



Hingham Net Zero Final Comments – Proposed Stretch Codes Summarized in DOER 2/8/2022 Presentation. (This email supersedes the email sent on 3/7/2022.)

I am submitting these Final Comments on behalf of Hingham Net Zero, a grass roots climate action voluntary association in Hingham, MA. We were instrumental in 2021 in persuading the Town to commit to the goal of net zero carbon emissions by 2040. Hingham is a Green Community and as such will, at a minimum, adopt the newest stretch code. We anticipate that we will advocate that the Town opt-in to the new “specialized, opt-in (net zero)” stretch code, probably at its 2023 Town Meeting.

I. Introduction

Hingham, like many small Massachusetts towns, is predominantly a residential community. HVAC is by far our biggest source of emissions and our biggest challenge. Electrification of HVAC is essential to success. In order to meet our aggressive net zero by 2040 goal, it is urgent that we have the support of strong energy codes standardized across the Commonwealth. As your slides point out, new buildings constructed between 2024 and 2050 will comprise **27% of the built environment by 2050**; these are the easiest to make net zero compliant and **the new stretch codes must mandate that**. However, by subtraction, this also means that fully **73% of the built environment will be older structures**. In Massachusetts, much of our housing stock ranges from antique to simply old. These structures, which must be optimally weatherized and retrofitted with non-fossil-fuel technology, are in many ways the bigger challenge. Unlike the more easily monitored large projects, these small retrofits will involve hundreds of thousands of local renovations.

II. Two Overarching Comments:

- a. It is not consistent with the purpose and intent of the Commonwealth’s climate policy Roadmap to limit the **scope** of the new stretch codes to **new** buildings. The codes must address **both new construction and renovations of existing buildings**.
- b. It is illogical to release “specialized, opt-in (*net zero*) stretch codes” **without providing a definition of a net zero, or net zero-ready building**. Our experience is that there is wide confusion around these terms and many different competing definitions. DOER’s definition is critical context for understanding the new codes and its absence hampers our assessment and will hamper implementation.

III. Proposed stretch code for residential buildings:

Main points of our comments:

- The Stretch Code should apply to both new buildings as well as retrofits/renovations.
- Electric heat pumps should be mandated now.

- No HVAC incentives/rebates should be allowed until Energy Efficiency (EE) measures have been implemented in terms of insulating, air sealing, etc.
 - The DOER should make “Manual J” software analyses available to contractors cost-free, especially small contractors doing home renovations.
 - Trading off potential “envelope” improvements for delayed electrification ignores the climate impacts of deferring the immediate 64% reduction in emissions possible by mandating heat pumps.
 - Contractors will stay with fossil fuels until mandated otherwise. DOER must lead by forcing their transition to electric heat pump technology, including funding re-training, if necessary.
 - DOER should publish data bearing on capacity of grid to support electrification of HVAC.
1. DOER slide #20 makes the following strong case for electric heat pumps in terms of energy efficiency, construction cost, operating cost and overall emissions when compared to natural gas:
 - a. “Better air sealing and ventilation is all that is needed to reach HERS 42-45”.
 - b. “Incremental costs savings range from \$11,938 to \$28,597 after incentives.”
 - c. In contrast, gas-heated homes will entail preponderantly some level of additional expenditure to meet the proposed HERS42 standard up to as much as \$7,900, after incentives.

These facts beg the obvious question: ***why not mandate electric heat pumps now?*** This would be far more affordable for the consumer/developer, would be much simpler and easier for building departments to understand/enforce, and most importantly, would decouple residential housing from natural gas *now*, with an immediate 64% savings in carbon emissions compared to gas due to higher efficiency, *regardless of the fuel mix currently reflected in the electric grid* (see Slide #14 and below).

2. The only reasons for not mandating heat pumps would be if:
 - a. The DOER has information indicating that there are plans/investments reliant on natural gas HVAC in the pipeline of sufficient volume such that developers would not be able to make the needed adjustments in time to comply with a ban on fossil fuels. If so, it would be helpful if these *data* (not hyperbolic lobbying assertions) were made public.
 - b. The DOER is wagering that it would precipitate better overall, longer range residential energy efficiency insofar as those developers opting for natural gas would have to meet more stringent building envelope requirements (Slide #20: “some combination of triple-glazed windows, improved insulation, better air sealing and heat recovery ventilation”). These higher standard “envelope” efficiencies would constitute a longer range investment in lowered emissions insofar as they would last long after the original gas-fired equipment needed to be replaced (with what at that point would be required to be electric equipment.) However, this would seem like a marginal bet and would ignore ***the time value of emissions*** – in terms of cumulative climate impact, a ton of CO2 saved now is worth more than one and a half tons saved in 2045.
 - c. DOER does not think that sufficient electric generating/distribution capacity is available to power all new residential construction in the next several years. Again, if so, please share the data.

- d. DOER does not think that the requisite contractor capabilities are resident yet in the Commonwealth sufficient to accommodate what the resultant demand would be if heat pumps were to be mandated. We believe this may be a real problem but watering down “stretch” energy codes to enable avoidance is not the answer. If the DOER has data on this, then let’s have the public discussion. Better to face the issue head on.
- e. DOER should force the transition to electric heat pump technology and should foster and finance the re-training of HVAC technicians as needed to ensure adequate installation capacity.

If allowed, HVAC contractors will continue to do what they have always done, what they are familiar/comfortable with, what they think they can make money on and what will be least disruptive to their traditional business model. In the last few years, some of us have personally been subjected to outright lies (the polite term is “demarketing”) by contractors avowing that heat pumps are not effective below 30 degrees F and are not “appropriate” for a whole house solution. This is at the same time that DOER was offering alternative energy credits for whole house installations! Contractors often fall on a continuum ranging from simple lack of knowledge/training to outright mendacity. We need to help them begin to change their business model to electric HVAC *now*. Further delay will only prolong this essential transition.

- 3. Especially in retrofits and renovations, efficient heat pump HVAC installations will be less efficient if contractors oversize them due to inefficient building envelopes.
 - a. HVAC rebates should be made contingent upon completion of data-driven Energy Efficiency (EE) assessments and implementation for both new buildings and renovations.
 - b. The relative magnitude of HVAC incentives and rebates should be harmonized with those for baseline insulating and air sealing.
 - c. Indoor air quality should not be neglected.
 - d. There are Manual J software programs available to ensure “right sizing” HVAC, but they are typically outside the capabilities of many smaller installers who do renovation work.
 - e. The DOER should support contractors by providing information on industry best practices, making “Manual J” services easily accessible for free from a centralized or regional source and requiring their use for owners seeking to qualify for rebates and incentives.
 - f. The DOER should build this common sense, sequential process into the proposed opt-in Stretch Codes.

IV. Proposed specialized “net zero” opt in stretch code for both residential and commercial buildings:

Main points of our comments:

- Code should apply to both new buildings as well as retrofits/renovations.
- Electric heat pumps should be mandated now.
- No HVAC incentives/rebates should be allowed until Energy Efficiency (EE) measures have been implemented in terms of insulating, air sealing, etc.
- The DOER should make “Manual J” software analyses available to contractors cost-free, especially small contractors doing home renovations.

- Fossil fuel-fired buildings and retrofits/renovations should not be allowed in this ostensibly more aggressive code.
 - The term “fossil fuel” encompasses oil, coal and propane. If the DOER has data that shows that natural gas must be allowed for an interim period, at a minimum, these other fossil fuels should be banned.
 - The phrase “electrification ready (pre-wiring)” is vague, unenforceable, implies that all retrofits can be accomplished by providing for wiring, and invites gaming.
 - The provision “solar on roof where feasible” should be amended along the following lines;
 - How do building departments adjudicate feasibility? Eliminate or better define.
 - Solar on roof, canopy solar or ground installations should be allowed.
 - Metrics should be established ensuring solar arrays are proportional to building size.
 - Solar should be ready to produce electricity upon occupancy
 - On no account should an opt-in stretch code that allows fossil fuels, especially oil, propane and coal, be labeled “net zero.”
1. Why are these ostensibly more aggressive codes allowing “fossil fuel” of any kind? Consider:
 - a. The 2/8/2022 DOER presentation notes that 27% of all buildings in 2050 will have been built after 2023.
 - b. Our rule of thumb in Hingham is that new municipal buildings will have a useful life of at least 50 years or more.
 - c. That means that, in 2050, 27% of the total buildings then extant will have at a minimum at least one half their useful lives still ahead; later buildings will last proportionately longer. By subtraction, it also means that almost three quarters of our stock will be older buildings built before 2023.
 - d. Together, these metrics guarantee a dauntingly large volume of retrofits, not only for pre-2024 buildings, but also, inexcusably, for newer buildings. Retrofits are by definition more expensive than “doing it right the first time.” In Hingham town governance parlance, we call this “kicking the can down the road.”
 - e. Even for communities served by a grid powered by a high percentage of fossil fuel (or even 100% ,“cleaner” gas), electric ground or air source heat pumps still lead to an instant net reduction in overall emissions because of their comparatively higher energy efficiency – less energy used means lower emissions. Slide #14 states that electric heat generates 64% fewer emissions than natural gas. So even now, regardless of how “dirty” the relevant grid may be, heat pumps lead to an **immediate 64% reduction in emissions**. In 2050, when the grid is largely carbon free, that number will reach 98%. Though oil is not cited, the savings in emissions is dramatically higher still with electricity compared to oil.
 - f. All of the above argues that a true “net zero” stretch code should prohibit fossil fuels in both new buildings and retrofits/renovations. The DOER’s own slides in effect strongly argue that **there is no rationale for not requiring all-electric HVAC now**. If there is a rationale, DOER should state it for public evaluation.
 2. The proposed opt-in stretch codes reference “gas, propane or other fossil fuel,” which by definition includes oil (or even coal!) . In what world is it necessary today to allow a new building

to be heated with oil? With a few electrical lines depicted on a blueprint and two solar panels, that building would meet the opt-in “net zero” stretch code! It would be different if economical, efficient, scalable electric alternatives were not available, but that is not the case. To wit:

- a. Hingham is currently building two new facilities – a combined police/fire Public Safety Facility (PSF) and a new grade school.
 - b. The mechanical engineers for both projects have recommended air source (PSF) or ground source (grade school) heat pumps as clearly superior choices compared to natural gas options. The point is that scalable electric heat pump technology, superior in both cost and performance, is available on the market and being routinely specified ***right now. There is no reason for the opt-in stretch codes to allow fossil fuel-fired mechanical systems , especially oil, to be designed into new buildings.***
3. Especially in retrofits and renovations, efficient heat pump HVAC installations will be less efficient if contractors oversize them due to inefficient building envelopes.
 - a. HVAC rebates should be made contingent upon completion of data-driven Energy Efficiency (EE) assessments and implementation for both new buildings and renovations.
 - b. The relative magnitude of HVAC incentives and rebates should be harmonized with those for baseline insulating and air sealing.
 - c. Air quality should not be neglected.
 - d. There are Manual J software programs available to ensure “right sizing” HVAC, but they are typically outside the capabilities of many smaller installers who do renovation work.
 - e. The DOER should support contractors by providing information on industry best practices, making “Manual J” services easily accessible for free from a centralized or regional source and requiring their use for owners seeking to qualify for rebates and incentives.
 - f. The DOER should build this common sense, sequential process into the proposed opt-in Stretch Codes.
4. How will building departments enforce a code that says something like “electrification ready (pre-wiring)”?
 - a. The scope of designing to enable future retrofit will often exceed just providing for electrical wiring.
 - b. How will building inspectors judge whether a designed path to retrofit is realistic or adequate? Intuitively, this would seem to be highly variable based on the building. Are Building Inspectors going to calculate needed square footage in mechanical systems rooms or in outdoor spaces for electric equipment? Which equipment? What guidance will they have?
 - c. It seems certain that this provision will invite gaming. It is telling that almost no examples of this seemingly token nod toward retrofit are furnished in the slides.
5. The way the requirement for solar is expressed (“solar on roof where feasible”), the codes make solar a nice-to-have afterthought that can also be easily gamed.
 - a. How do Building Departments adjudicate “feasibility”? this seems unenforceable.

- b. Just two 430 Watt solar panels installed on a 10 story gas-fired building would meet code! This is absurd. Metrics should be established which mandate minimum size of solar arrays in kW's proportional to total building square feet, roof square feet, etc.
- c. Why "on roof"? Canopy solar over parking lots and other areas, as well as simple ground installations, should be allowed/required to meet the code where a roof-sited solar array commensurate with the building size is not feasible.
- d. The code should make clear that the solar array must be ready to begin producing power to the electrical panel when the building begins occupancy. "Solar ready" good intentions do not produce renewable energy.
- e. On no account should an opt-in stretch code that allows fossil fuels be labeled "net zero." This is simply misrepresenting the avoidance behavior these codes will enable.

Process Comments

The 2021 Climate Act passed by the Massachusetts State Legislature aims to get Massachusetts to net zero emissions by 2050. One key step toward that goal is for all new building construction to have net zero emissions. That goal requires a new code—called a stretch energy code—that sets building standards and defines a "net-zero building." Again - where is the definition of a net zero, or net zero-ready building?

The new code proposed by the Department of Energy Resources (DOER)

- is being rushed through hearings (all in one week) seemingly to minimize public input, rather than facilitate it.
- prevents cities and towns from mandating all-electric new construction,
- and fails to specify key features of the building performance standards
- Extending the deadline for comments to March 18th is a helpful adjustment

We appreciate the opportunity to comment and hope that the revised codes the DOER has promised will reflect these and the other comments we heard at the March 8th webinar. We look forward to a comprehensive report from DOER summarizing the public comments it has received.