Advisory Committee

School Subcommittee

Warrant Article 21, a Resolution Regarding a Net Zero Energy Ninth Elementary School and the Expansion of Brookline High School

Report and Recommendations

Attendance:

The Schools Subcommittee held a public hearing on Warrant Article 21 on Tuesday, April 18th from 6:00 to 7:30 p.m. in Brookline Town Hall, employee lounge, third floor. In attendance were subcommittee members Mariah Nobrega, Shaari Mittel, Bobbie Knable, and David Lescohier; petitioners Werner Lohe (TMM), Alan Christ (TMM), and Kathleen Scanlon (TMM); School Committee member and former Building Commission member David Pollak (TMM), Deputy Superintendent of Brookline Schools MaryEllen Dunn, former school committee member Rebecca Stone (TMM), Ray Masak from the Building Department, Claire Stampfer (TMM), Virginia La Plante (TMM), Tom Kilday, Regina Frawley (TMM), Paul Harris (TMM), Richard Nangle (TMM), and Bonnie Rotenberg.

Voted:

The subcommittee voted 4-0-0 to recommend WA 21 as amended.

Background:

This Warrant Article sets out energy efficiency goals and minimum standards for the Ninth School construction and the expansion of Brookline High School that will be a significant advance toward "net zero energy" schools for Brookline, using LEED, EUI and NetZero energy standards.

LEED stands for "Leadership in Energy Efficiency Design". This standard has been developed by the United States Green Building Council. LEED has evolved as building science technology has advanced. The current version is 4. Buildings can be qualified at four levels: certified, silver, gold or platinum. The level depends on the number of points earned by the building design in each category. A minimum of 40 points are required for the lowest level, 'certified'. With additional points, the building earns silver, gold, or platinum levels up to a possible 110 points. The categories are:

- Location and Transportation
- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality
- Innovation, and Regional Priority

The Energy and Atmosphere category offers the most points, and the Optimize Energy Performance subcategory offers the most points within the Energy and Atmosphere category, a maximum of 16 points.

LEED uses a modeling method to determine the LEED Optimize Performance score. It works somewhat like Turbo Tax software or an accreditation manual. As the designer answers building characteristics and energy optimization questions, the modelling software or the accreditation worksheet forms assign points as appropriate.

EUI stands for Energy Use Intensity. It is commonly expressed in thousand British Thermal Units (kBTU) per square foot per year. A square foot is readily understood. BTU and kBTU are less common. kBTU measures energy just like kilowatt hours (kWh). A kilowatt hour is the amount of energy used by a 100 watt bulb every 10 hours. kBTU measures the same energy as kWh. kBTU can be converted into kWh and vice-versa. One kBTU is the same as 0.29 kWh.

Net zero energy schools are schools for which the energy delivered to the building for heating, ventilation, cooling, and plug-in loads, all the energy the building uses, is less than the amount of offsetting energy produced (exported) by the building. Net zero energy buildings typically employ a solar PV array as a means of providing an offsetting energy source. There are a wide range of understandings and definitions for how to calculate the actual net zero energy budget of a building. The term net zero energy building does not yet have a clearly established, universally accepted meaning even though the US Department of Energy, through the National Institute of Building Sciences has published "A Common Definition for Zero Energy Buildings" in September 2015. Therefore, comparing the performance of buildings that claim to be net zero energy buildings is currently not straightforward. In view of this uncertainty, the Warrant Article, unlike LEED and EUI, does not identify an explicit minimum or goal for net zero energy performance. Regardless, the Warrant Article seeks to set in motion use of net zero energy building principles, thereby aiming to decrease the carbon footprint of our schools as much as feasible.

Brookline's most recent Climate Action Plan, updated in 2012, accepted Massachusetts' Green Communities Act target for greenhouse gas emissions, i.e. a reduction in emissions to 80% below 1990 levels by 2050. However, the overall town-wide progress toward reduced emissions has been slow, not yet approaching the rate needed to reach this goal.

While all efforts to achieve reductions in greenhouse gas emissions are important, the emissions under the direct control of the Town are a small (3%) part of the whole and offer only limited scope for achieving the overall reduction goal. However the actions of the Town – leading by example, demonstrating what is possible, and acting on the Town's stewardship of the environment values – will likely have an impact beyond the specific reductions or avoided increases associated with the construction of the Ninth School and the expansion of Brookline High School. In addition, there are clearly extremely significant but less measurable benefits, such as these school buildings serving as teaching assets, particularly for the science, social studies, and environmental aspects of the curriculum. Today's students are likely to be very aware and concerned about future climate change since, in view of their age, they are the most vulnerable to the expected consequences. Aiming for constructing net zero energy schools is consistent with Brookline's educational and environmental

stewardship values. The PSB Education Plan for the Ninth School says: "Building a new school…when our community and society are more conscious than ever of the delicate balance between environmental sustainability and ongoing development provides an opportunity to have the physical plant itself play a significant role in the culture, educational approach, and daily lives of students and teachers."

Discussion:

A lengthy and wide ranging discussion among the committee, the petitioners, and the numerous members of the public touched on a number of points.

Within this discussion, it was agreed that this Warrant Article is not:

- About the siting of the Ninth School or the expansion of Brookline High School decisions;
- Altering in any way in the design processes required by Town Bylaw Article 3.7, the role of the Board of Selectmen, the Building Commission, or the School Committee;
- Changing applicable building codes or other requirements;
- Affecting established methods for cost-benefit analysis;
- Affecting funding decisions ultimately requiring Town Meeting approval.

It was widely recognized that in order to most cost-effectively implement these LEED/EUI/NetZero principles, high performance environmental and sustainability goals must be incorporated into the planning at the beginning of the design process, which is why this Warrant Article is timely. Ultimately, there was interest among many in the room about the suggestion that these principles should possibly be applied to all appropriate, future Town building construction projects, and agreement that this warrant article was a good beginning.

Other key points:

There was concern that, while the environmental impact reduction goals should definitely be supported, that the impact of the original wording of this Warrant Article could create the impression that we are imposing costs that future Town Meetings would be forced to accept. This was addressed through amendments to the article accepted by the petitioners to change instances of 'be designed' to 'seek' in the first resolved clause. This recommended change is intended to make it plain that the Warrant Article is not to be implemented in a manner that would create a cost burden for a future Town Meeting.

Questions were asked about how these standards compared to the new Devotion building, which, along with Runkle, are high performance buildings. How much additional performance would this WA require? Are the goals and minimums feasible, or would meeting them be a stretch? How certain can we be that the minimums are practical? Based on the advice of Ray Masak and David Pollak, the committee suggested some edits to the language of the Warrant Article, which the petitioners accepted, to align minimums specified in the Warrant Article to be consistent with the expected energy efficiency performance of the new Devotion School, and with what the Building Department feels confident can be achieved. Specifically the warrant article was amended to:

1. Change ‘Gold’ to ‘Silver for LEED. While Devotion is very, very close to Gold, it is slightly short of the points needed to be ‘Gold’. Therefore, to be cautious and guard against over promising, the committee recommends that the Warrant Article should set ‘Silver’ rather than ‘Gold’ as the minimum, while ‘Platinum’ is still the goal. (With respect to new Devotion, only one additional point would raise it to the Gold level.)

2. Change the recommended minimum energy optimization points from 14 to 13, while keeping a goal of 16.

Finally, the committee recommended:

1. Moving the ‘whereas’ clause that defines LEED to second place, before other whereas clauses that reference this term.
2. Deleting ‘Baldwin’ throughout so that the Ninth School is not specific to any site for the purposes of this Warrant Article.

VOTED:

THE SUBCOMMITTEE VOTED 4-0-0 TO RECOMMEND WA 21 AS AMENDED BELOW.

ARTICLE 21

To see if the Town will vote to adopt the following resolution:

Whereas our town, the nation, and the world are increasingly aware of the need to address climate change and of the importance of better protection of the environment in general, and

Whereas an international standard known as LEED (Leadership in Energy and Environmental Design of the United States Green Building Council) allows for a building's environmental and energy performance to be accurately measured and provides a benchmark to assist in designing a net zero energy building, and

Whereas net zero energy LEED Platinum schools create an environment that supports student learning and health through improvements in daylighting, indoor air quality, thermal comfort, acoustics, and classroom design, all of which have an impact on a child's ability to learn and a teacher's ability to teach, while saving energy, resources, and money, and

Whereas net zero energy LEED Platinum schools increase energy efficiency, thereby reducing greenhouse gas emissions, cost less to operate, utilize durable materials, reduce water and energy use, and provide other benefits; while providing an educational experience that transcends the classroom by creating opportunities for curriculum innovation and hands-on, project-based learning in which the building itself becomes an interactive teaching tool, and

Whereas decisions made now about the design of the Ninth Elementary School and the expansion of Brookline High School will determine each school’s environmental footprint, particularly greenhouse gas emissions, for decades to come, and

Whereas the technical ability to create energy-efficient, high performing buildings has increased significantly by incorporating systems thinking into design processes, and

Whereas construction of new schools in Massachusetts and around the nation during the past five years has shown the feasibility and desirability of net zero energy schools, that is, schools in which the amount of energy delivered on an annual basis is less than or equal to the amount of renewable energy exported from the site, and

Whereas the most accurate measure of energy efficiency for a building is EUI (Energy Use Intensity), calculated by dividing total energy consumed annually by the gross floor area of the building,

Now therefore be it Resolved that in order for the Ninth Elementary School be a significant advance toward a net zero energy school and consistent with the projected energy efficiency results at the new Devotion School, the Ninth Elementary School shall **seek** to obtain a minimum of LEED v4 certification at the **Silver** rating level, with a goal of achieving the Platinum rating level; and in addition it shall prioritize achieving points in the Optimize Energy Performance category and shall **seek** to achieve a minimum of **13** of the possible 16 points available in that category, with the goal of achieving 16 of the possible 16 points available in that category**;** and**,** finally, it shall **seek** to achieve a minimum EUI of 30 kBTU/sq.ft./yr., with the goal of achieving an EUI of 25 kBTU/sq.ft./yr.,

And, be it further Resolved that while overall net zero energy is unlikely to be achieved for Brookline High School and even the degree to which the as-of-yet-undefined, expanded portion of the school can approach net zero energy design is currently uncertain, nevertheless, net zero energy principles shall be appropriately applied, to the extent feasible, during all design phases of Brookline High School,

or act upon anything relative thereto.