Advancing the Clean Energy Future

Acadia Center

198 Tremont Street, Suite 415
Boston, MA 02111
617.742.0054
acadiacenter.org

March 18, 2022

Via E-mail Only

Massachusetts Department of Energy Resources
100 Cambridge Street, Suite 1020
Boston, MA 02114

Re: **Stretch Code Straw Proposal Comments**

Dear Secretary Theoharides, Commissioner Woodcock, and Director McCarey,

Acadia Center appreciates the opportunity to comment on the Stretch Code Straw Proposal presented by the Department of Energy Resources (DOER) at a virtual briefing on February 8, 2022. This proposal contained not only updates to the existing Stretch Code, but the framework for a new Net-Zero Specialized Stretch Code ("Net Zero Code"), as required by Chapter 8 of the Acts of 2021, *An Act Creating a Next Generation Roadmap for Massachusetts Climate Policy.*

Every year, about 14,280 new housing units[1] are built in Massachusetts. An overwhelming majority of these homes are built with fossil fuel systems and appliances. Homes built in Massachusetts between now and 2050, using fossil fuels, will emit about 34 million metric tons of carbon dioxide equivalent (MMT CO2e) emissions over those 30 years—emissions comparable to driving every Massachusetts-registered automobile the entire 138-mile length of the Massachusetts Turnpike, from Logan Airport to West Stockbridge, 313 times. In addition, the indoor air quality risks, volatile fuel prices, and combustion safety issues associated with using heating oil, natural gas, or propane beg the question of whether there is a better option. Fortunately, there is: heat pumps and induction stoves can reduce or eliminate the many drawbacks of business-as-usual fossil fuel equipment. By setting policies that make all-electric homes easier and more cost-effective to build, the state can reduce emissions associated with these homes by more than half today, and eventually reduce emissions by 100% as the grid transitions to a heavier reliance on carbon-neutral sources of electricity.

Massachusetts' Stretch Code has been a national model for energy efficient new construction, and Acadia Center applauds DOER's efforts to ensure that the updated code continues this effort. This straw Stretch Code proposal takes important steps to put a thumb on the scale to ensure building electrification in new construction, though there is still room for improvement.

---

[1] https://www.census.gov/construction/bps/stateannual.html. The average number of building permits issued annually in Massachusetts since 2010 is 14,280. Forty-nine percent of the permits issued in a given year are for single-family homes, while 46% are for buildings with 5 or more units.

The improvements that Acadia Center suggests are as follows:

- Modify the Net Zero Code to require that all low-rise residential buildings be all-electric.
- Modify both the Stretch Code and the Net Zero Code to require that each dwelling unit with a parking space in a low-rise residential building have access to one EV ready parking space.
- Provide more information to stakeholders on the proposed EV ready parking requirements for commercial buildings.
- Compliance pathways requiring rooftop solar "where feasible" should have an alternative compliance mechanism in cases where solar is not deemed feasible.

The Net Zero Code Should be Modified to Require that Low-rise Residential Buildings be Built All Electric

The proposed Net Zero Code for low-rise residential buildings still provides multiple pathways by which new residential buildings are permitted to combust fossil fuels. The first of the two pathways allowing fossil fuel combustion requires a building to obtain a HERS rating of 42, install rooftop solar "where feasible," and pre-wire for the eventual installation of electric appliances. The second of the two pathways requires the building to be built to Passive House specifications and be pre-wired for the eventual installation of electric appliances. While these requirements are a step in the right direction, they simply don't go far enough.

The Massachusetts 2050 Decarbonization Roadmap ("MA Roadmap") identified building electrification as the most cost-effective path to obtaining the levels of building decarbonization that the Commonwealth must achieve on its path to economy-wide decarbonization by 2050. The "All Options" pathway in the MA Roadmap pathway calls for electrification of over 90% of residential space heating and 95% of residential water heating by 2050.[2] All-electric requirements in building codes are one of the most cost-effective means of achieving these levels of electrification, as it is widely agreed upon that electrification of new buildings is more cost-effective than all-electric retrofits of existing buildings. As the MA Roadmap put it:

"New construction offers the easiest and most economically attractive way to start decarbonizing the buildings sector and will have lasting impacts. The implementation of a high-performance, net-zero emissions building energy code will minimize the near-term installation of additional fossil fuel equipment that would require, in the mid- or long-term, either costly zero-carbon fuels, emissions allowances, or early retirement."[3]

For every code cycle in which the Commonwealth delays the inevitability of all-electric new residential construction, it will result in more "GHG mitigation slack" needing to be picked up somewhere else to stay on track to achieving net zero by 2050 - for example, necessitating deeper, more expensive retrofits to existing buildings or conversion of existing buildings to all-electric appliances before their existing fossil fuel appliances reach "end of life."

---

[2] Massachusetts 2050 Decarbonization Roadmap: Buildings Sector Report, page 5 https://www.mass.gov/doc/building-sector-technical-report/download

[3] Massachusetts 2050 Decarbonization Roadmap: page 52 https://www.mass.gov/doc/ma-2050-decarbonization-roadmap/download

While it commonly is asserted that all-electric buildings both cost more to construct and cost more to own, DOER's own analysis demonstrates that this is not the case. The cost analysis included in the "Summary of Stretch Code Study Energy Efficiency Analysis" shows that for all four types of low-rise residential building types, choosing all-electric both results in construction cost savings for builders and annual cost savings for homeowners when compared to a natural gas home with the same HERS rating.

Table 1: Cost Savings of HERS 42 All-Electric Home Compared to HERS 42 Gas Home[4]

Home Type	Construction Cost Savings	Homeowner Net Annual Cost Savings
Large Single Family	$23,245	$246
Small Single Family	$36,504	$1,549
Townhouse	$12,740	$356
6-Unit Multifamily	$17,967	$669

For example, the DOER analysis estimates that an all-electric small single-family home with a HERS 42 rating will cost a builder over $36,000 less to construct than the same building with natural gas appliances. The same all-electric home would cost a homeowner over $1,500 less annually to own than a similar home with natural gas appliances. This is great news for all residents of Massachusetts, but particularly low-income residents for whom housing affordability is a major concern. In addition, DOER's own analysis shows that even by 2030, well before the grid becomes carbon neutral, residential buildings built to an all-electric standard will release nearly 75% less GHG emissions than an equally efficient gas home.

If all-electric requirements for new homes are one of the most cost-effective routes to decarbonization of the building sector, drive down costs to developers, drive down costs to homeowners, reduce indoor air pollution, and dramatically reduce GHG emissions compared to natural gas homes, why is DOER not providing a route by which municipalities can require new homes to be built all-electric? It is our understand that some have expressed concerns regarding the legality of an all-electric residential code. However, we urge the Department to advance a code that attempts to achieve that possibility to the maximum extent practicable. **Acadia Center recommends that DOER modify the Net Zero Code so that it requires all low-rise residential new construction to be all-electric.**

[4] DOER: Summary of Stretch Code Study Energy Efficiency Analysis, February 2022, Slides 13 & 14
https://www.mass.gov/doc/summary-of-stretch-code-study-energy-efficiency-analysis-feb-2022/download

The Stretch Code and Net Zero Code Should be Modified to Ensure that Each Dwelling Unit in Low-rise Residential Buildings With Access to Parking Has Access to EV Ready Parking

The straw Stretch Code and Net Zero Code propose that 10% and 20% of parking spaces, respectively, in new low-rise residential construction be built with wiring that accommodates the future installation of electric vehicle (EV) charging (referred to as "EV ready"), with a minimum of one EV ready space in single-family homes. While this is a small step in the right direction for decarbonizing the transportation sector, it isn't enough.

The MA Roadmap identifies electrification as the most cost-effective path to decarbonization of the transportation sector, particularly light-duty passenger vehicles. The "All Options" pathway found that battery electric vehicles (BEVs) made up 95% of the light-duty fleet and 50-60% of the medium/heavy-duty fleet by 2050. It's also important to note that while the study found that converting approximately 20-30% of the medium/heavy-duty vehicle fleet to hydrogen fuel cell electric vehicles (FCEVs) by 2050 was cost effective, the study found no cost-effective role for hydrogen in decarbonizing passenger car and light-duty truck fleets.[5] In other words, BEVs are the most surefire path we have to decarbonizing the cars and trucks that most residents drive on a daily basis. We are already seeing this rapid transition to BEVs and the scale of the transition over the next two decades should be nothing less than breathtaking. As the MA Roadmap put it:

"Due to the current market growth and technological outlook of light duty BEVs, rapid electrification is assumed to be the predominant, least-cost strategy for this subsector. Based on current developments and trends, the sector is assumed to undergo a rapid market transformation between 2025 and 2040, nearing exclusive market share in the late 2030s/early 2040s."[6]

Multiple studies have demonstrated that access to EV charging at home is a critical variable driving EV adoption and that pre-wiring parking lots to accommodate future installation of EV charging is significantly cheaper than retroactively ripping up parking lots to lay long stretches of conduit. For example, one study found that it was 2.8 - 3.4x more expensive to add EV infrastructure to existing multi-family and office buildings compared to during the new construction phase.[7] This is one of the reasons that five San Francisco Bay Area cities and Santa Clara County have adopted codes that require 100% of dwelling units with parking spaces to have, at a minimum, one EV ready parking space.[8] The City of Vancouver has gone even further, requiring 100% of parking spaces in multi-family

[5] Massachusetts 2050 Decarbonization Roadmap: Transportation Sector Report, page 13
https://www.mass.gov/doc/transportation-sector-technical-report/download
[6] Massachusetts 2050 Decarbonization Roadmap: Transportation Sector Report page 10
https://www.mass.gov/doc/transportation-sector-technical-report/download
[7] Energy Solutions "Electric Vehicles Infrastructure Cost Analysis Report for Peninsula Clean Energy & Silicon Valley Clean Energy"
https://bayareareachcodes.org/wp-content/uploads/2020/03/PCE_SCVE-EV-Infrastructure-Report-2019.11.05.pdf
[8] Bay Area Reach Codes, 2022 Building Electrification & EV Infrastructure Reach Code Initiative "EV Zoning Code" page 4
https://bayareareachcodes.org/

dwellings to be EV ready.[9] The figures below contrasts the mandatory EV charging requirements under the 2022 California Green Building Standards Code ("CALGreen") with the model codes proposed by the Bay Area Reach Code Initiative that are the result of a rigorous analysis to determine the most cost-effective path towards decarbonizing the transportation sector.

Figure 1: Electric Vehicle Infrastructure Requirements in Multi-family New Construction: California Building Code Mandatory Requirements vs. Proposed Model Codes[10]

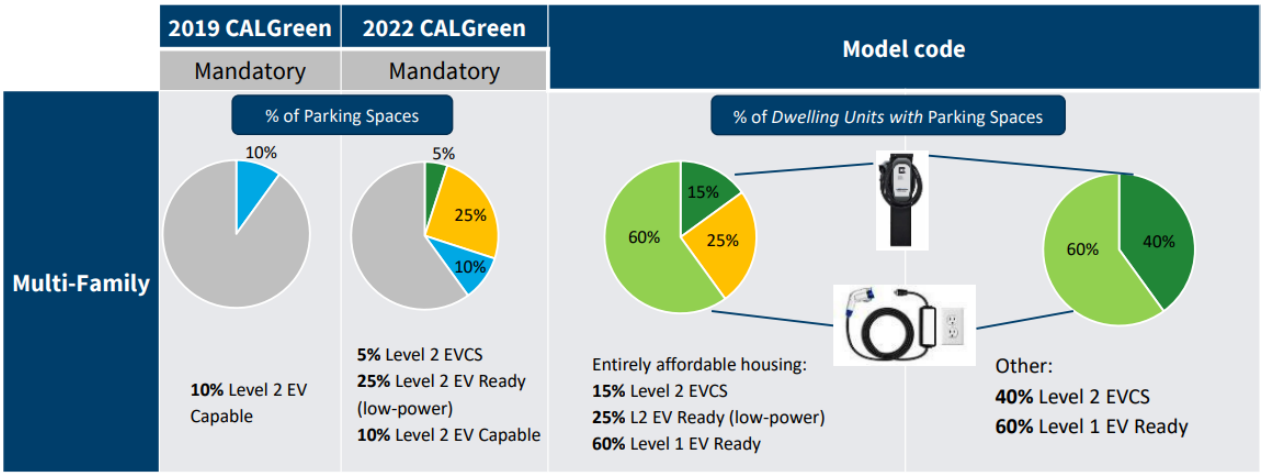
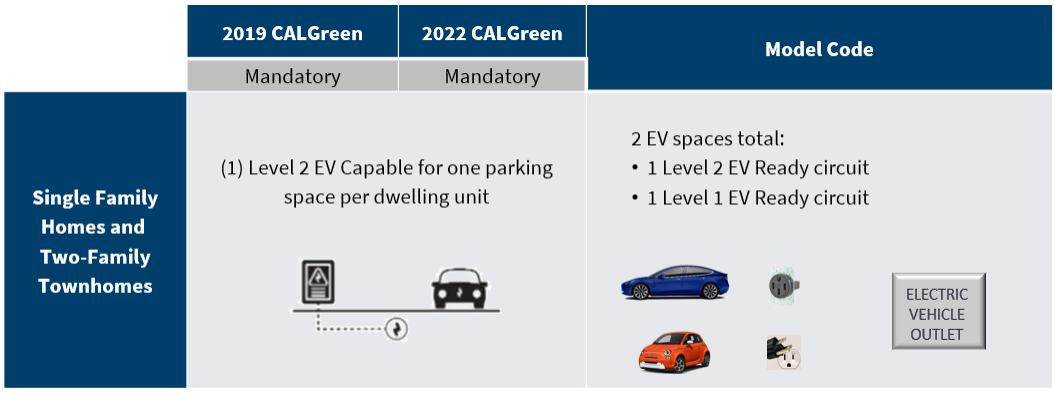


Figure 2: Electric Vehicle Infrastructure Requirements in Single-Family and Two-Family New Construction: California Building Code Mandatory Requirements vs. Proposed Model Codes[11]



[9] Pacific Northwest National Laboratory "Electric Vehicle Charging for Residential and Commercial Energy Codes", July 2021, page 10 https://www.energycodes.gov/sites/default/files/2021-07/TechBrief_EV_Charging_July2021.pdf

[10] Reach Code Initiative, "2022-2023 Reach Codes Initiative", page 31 https://bayareareachcodes.org/wp-content/uploads/2022/02/2022-Reach-Code-Initiative-Feb-17.pdf

[11] Reach Code Initiative, "2022-2023 Reach Codes Initiative", page 30 https://bayareareachcodes.org/wp-content/uploads/2022/02/2022-Reach-Code-Initiative-Feb-17.pdf

Acadia Center recommends that DOER propose EV charging infrastructure requirements for both the Stretch Code and the Net Zero Code that are in line with the model code recommendations above for all multi-family buildings, regardless of whether these multi-family buildings fall under the "low-rise residential" or "commercial" classification. Additionally, for single-family and two-family homes where each dwelling unit is allocated more than one parking space, Acadia Center recommends that DOER require one level 2 EV ready circuit and one level 1 EV ready circuit.

Using the right metric: For multi-family buildings, the Reach Code Initiative's model code considers "*percent of dwelling units with parking spaces*" as the key metric rather than "*percent of parking spaces*" as proposed by DOER. This is a key distinction. The dwelling unit metric is superior because, regardless of the total number of building parking spaces or parking spaces allocated per dwelling unit, what ultimately matters is the percent of households that have access to EV charging. To illustrate this point, consider the simple example below of a 6-unit multifamily building under different parking scenarios: assuming one, two, and three total parking spaces (regardless of EV charging readiness level) per dwelling unit. All scenarios require 20% of all parking spaces at the building to be EV ready.

Table 2: 6-Unit Multifamily Building Access to EV Charging Assuming 20% of all Parking Spaces are EV Ready

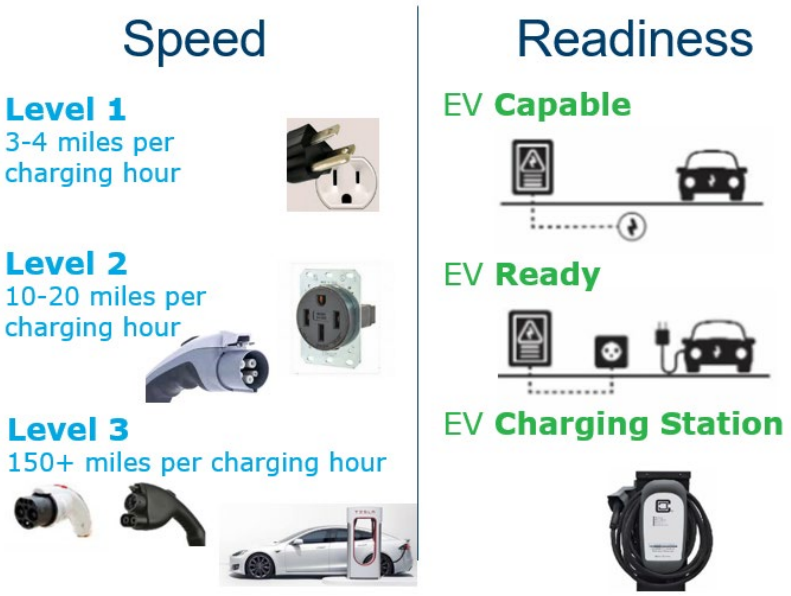
Total Building Parking Spaces Per Dwelling Unit	Total Building Parking Spaces	Total Building EV Ready Parking Spaces	% of Dwelling Units with at Least 1 EV Ready Parking Space	% of Total Building Parking Spaces EV Ready
1	6	1	20%	20%
2	12	2	40%	20%
3	18	4	60%	20%

Notice that with the 20% of parking spaces EV ready requirement that the number of parking spaces, regardless of EV charging status, allocated per dwelling unit has a dramatic impact on the percent of dwellings that have access to at least one EV ready parking space. For example, in instances where each dwelling unit is allocated one parking space, only 20% of the dwelling units have access to at least one EV ready space. In contrast, in instances where each dwelling unit has a total of three allocated parking spaces, 60% of dwelling units have access to at least one EV charger.[12] This 20% of parking spaces rule has the unintended consequence of essentially punishing residents that live in multi-family buildings with less total parking spaces, as the likelihood of their one parking space being EV ready is low. This is an extremely unfortunate unintended consequence of such a policy.

[12] Note: This example assumes that EV ready parking spaces are allocated relatively evenly across dwelling units (i.e., one dwelling unit is not allocated three EV ready parking spaces).

Minimizing construction cost without sacrificing charging access: As demonstrated in Figure 1 and Figure 2 above, the model code uses a combination of "readiness levels" and charging speeds to minimize the cost to builders while simultaneously preparing the building for the reality of rapid EV deployment over the coming decade.

Figure 3: EV Charging Speed and Readiness Explainer[13]



"Level 1 EV Ready" and "Level 2 EV Ready (low-power)" configurations, opposed to the more costly installation of Level 2 EV charging stations (EVCS), can be used to reduce installed cost and the likelihood of electricity system transmission and distribution upgrades resulting from EV infrastructure deployment. This is particularly relevant for affordable housing multi-family buildings, where the requirements can be adjusted (as demonstrated in Figure 1 above) to further reduce installed costs.

Analysis by the Reach Code Initiative found that the EV requirements called for in their model code are by no means cost prohibitive. For example, in a 100-unit muti-family building, requiring each unit to have access to one EV ready parking space costs an estimated $167,000, translating to less than 0.3% of the total cost of construction. These costs pale in comparison to the future cost of retroactively ripping up large sections of parking lots to lay conduit in order to expand the number EV ready parking spaces.

[13] Reach Code Initiative, "2022-2023 Reach Codes Initiative", page 29 https://bayareareachcodes.org/wp-content/uploads/2022/02/2022-Reach-Code-Initiative-Feb-17.pdf

Provide More Information to Stakeholders on the Proposed EV Ready Parking Requirements for Commercial Buildings

During the February 8th webinar DOER mentioned the following with regard to EV ready parking requirements for commercial buildings: *"All commercial buildings will have some EV ready wiring requirements in the base code and the stretch code. The Specialized Opt-in Code will increase the percentage of parking spaces required to be EV ready."* However, no additional information was provided on what these requirements will be and if they will vary across different building types. This information is critical, particularly when considering the importance of access to EV charging at "commercial" buildings where people spend long periods of time: large multi-family, offices, hotels/motels, and other prime destinations (e.g., state parks, amusements parks, etc.). Access to EV charging at these places of residence and destinations is critical for driving EV adoption at the rates the Commonwealth needs.

Understanding the critical need for EV infrastructure in new commercial construction, the Bay Area Reach Code Initiative developed model code language targeted at particular types of commercial buildings.[14] Acadia Center already previously addressed their recommendations for EV charging in multi-family buildings (regardless of whether these buildings fall under the "low-rise residential" or "commercial" categorization), but the below table summarizes the Reach Code Initiative's model code EV charging requirements for other "commercial" buildings .

Table 3: Electric Vehicle Infrastructure Requirements in Commercial New Construction: Proposed Model Codes[15]

Charging Readiness	Offices	Hotels/Motels	Other Commercial
Level 2 EVCS	20%	5%	10%
Level 2 EV Ready (Low Power)	0%	25%	0%
Level 2 EV Capable	30%	10%	10%
Total	**50%**	**40%**	**20%**

Acadia Center recommends that DOER propose EV charging infrastructure requirements for both the Stretch Code and the Net Zero Code that are in line with the model code recommendations above for offices, hotels/motels, and other commercial buildings. Acadia Center also recommends that DOER explore its ability to require a higher percentage of EV ready parking spaces in specific commercial "destination parking" locations where visitors are likely to spend long periods of time (e.g., state parks, amusement parks, etc.). Acadia Center looks forward to receiving more information on the commercial building EV ready requirements in the straw proposal.

[14] Bay Area Reach Codes, 2022 Building Electrification & EV Infrastructure Reach Code Initiative "EV Zoning Code" page 5 https://bayareareachcodes.org/

[15] Reach Code Initiative, "2022-2023 Reach Codes Initiative", page 31 https://bayareareachcodes.org/wp-content/uploads/2022/02/2022-Reach-Code-Initiative-Feb-17.pdf

Compliance Pathways Requiring Rooftop Solar "Where Feasible" Should Have an Alternative Compliance Mechanism in Cases Where Solar is Not Feasible

The "gas or other fossil fuel" Net Zero compliance pathway for both low-rise residential and commercial buildings requires rooftop solar "where feasible". While it is understood that rooftop solar will not be feasible in many newly constructed buildings, allowing these building projects to continue construction once rooftop solar is not deemed feasible, without being required to achieve compliance through an alternative mechanism, does not comply with any reasonable definition of net zero.

For low-rise residential, Acadia Center would prefer for this fossil fuel pathway to be completely eliminated. However, if the pathway shall stay in place, Acadia Center recommends that developers utilizing the fossil fuel pathway for both residential and commercial buildings should be required to fund the development of off-site renewable energy in cases where rooftop solar is not feasible. For example, in cases where rooftop solar is not feasible, developers could be required to pay an "in-lieu fee" which goes towards funding community solar projects in the Commonwealth. Acadia Center looks forward to receiving more information from DOER on:

- How rooftop solar feasibility will be determined
- How the required rooftop system capacity will be determined (e.g., required to offset certain percentage of fossil fuel combustion energy)
- In instances where rooftop solar is not feasible, what alternative compliance mechanism will be put in place (e.g., community solar development fee)

Thank you for the opportunity to comment on this incredibly important issue. If you have any questions or concerns, please do not hesitate to reach out.

Sincerely,

Ben Butterworth
Senior Manager, Climate and Energy Analysis
bbutterworth@acadiacenter.org
617-742-0054 x111

Cailtin Peale Sloan
Vice President for Massachusetts
cpeale@clf.org
617-850-1770