



the campaign for
environmentally responsible
health care

BOSTON OFFICE

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Recommendations for the 2013-2015 EEAC Plan and Health Benefits of Massachusetts' Current Three Year Energy Efficiency Goals

Health Care Without Harm is a coalition of more than 450 health-related organizations in 52 countries working to transform the health care sector, without compromising patient safety or care, to be more ecologically sustainable and no longer a source of harm to public health and the environment. More than 15 years ago, our first major campaign, initiated in Massachusetts in combination with US EPA rulings, led to the elimination of over 5500 medical waste incinerators (MCI) nationwide, including 77 in MA. The steam autoclaves that replaced virtually all the MCI's saved the sector millions of dollars (it cut Mass General's costs in half) and virtually eliminated the incinerators' dioxin and other toxic emissions.

We have been increasingly focused on green building, energy efficiency (EE) and climate issues for nine years. As with the incinerator campaign, MA and Boston hospitals are leading a nation-wide transformation in mindset and practice around energy efficiency. In Boston we currently coordinate the efforts of more than 20 hospitals working under Boston's Green Ribbon Commission, including:

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	Bob	Loranger

We strongly endorse the four program recommendations of these institutions, submitted separately:

1. Develop prescriptive specifications on sequences of equipment operation, and for key equipment.

2. Support for better metering, software and monitoring as essential gateways to deeper savings.
3. Implement deeper financing, technical support and incentives for economically stressed institutions.
 - a. These are, in-effect, our sector equivalent of a large “Hard to Reach/Hard to Serve community worthy of closer attention.
4. Support for a deep dive into energy efficient behavior change in health care, life sciences and other energy intensive situations.

While time did not allow all the institutions to ‘sign off’ there is good support on several more points:

5. For new acute care buildings and other major types, the Plan should support the development of a voluntary, periodically updated, energy performance target, e.g. total use of not more than 190 kBtu/sq, by 2020. To ensure such targets attract commitments and ensure these are met, a signed MOU (or similar) would be combined with utility technical support, incentives and or financing packages --tailored to health care’s unique complexities. The effort would start at the very early stages of integrated schematic design to prevent value engineering out of EE and/or renewables.
6. Early analysis shows it will be impossible for healthcare to achieve the MA GHG reductions goals of 80% GHG reductions by 2050 without sizeable, scalable renewable supply. Energy Efficiency alone will not suffice. **Given the need to reduce energy use as much as possible before sizing clean energy systems and the time needed for institutions to develop such resources, it is not too soon for the Plan to support serious collaborative discussions between the Commonwealth, utilities and the sector.** Several systems are seriously exploring substantial investments in solar and wind, but are finding that significant legal, technical, and financial barriers, as well as SREC and other pricing uncertainties would be best dealt with at a more systemic level. We’d also like to explore that if an entity’s strategic energy master plan is being fully implemented such that it is on track to meet or beat clear and aggressive energy reduction criteria, such implementation would trigger incentives, financing, etc. that help bridge the gap on payback for renewable energy feasibility studies, design and/or installations.

Since the energy efficiency health benefit estimates below reflect the enormous value provided to the Commonwealth, we also recommend the 2013-15 Plan and support coordinate:

7. Work with the public health agencies, health care, and utilities to develop fully-vetted, utility-grade estimates of such positive impacts that can guide DPU work and future 3 year plans.
8. State and utility assistance in implementing state-wide, detailed reporting of health care electrical and thermal energy use. The hospitals strongly prefer this be collated and rolled up by a third party who can protect confidentiality and work collaboratively to benchmark sector energy efficiency. Financially and resourced-stretched health organizations can then understand their energy performance in context, and those with the most potential savings will be more receptive to meaningful action. Other C&I sectors could be similarly assisted.

If the above measures are integrated into the Plan and implemented, Boston’s status as a “medical Mecca” worldwide can be matched on the operations side, as these facility leaders make their efforts a national model on energy efficiency and GHG reduction.

“Forward thinking healthcare CEOs are making a strong business case for energy efficiency as a cornerstone of their sustainability policies. They are also considering the economic, social and even personal impacts of their practices. As a result, healthcare thought leaders have adopted a broad, systems-thinking approach to sustainability. *The result: energy management now sits side-by-side with clinical and financial governance.*”

--David Ray for BetterBricks

We think health care deserves special attention from the Council due to two not-well-recognized overarching facts. First, health care is and will be for the foreseeable future, on the front lines of the energy/climate issue. This is due not only to our energy intensity, but because extreme weather events, air quality, disease vectors, sea level rise and other factors are already impacting emergency response planning, facility design, operations, and demand for clinical services. It’s an inconvenient truth that this challenge comes at the same time the sector is busy trying to reinvent itself to deliver care more effectively and efficiently. Despite that ‘minor distraction,’ ever more

aggressive pursuit of energy savings and clean energy supply are essential to our response to this extended, emerging public health and our larger structural health care crisis.

Second, healthcare's energy obligations and leverage are enormous and unique. We have immensely complex buildings and clinical equipment with 24/7 life and death operations dedicated to "doing no harm." We are the Commonwealth's 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. This will reduce environmental health burdens for everyone, and especially for our most disadvantaged, vulnerable populations who suffer most from the cumulative impacts of multiple negative social and environmental determinates of health.

Because of all this, we strongly support the Council's and Utilities' nation-leading efforts, and think the forthcoming plans need to maintain achievable, yet aggressive savings rates, and continue to 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.

We urge the EEAC-approved plan support even greater engagement of large energy consumers. We applaud the Council and the utilities in their 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.

From the public health and health care sectors perspective, energy efficiency and cost-effective clean energy supply are essential to the health and economic well-being of the Commonwealth, of its citizens, and to health care cost containment. Let's talk numbers. In support of the Council's efforts, we used our Healthcare Energy Impact Calculator (EIC) to provide a rough quantification of some of the important health benefits of the Commonwealth's 2009-2011 energy efficiency goals.

The EIC is a free web-based, self-serve tool 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 data to build conservative estimates¹. EIC users enter their electric utility region and annual kWh consumption and the EIC displays:

- Estimated CO₂, SO₂, NO_x 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 following screenshots show the emissions reductions from the 2009-2011 statewide energy efficiency achievements are saving millions of dollars in health costs, and resulting in thousands fewer adverse health incidents. **Health is our most important non-energy, strategic, and economic benefit.**

Using the EIC with the Commonwealth's existing 3 year energy efficiency goals, we find the 2,625,600 MWH savings, if maintained, will yield estimated annual avoided emissions, health benefits and savings as follows.

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¹ 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

Northeast Power Coordinating Council/ New England

kWh

Clean Energy Fraction: %

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:

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7: NEPP/NE

Northeast Power Coordinating Council/ New England

kWh per Year:

Clean Energy Fraction: %

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 National Renewable Energy Laboratory data², 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:

“Estimated 2010 Health Impacts of Coal-fired Power Plants

² Energy and Emission Factors for Energy Use in Buildings, Deru and Torcellini, US DOE, NREL

	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. The National Academy of Sciences³ (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'

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³ *Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use*. The National Academy of Sciences, 2009

As stated above, since such estimates reflect vitally important non-energy benefits, we recommend the 2013-15 Plan include:

7. Work with the public health agencies, health care, and utilities to develop fully-vetted, utility-grade estimates of such positive impacts that can guide DPU work and future 3 year plans.
8. State and utility assistance in implementing state-wide, detailed reporting of health care electrical and thermal energy use to a third party who can protect confidentiality and work collaboratively with the sector to benchmark and improve it's energy efficiency. Other C&I sectors could be similarly assisted. Such data will also help identify hospitals with the most potential savings, and dovetail with providing special attention and support to financially and resourced-stretched health organizations.

We will file comments with the DPU regarding Order 11-120, but we ask the Council strongly encourage the DPU to adjust the Total Resource Cost Test (TRC) to include such benefits in a rigorous, sound way. Insofar as the EEAC is concerned, the fuel targets in the Clean Energy and Climate Action Plan for 2020 (CECP) are far more likely to be met by the incorporation of health savings and avoided carbon costs in the benefit-cost analysis in the upcoming Plan. For the PUC, we see the CECP as the functional equivalent of a regulation currently in place that will increase the value of avoided carbon in Massachusetts. As a result, the Department should start its inquiry with the assumption that the Plan is the foundational policy to drive the calculation of avoided health costs and carbon prices.

It is in the best interest of ratepayers not to leave sound and cost-effective energy efficiency investments on the table. Cleaner air, reduced emissions, better public health and job creation need to be part of the TRC to more comprehensively reflect benefits of efficiency programs from a societal perspective. Adjustments should include applying a cost-effectiveness test that values non-energy benefits (e.g., environmental, economic development, and improved consumer health, safety, and comfort) with high societal value even if they some programs might carry a fairly high program expense per unit of energy saved, and thus fail a traditional application of the TRC test. The procurement of energy efficiency resources needs to be scrutinized in a manner consistent with their recognized ability to assist the state in meeting imperative public policy goals. The current regulatory framework is weighted *against* energy efficiency resources compared with, for example, how traditional electric supply (generation, transmission and distribution) is regulated.

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. Because of this, we support the Council in seeking aggressive savings rates, reduced barriers, increased access, and improved data collection and transparency to drive continuous program improvement. **Health care is perhaps the most cohesive, energy intensive, forward thinking sector you will find. We have the ability to make perhaps the largest impact. We are ready to work intensively with you and the utilities.**

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. **Health is our most important non-energy, strategic, and economic benefit.**

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Respectfully submitted for Health Care Without Harm:

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