



Town of Brookline

Final Report and Recommendations

of the Net Zero Ninth School Subcommittee

of the Select Board's Climate Action Committee¹

March 25, 2019

Introduction

Before the Brookline Select Board's Climate Action Committee (SBCAC) formed the Net Zero Ninth School (NZNS) Subcommittee, it had received public comments and had its own discussions concerning whether the Town's already energy-efficient school building projects could be made even better by focusing specifically on the need to address climate change through state-of-the-art design. The decisions to construct a ninth elementary school and to expand the high school were recognized as prime opportunities to explore this issue, and, in response, the SBCAC created the NZNS Subcommittee in late summer 2016.

The subcommittee met regularly throughout 2017 and 2018 and into 2019. During that time, it worked with representatives from the School, Building, and Planning departments, as well as with the Massachusetts Department of Energy Resources, and other municipalities and individuals—including making site visits—to research Net Zero Energy concepts and the practical opportunities and obstacles to making them a reality in Brookline. During its work, the subcommittee's focus slowly broadened toward the ideas of zero carbon emissions and fossil fuel free buildings.

The subcommittee issued an interim report and recommendations in October 2017 to share what it had learned. This report is the final step in sharing information and making recommendations.

1. This report was approved by vote of the Select Board's Climate Action Committee at its meeting of March 25, 2019. (v.6) drafted 3/21/19

Major Changes

Since the committee's inception in 2016, changes in awareness, understanding, and commitment to address climate change have taken place on a town level and a global level, and have had significant impact on the work of the committee. The recent interest and concern in town about fuel choices for space heating, for example, is unprecedented. A brief history:

May 2017: Brookline Town Meeting passed Warrant Article 20, which committed Brookline to uphold the Paris Agreement on Climate Change, and Warrant Article 21, which established energy-efficiency goals and minimums for the ninth elementary school and the Brookline High expansion.

September 2018: The Brookline Select Board, in adopting Brookline's 2018 Climate Action Plan, revised its goal—originally set to conform with the Massachusetts Global Warming Solutions Act goal of 80% reduction of GHG emissions—to a goal of achieving zero greenhouse gas emissions for the government and the community by 2050.

October 2018: The Intergovernmental Panel on Climate Change (IPCC), a group of scientists convened by the United Nations, released its report, which said that to prevent a catastrophic rise of 2.7 degrees Fahrenheit of warming, CO₂ emissions must be reduced by 45 percent from 2010 levels by 2030, and 100 percent by 2050. The prospect of 12 years to make a difference has galvanized many in town.

November 2018: Brookline Town Meeting, in an atmosphere shaped not only by the October IPCC report, but also by deadly wildfires in California in early November and even by the September gas explosions in the Merrimack Valley, voted by a three-to-one margin not to authorize the Town to grant an easement for gas service to a new Fire Department facility.

November 2018. The National Climate Assessment was issued, stating that without "substantial and sustained reductions" in greenhouse gas emissions, climate change will hurt people, economies, and resources across the U.S.

December 2018: Brookline Town Meeting passed amendments to Warrant Articles 2 and 3, which imposed a condition that no funds be used during schematic design for non-emergency fossil-fuel operated building systems for the ninth elementary school and also the Driscoll School.

Where We Are Now

With increasing knowledge, our sub-committee has progressed from exploring Net Zero Energy school buildings to the simpler and more stringent target of Fossil Fuel Free school buildings. A Fossil Fuel Free building uses only electricity for its building systems. Since a building in Brookline typically cannot generate all the power it needs on-site, the long-term goal is to purchase electricity only from renewable sources on the power grid. Any electricity generated on site would be required to be provided by the wind or the sun. Building space heat and cooling would likely be supplied by ground-source heat pumps or air-source heat pumps.

The committee not only supports Fossil Fuel Free school buildings, but believes it is important to expand the concept to include all municipal building and substantial renovation projects (beyond school buildings). Therefore, the committee recommends the following high priority step:

1. **Commitment to Fossil Fuel Free Buildings:** The Town must commit to designing and constructing Fossil Fuel Free buildings on all new construction and major renovations of municipal facilities, to include (1) achieving high-energy-efficiency design² and operation; (2) generation, consumption, and storage of renewable energy; and (3) achieving fossil-fuel-free operation by using all-electric systems. A written policy should be promulgated by the end of 2019 by either the Select Board or the Building Commission or such a policy could be pursued by bylaw change or resolution of Town Meeting.

While not as urgent, the following steps should also be considered because they support and document the process that will ensure achievement of the goals. These tasks would be completed by town staff in consultation with the SBCAC:

2. **Prepare a procedures manual:** This manual would document best practice procedures for (1) achieving Fossil Fuel Free buildings using whole-building design principles and (2) continuing to assess the behavior of building occupants to ensure long-term low energy consumption. The document will be informed by this committee's research, the Building Department's experience, and also by lessons learned from the high school expansion project.
3. **Propose changes to the Building Commission Bylaw:** The current bylaw from May 2013 should be updated to be consistent with procedures, particularly life-cycle cost analysis procedures, that ensure the exploration of and achievement of Fossil Fuel Free buildings, as well as continually improving energy-efficiency and cost-saving measures.

2. Achieving a minimum LEED silver certification and an Energy Intensity Use (EUI) of 30 kBtu/ft²/yr was approved by Town Meeting in the Warrant Article 21 resolution of May 2017. The committee recommends exploring whether these key requirements should be increased.

Where To Go Next

The two warrant-article amendments passed by Town Meeting in December 2018 prohibited the design of any building systems using fossil fuels for the two upcoming school building projects—the ninth elementary school and the Driscoll School. As a result, the NZNS Subcommittee has achieved its initial objective of studying, educating the public, and improving school building design, and other members of the community—particularly in Town Meeting—have embraced its goals and exceeded its original expectations.

However, we have gathered considerable knowledge and feel that the Select Board's Climate Action Committee (SBCAC) could benefit from establishing a new subcommittee to build on that knowledge and work toward future goals that the SBCAC may identify.

Continue to focus on buildings. Looking beyond schools to the larger community, buildings annually account for nearly 70% of greenhouse gas emissions in Brookline, broken down as follows: municipal buildings 2%, commercial buildings 20%, and residential buildings 48%.³ In order to meet our GHG emissions reduction target, we must significantly reduce the carbon footprint of buildings.

- Expand the focus beyond municipal buildings to include commercial and residential property (rentals, condominiums, and 1-, 2-, and 3-family homes). To meet the ambitious goal of zero greenhouse gas emissions for the government and the community by 2050 or earlier, we must focus on the commercial and, especially, the residential sectors.
- Develop a site selection process for new municipal buildings that supports measures such as walkability, access to public transportation, and other sustainable and GHG-emission-reducing features.
- Explore whether zoning changes can be used to encourage or require greener buildings.
- Consider preservation and renovation of existing buildings in order to conserve the embodied carbon in the materials from which the buildings are constructed.
- Consider better sourcing of building materials, including analysis of embodied carbon.
- Encourage new buildings and renovations to use all-electric systems, that is, to be Fossil Fuel Free.
- Utilize new approaches for on-site energy storage and other new technologies that are consistent with Fossil Fuel Free buildings.
- Move toward purchase of electricity from 100% renewable energy sources.
- Design and prepare high-energy-efficiency buildings with onsite energy storage to be used as places of refuge during extreme weather events.
- Develop policies, user manuals, “energy dashboards,” and occupant education for municipal buildings to monitor energy usage and improve energy management and operations.
- Continue to research and support techniques for better financial analysis of building design and operations.

3. Town of Brookline Greenhouse Gas Inventory Overview, May 21, 2010.

Focus on transportation. Transportation accounts for 30% of greenhouse gas emissions in Brookline.⁴

- Require Electric Vehicles (EVs) for school buses and other town-contracted transportation needs.
- Take the climate change implications of transportation options into consideration during site selection for any new municipal building projects.
- Purchase EVs for the municipal fleet.

Committee Members

Werner Lohe, Chair, SBCAC

Michael Berger, SBCAC

Benjamin Chang, SBCAC, School Committee Representative, stepped down summer 2018

Alan Leviton, SBCAC

Susan Martin, Climate Action Brookline

David Pantalone, Climate Action Brookline, joined fall 2018

David Pearlman, SBCAC, School Committee Representative, joined fall 2018

Deborah Rivers, SBCAC, AIA, LEED AP BD+C, joined fall 2018

Kathleen Scanlon, SBCAC, stepped down fall 2018

Staff Members

Maria Morelli, Senior Planner, Planning Department

Ray Masak, Project Manager, Building Department

4. Town of Brookline Greenhouse Gas Inventory Overview, May 21, 2010.