildings?

The web-based EIC is limited to electric generation, but Health Care Without Harm is developing a companion thermal health impact tool for emissions from buildings' boilers, chillers, and turbines. The alpha version, similarly based on EPA and US DOE's National Renewable Energy Laboratory data[3], can provide a (crude) estimate of some of the resulting benefits, based on the Commonwealth's existing 3 year energy efficiency goals of 57,402,198 therms in savings. Assuming all the savings are from natural gas, this calculations yield estimated avoided annual health benefits and savings of:

Impact	Incidents	Societal Value
Premature Mortality	0.54997	$3,716,441
Chronic Bronchitis	0.34738	$164,208
Hospital + ER Visits	0.51123	$6,714
Asthma Attacks	11.2792	$700
Respiratory Symptoms	509.415	$18,467
Work Loss Days	99.2362	$18,059
Mercury Related	N/A	$208,731
Total	**N/A**	**$4,133,319**
Unintended Societal & Direct Health Impact Costs per MMbtu		**$0.70**

Furthermore, 897,481,544 therms **lifetime savings** would yield avoided health cost benefits of:

Impact	Incidents	Societal Value
Premature Mortality	8.59869	$58,107,070
Chronic Bronchitis	5.4312	$2,569,094
Hospital + ER Visits	7.99305	$105,147
Asthma Attacks	176.35	$10,581
Respiratory Symptoms	7964.68	$289,733
Work Loss Days	1551.55	$282,288
Mercury Related	N/A	$3,264,567
Total	**N/A**	**$64,628,479**
Unintended Societal & Direct Health Impact Costs per MMbtu		**$0.70**

Note: The health benefits of thermal EE programs will be much greater since other fuels, especially coal and fuel oil have significantly greater health impacts. As stated in the footnote above, EIC estimates are considered to be very conservative by environmental health scientists. For comparison, Abt, McCubbin et al (2010) estimated annual MA health impacts from emissions from coal fired power plants only as follows:

[3] Energy and Emission Factors for Energy Use in Buildings, Deru and Torcellini, US DOE, NREL

"Estimated 2010 Health Impacts of Coal-fired Power Plants

	Berkshire County	Hampden County	Worcester County	Middlesex County	Essex County	Plymouth County	Suffolk County	Bristol County	Barnstable County	**Total**
Deaths	11	29	24	41	25	22	18	32	14	**216**
Heart Attacks	18	49	43	85	48	41	32	59	24	**399**
Asthma Attacks	105	438	402	728	417	369	308	501	98	**3366**
Hospital Admissions	8	22	20	38	21	18	15	26	10	**178**
Chronic Bronchitis	5	16	15	29	15	14	13	20	6	**133**
Asthma ER Visits	4	15	14	26	15	13	12	18	3	**120**

Source: Clean Air Task Force, 2010

These impacts also carry with them a significant monetary cost of $1,848,355,000, as shown in the table below. The National Academy of Sciences[4] (2009) reveals that coal-fired power plants generate the most damages including pollution effects on public health, crops, timber yields, and more. Epstein et al. 2011 estimate that the life cycle impacts of coal and the waste stream generated are costing the public a third to over one half a trillion dollars annually. The cost of coal in MA in particular, is even more expensive when one considers that in the absence of a natural reserve, the Commonwealth must import all its coal from abroad, including from places like Indonesia. In this context, accounting for the damages related to coal conservatively doubles to triples the price of electricity from coal per kWh generated.

Costs Expressed in Thousands of Dollars, by County, of Coal-fired Power Plants

	Berkshire	Hampden	Worcester	Middlesex	Essex	Plymouth County	Suffolk	Bristol	Barnstable	**Totals**
Deaths	$77,000	$210,000	$170,000	$300,000	$180,000	$160,000	$130,000	$240,000	$99,000	**1,566,000**
Heart Attacks	$1,900	$5,400	$4,700	$9,400	$5,200	$4,500	$3,400	$6,400	$2,500	**43,400**
Asthma Attacks	$6	$23	$21	$38	$22	$19	$16	$26	$5	**176,000**
Hospital Admissions	$180	$510	$450	$880	$490	$420	$330	$610	$240	**4,110**
Chronic Bronchitis	$2,300	$7,100	$6,600	$13,000	$6,800	$6,000	$5,700	$8,700	$2,600	**58,800**
Asthma ER Visits	$1	$6	$5	$10	$6	$5	$4	$7	$1	**45**

Source: Clean Air Task Force, 2010 **Total (not in thousands): $1,848,355,000"**

[4] *Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use*. The National Academy of Sciences, 2009

While further health benefit quantification is beyond the scope of this document, we recommend the DPU and the next 3 year plan consider such data in evaluating projects on “all cost effective measures” and their important non-energy benefits.

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