

RANDOLPH'S DRAFT ENERGY REDUCTION PLAN

Ordinance Subcommittee meeting on November 11, 2025

Questions and Answers

1) Why does the North Fire Station use so much energy relative to its size and why are building envelope improvements needed although the building is only eight years old?

Per available data, the North Randolph Fire Station uses more annual electricity and gas than the Central Fire Station even though it is smaller. The combination of these factors gives the North Randolph Fire Station a higher Energy Use Intensity (EUI) as the calculation is dependent on the square footage. In general, new buildings can have higher energy usage than comparable older buildings due to higher ventilation requirements, so that could be one reason to explain the higher energy usage. Preliminary analysis identified that while the North Randolph Station has similar energy usage as the Central Station in the summer months, energy use in the winter is much higher. This could come from higher temperature settings or issues with the heating system. The Town will investigate this further.

2) If the Town of Randolph was awarded state grant funds to install solar panel and battery storage systems at one of the town schools, would the Town own the systems?

Yes. The Town recently submitted an application for grant funding for a study of solar panels with battery storage at school buildings with a goal of evaluating all sites and identifying the optimal location. A separate application will be submitted for construction funding which would be used to purchase and install the solar panels and battery storage system under Town ownership. This means the financial proceeds and the energy from any electricity generated by the solar panels and stored in the batteries would directly benefit the Town and the school district.

3) How many of the five eligibility criteria of the Green Communities program of the MA Department of Energy Resources does Randolph fulfill?

To date, Randolph has completed three of the required criteria: 1. as-of-right siting of clean energy facilities; 2. expedited permitting for clean energy facilities; and 3. adoption of the Stretch Code for energy-efficient buildings. The two remaining criteria are the adoption of the Energy Reduction Plan, currently under consideration by the Town Council, and of the Fuel-Efficient Vehicle Policy. The Fuel Efficient Vehicle policy has been drafted and is in the process of being signed by the Town Manager and Superintendent. The application deadline for the Green Communities program is December 30, 2025.

4) How does the estimated payback period calculation in Table 4 on page 17 of the Energy Reduction Plan work?

The column "Estimated Payback After Incentives (years)" shows how many years it takes for the listed energy efficiency projects to be fully paid off and start yielding a financial return for the town. The value of the estimated payback period is calculated as follows:

$$\frac{\text{Estimated [Project] Cost After Utility Incentives (\$)}}{\text{Project Annual Cost Savings (\$)}}$$

For example, a project to install more efficient LED lighting at Randolph High School costs an estimated total of \$103,788.37. After accounting for utility incentives for lighting, the project cost is reduced to \$89,991. Divided by the expected annual cost savings of \$9,435.31 thanks to the more efficient lighting, it will take 9.5 years for the Town's investment of \$89,991 to be fully paid off. After that, the Town will save \$9,435.31 on its annual operating expenses.

In reviewing the table on pages 17-19 of the proposed plan, one can see payback periods ranging from 0.40 years to 958.8 years. These figures can more readily be broken down into two categories: less than 20 years and greater than 20 years.

A total of 53 different projects fall into the first category, and collectively they require an average of 8.2 years for payback. These projects, such as installing new lighting, making improvements to building envelopes, and some modest HVAC upgrades, would be undertaken to improve town and school buildings, while also contributing significantly to energy efficiency goals.

The longer-term category includes 21 projects with an average return on investment in 284.5 years. These would include large investments such as new boilers and HVAC units that would be required primarily due to end of life of the equipment, but would have a secondary benefit of reducing energy costs somewhat.

It must be noted that the calculated payback period across all energy efficiency projects does not take into account potential grants which the Town intends to apply for. If the Town is awarded substantive grant funding through state programs like Green Schools Works, Transforming Energy in Schools Initiative, the Municipal Vulnerability Program (MVP), or Green Communities, the payback period can be brought down substantially.

5) Will the projects outlined in the Energy Reduction Plan reduce gas-powered energy use and increase electricity-powered energy use?

Yes. Energy efficiency projects like building envelope upgrades (e.g. air-sealing or improved insulation) and/or switching the source of space heating from gas boilers or furnaces to electric heat pumps will reduce the overall building energy use. In addition, by phasing out gas-powered heating and replacing it with electric heat pumps, energy use through gas combustion goes down and energy use through electricity goes up. Despite the increase in energy use from electricity from heat pumps, overall energy use will still be significantly lower than before thanks to the [large energy efficiency advantages of heat pumps versus gas heating](#) (#9 below). The process of phasing out the use of fossil fuel equipment in buildings is called building electrification, which is part of the stated energy policy of Massachusetts.

6) Do heat pumps use more energy than natural gas heating equipment like boilers and furnaces for indoor heating?

No. In fact, Heat pumps use roughly [three \(air-source heat pumps\) to five \(ground-source heat pumps\) times less energy](#) to heat the same area of indoor space compared to gas boilers and furnaces. Gas-powered heating systems like boilers or furnaces burn fossil fuels to generate heat energy. On the other hand, electricity-powered heat pumps draw existing heat energy from the surrounding air or ground and distribute it around the room. Like air conditioners, heat pumps can also provide cooling by drawing out indoor heat energy and moving it outside. The Massachusetts Department of Energy Resources provides more [information about air source heat pumps and ground source heat pumps](#).

Though heat pumps use much less energy than gas heating systems, this does not mean that the energy costs of heating with a heat pump are necessarily lower than with gas heating. In Massachusetts, a unit of energy from electricity is currently more expensive than a unit of energy from natural gas combustion. Whether or not heating from a heat pump compared to natural gas is cheaper [depends on customer usage and their electric utility](#). Mass Save provides a helpful [Heating Comparison Calculator](#) to get cost estimates for different heating systems.

7) Is geothermal heating and cooling (aka, ground-source heat pumps) an option for Randolph?

Ground-source heat pumps are the most energy-efficient and environmentally friendly heating and cooling option for residential and commercial buildings. They use approximately five times less energy than gas heating equipment. However, upfront costs tend to be high due to the necessary drilling involved in the installation, in addition to any building system improvements needed to tie into geothermal sources.

However, upfront costs can be reduced significantly through government and utility incentives. For example, [MassCEC estimates](#) that the cost of a ground-source heat pump for a 2,000 sf home can be reduced from \$45,000 to \$18,500 after accounting for utility, state and federal incentives.

8) What about the geothermal network in Framingham?

Eversource inaugurated the country's first utility-owned geothermal network in Framingham, MA in June 2024. The network of geothermal piping and ground-source heat pumps connects 36 buildings encompassing 125 customer accounts in a Framingham neighborhood and provides ultra-efficient heating and cooling.

Eversource created this useful [2-minute explainer video about networked geothermal](#). More information about onsite progress can be found on the [project page](#).

9) What are the potential benefits of installing solar panels onsite together with electric heat pumps?

The potential benefit of these measures is to reduce building utility costs dramatically, potentially to \$0, and improve building energy resilience – in short, creating a [“net zero” building](#) which can fully produce the electricity needed to cover its own electricity demand. This also means that the building burns no fossil fuels.

By electrifying heating (replacing gas boilers with heat pumps) and cooking systems (replacing gas stoves with induction stoves), buildings can run fully on electricity and require no more gas supply. The addition of solar panels ensures that a building can generate electricity onsite, which reduces the need for outside, utility-supplied electricity. Coupled with onsite battery storage and ambitious energy efficiency measures like triple-pane windows and improved insulation and air-sealing, it is possible to almost completely bring down utility costs and the supply of outside energy.

The MA Department of Energy Resources provides a helpful [list of case studies of net-zero residential and commercial buildings](#). The architecture firm SMMA provides [more information about net-zero school buildings](#) on its website.

10) What is the policy of the Massachusetts School Board Authority (MSBA) on funding for schools which have previously received MSBA funds and are then demolished for new construction?

To research this question, staff spoke with a representative of the MSBA. Per that conversation, it was learned that while the MSBA does not preclude a community from applying for the rebuilding of a school building that previously had an MSBA investment, they do require that the community analyzes renovation, addition, and demolition during the investigatory process. And, further, if the MSBA investment is less than 20 years of age, the MSBA will determine if their prior investment should be “recaptured” as part of the new award. Effectively, they look at the value of the prior investment and how long it has been in place, and then they could potentially deduct from the new award a proportionate share of their prior investment. The calculation would be done at the time that schematic design is complete and local voters have approved the project. Per MSBA records, Randolph High School has received 2 investments that are less than 20 years old. These include \$750,000 for roof repair (2013) and \$2.1 million for replacement of windows and doors (2014).

In addition, while the federal government does not have a specific policy regarding how long grant fund expenditures should remain in place, some potential exists that they could seek to reclaim funds if their investment has not seen its full benefit. The Town’s ARPA consultant recommends that, should the Town consider demolishing the high school building, it should document how any investment has been used during the time period of its existence. In recent years, the Town has invested just under \$2.8 million in ARPA funds for the Codman Square Health Clinic which had a soft opening the week of November 17th, and the School District has invested just over \$3.1 in ESSER funds at RHS for a science and engineering lab, replacement boiler, and other projects.