



# Public Facilities Committee Report

## City of Newton In City Council

**Wednesday, May 5, 2021**

Present: Councilors Leary (Chair), Laredo, Kelley, Danberg, Norton, Kalis, Gentile and Crossley

Also Present: Councilors Downs, Bowman and Malakie

City Staff Present: Chief Operating Officer Jonathan Yeo, Chief Financial Officer Maureen Lemieux, Commissioner for the Department of Public Works Jim McGonagle, Director of Sustainable Materials Management Waneta Trabert and Co-Director's of Sustainability Ann Berwick and Bill Ferguson.

### Referred to Public Facilities & Finance Committees

**#167-21**      **Appropriate \$2.5 million for the Transportation Network Improvement Plan**  
HER HONOR THE MAYOR requesting the authorization to appropriate and expend two million five hundred thousand dollars (\$2,500,000) to supplement funding for the Transportation Network Improvement Plan.

**Action:**      **Public Facilities Approved 8-0**

**Note:**      Jim McGonagle, Commissioner of Public Works presented the request to appropriate and expend \$2,500,000 to supplement funding for the Transportation Network Improvement Plan. The funding will come from the American Rescue Plan (ARPA) funds and this will allow the City to add ten streets to the pavement program this year. Commissioner McGonagle explained that this work will include paving, maintenance work, ADA ramp improvements, sidewalk improvements and bicycle lanes. He noted that the goal is to add bicycle lanes to Parker Street if approved by the Traffic Council. This funding will also allow the City to pave the second half of Parker Street.

Maureen Lemieux, Chief Financial Officer noted that the City has not received the ARPA funding yet, but the hope is that they will arrive soon. This item will not get to full City Council until May 17, 2021 and if the funds are not available at that time the City Council will be asked to amend the source of funds. She further explained that the 4 categories of eligible uses for ARPA funds have not been fully defined yet and that they are still waiting for guidance from the Department of Treasury. Ms. Lemieux explained that two categories that the City plans on utilizing are loss in revenue and economic development. The City has attended to request for \$2.5 million come from Free Cash last year but due to the pandemic was unable to.

Committee members asked the following questions:

Q: Even with the addition of \$2.5 million to the Transportation Network Improvement, will the budget still be below \$9 million?

A: Jonathan Yeo, Chief Operating Officer explained that the docket item showed that this account will be at \$8 million for this current fiscal year. The budget was originally lowered to the \$5 million range. This \$2.5 million and another docket item for \$400,000 will bring the account to approximately \$8 million. Mr. Yeo explained that they have also spent millions of dollars on improvements to West Newton and Newtonville as well.

Q: Is there an idea of where the City could receive additional funds for the Transportation Network Improvement Plan for future fiscal years?

A: Ms. Lemieux explained when the budget is presented next week that it will show that the General Fund will have lost \$15-\$16 million in revenue from the previous fiscal year. She noted that they are receiving grant funding but because the guidelines are not clear, yet the administration can not say what these funds will be used for.

Q: Is there a timeframe for when the attached list of work will be done?

A: Commissioner McGonagle explained that a majority of this work will be completed before winter this year. Once these funds are approved the goal is start this work as soon as possible.

Q: Has it been difficult to get police details for this type of work?

A: Commissioner McGonagle explained that so far this year there has been sufficient police details. The Police Department has been working with DPW to be able to perform the work without the need of police details.

Committee members made the following comments:

The City should continue to make the Transportation Network Improvement Plan a priority and should continue to try to restore the full pre-pandemic budget.

Committee members thanked Commissioner McGonagle and his team for their work on the Transportation Network Improvement Plan.

Councilor Crossley motioned to approve which passed unanimously.

**#113-21      Resolution in support of EPR and an expanded Bottle Bill**  
COUNCILORS LEARY, NORTON, KALIS, KRINTZMAN, NOEL, LUCAS, HUMPHREY,  
GROSSMAN, LIPOF, KELLEY, BOWMAN, DOWNS AND CROSSLEY requesting a  
resolution of the City of Newton supporting Extended Producer Responsibility and  
expanded Bottle Bill.

**Action:**      Public Facilities Approved 8-0

**Note:**      Waneta Trabert, Director of Sustainable Materials Management presented the attached PowerPoint to explain the concepts that are included in the Resolution in Support of the Extended Producer Responsibility and expanded Bottle bill. A copy of the proposed resolution is also attached to this report.

Councilors asked the following questions:

Q: There have been conversations that recycled materials are being put in a recycling bin but then being mixed in with the trash. Is there any truth to these conversations?

A: Ms. Trabert explained that there has been some investigating journalism that has shown some light plastics ending up in developing countries that are not able to handle that material the right way. She explained that materials being managed by Newton are not being put into those kinds of streams at least as far as it can be tracked. Once the materials are sold by Waste Management it goes to a repurposing facility that is regulated. Ms. Trabert also noted that a lot of the recycling from Newton is being sold domestically but that has caused an increase in cost.

Q: What is the continued advantage of the Bottle Bill, even though there are wide-spread recycling programs throughout the city?

A: Ms. Trabert explained that the material that is collected through a container deposit system is more valuable than in the single-stream recycling system. She explained that her belief is that there should be a deposit on any glass bottle to incentives pulling it out of the single-stream recycling system. It is overall better for the environment and economically to recycle using a container deposit system. This also helps to prevent littering.

Councilors made the following comments:

This is a way for Newton and other communities to get control of the escalating costs of both trash and recycling disposal. In addition, this will go along with the City's Climate Action Plan if the bill is passed by the state.

It was noted that it is a good idea to support this concept and let the state legislature decided the specifics of the proposed bill.

The City should look at if there should be further sorting at the household level to have a better value of these materials.

The City also should look at what Newton can do on its own to improve recycling. This could include banning or limiting the sale of nips.

The Chair thanked the Sustainable Materials Management Committee for their work on this resolution.

Councilors thanked Mr. Trabert for her presentation on this matter and her work in the Sustainable Materials Management Division.

Councilor Danberg motioned to approve which passed unanimously.

**#294-20**      **Discussion to require or encourage the use of efficient electric technology**  
COUNCILORS CROSSLEY, KELLEY, LEARY, NORTON, ALBRIGHT, GREENBERG, AUCHINCLOSS, MARKIEWICZ, NOEL, DANBERG, KALIS, DOWNS, LAREDO & HUMPHREY requesting a discussion with the Sustainability Team to consider creating an ordinance that may require and/or encourage the use of efficient electric technology for heating, cooling, hot water, cooking and other appliances in new and substantially renovated buildings.

**Action:**      **Public Facilities Held 8-0**

**Note:**      The Chair noted that Thomas Kiley, the President and CEO of the Northeast Gas Association was invited to attend this meeting to give his perspective on the electrification of buildings.

Mr. Kiley explained that the Northeast Gas Association is a regional trade association that represents natural gas interests in 9 Northeast States. The Northeast Gas Association has approximately 33 local gas distributions companies and municipalities that serve 14 million customers in those 9 states. There are also 10 pipeline companies and liquified natural gas import facilities. He noted he was asked to answer the following questions regarding the electrification of buildings.

- 1) Have gas companies been following the conversations around the electrification of buildings and what do they feel their role is?
- 2) What are their major concerns with the electrification of buildings?

### **Question #1**

Mr. Kiley explained that they have been following this conversation. Gas companies do feel that they have a constructive role to play in partnership with renewable energy. He explained that there is a pathway that involves the delivery of decarbonized fuel through their existing network and this would help maintain affordability. He noted that natural gas provides an affordable and reliable energy source and is the preferred energy source for many consumers. He also noted that there has been an increase of users of gas as their energy source in the past few years. The largest gas provider for the residents of Newton is National Grid, who have released a net-zero by 2050 plan last October. In the plan, National Grid referenced 10 pillars. The 5 pillars that reference the future of heat and how utilized will be addressing lowering emissions going forward are listed below.

- Energy efficiency and demand response (45% of the energy efficient dollars are spent in the 9 states that are represented by Northeast Gas Association where there are 14 million customers who represent less than 20% of the United States gas customers)
- Decarbonizing the gas network with renewable natural gas and hydrogen
- Reducing methane emissions from its own network or working with the industry to reduce emissions through the entire value chain
- Integrating innovated technology to decarbonize heat including electrification, heat pumps and geothermal hybrid gas heating systems
- Investing in large scale carbon management

Mr. Kiley noted that the emissions from the natural gas sector in the last three decades have dropped while adding a tremendous number of customers nationwide. This statistic was done by the Department of Energy. National Grid has a proposed pilot program for geothermal products in Massachusetts.

## **Question #2**

Mr. Kiley explained that customer choice is essential to energy policy and regulation in Massachusetts. There is a concern of there being a mandate on electrification. He noted that incentives and pilot programs are welcome to test the advance of electrifications. There are already utilities that have investigated this approach. Mr. Kiley noted that natural gas fuels more than 50% of the power generation in Massachusetts and New England. Natural gas utilities will be an important partner to renewable energies going forward. There is a concern on the reliability and affordability of electrification. The energy transition is underway, but it takes time and the efforts will need to be coordinated. Mr. Kiley also cited the recent climate bill in the Department of Energy Resources (DOER) building code.

### **Councilors asked the following questions:**

Q: What is the definition of renewable natural gas?

A: Mr. Kiley explained that renewable natural gas is derived from organic waste materials. There is a company in Vermont that is taking waste from their farms and injecting it in their systems as part as the natural gas supply for Middlebury College. National Grid has multiple programs for renewable natural gas as well. This is a new technology that is still in pilot programs. Mr. Kiley further explained that the gas companies do need to continue to repair the significant back logs of leaks in this country.

Q: Regarding the previous answer, is this process capturing methane and what portion of the gas companies' product is capturing methane?

A: Mr. Kiley explained that yes this is capturing methane. He noted that he did not have an answer for the second question but could provide one at a later date.

Q: What is the Committee's goal from this docket item?

A: The Chair noted that the goal is for the City to meet its Climate Action goal and reduce greenhouse gas emissions. The overall goal would be to create an ordinance along with a Home-Rule petition.

Q: Can the current gas infrastructure be used to deliver electricity instead of gas?

A: Mr. Kiley explained that nationwide there is a move towards complete electrification. There is still a tremendous amount of infrastructure that will need to be put in place just to fuel the electric vehicle market. Another aspect that needs to be addressed is the amount of gas that is used especially in the New England states during the winter for heating. The gas infrastructure

needs to be maintained to be able to feed these customers, while still recognizing the state's climate action goals.

Q: Is it fair to say that companies represented by the Northeast Gas Association would have no issue with an electrification bill that called for the electrification with new construction or substantially renovated buildings as long as it doesn't change existing customers?

A: Mr. Kiley explained that he could not make this statement for the entire industry. He did note that gas companies are still bringing in new customers for natural gas but are careful when adding new customers due to climate action goals. Additionally, Mr. Kiley noted that there is a finite amount of infrastructure and it is extremely difficult for the gas company to get new pipes.

Q: What is the cost and timeframe to repair the gas leaks in Newton?

A: Mr. Kiley explained that the above question would need to be answered by National Grid. He suggested that the committee has an official from National Grid come to a meeting discuss these concerns.

Q: What are the plans in place to achieve carbon neutrality by 2050?

A: Mr. Kiley explained that those goals do vary between gas companies.

Q: Renewable natural gas has shown to be inefficient in the past. What is the plan for this going forward?

A: Mr. Kiley explained that this will never replace the trillions of cubic ft of gas that is going through the system on an annual basis, but this can make a difference.

Q: Would the trade association actively oppose local efforts to electrify buildings?

A: Mr. Kiley noted that the Board of Directors for the Northeast Gas Association has not taken any action to oppose these efforts at this time. They have been asked to go before local communities to discuss the usage of natural gas. He noted that there are regulations being considered that could make it difficult for the gas companies to maintain their infrastructure for current customers. He also noted that gas companies are essential to this region's economy.

Q: Is there any logistical problems with Newton creating an ordinance that may require electrification in new construction?

A: Mr. Kiley explained that residents may still want to have gas hook-ups when building a new home. There have been discussions that heat pumps alone are not reliable during cold winter nights in New England. There are also 27,000 residents/businesses just in Newton that are on natural gas. The technology is also not there to completely transition to all electric homes and businesses.

Councilor's outstanding questions

Q: How much have emissions dropped across the gas network?

Q: How are gas companies investing in renewable energy technology?

Q: How will the gas companies work with the city to reach out to the private sectors to reduce their emissions?

Q: What exactly are the gas companies doing to collaborate on the need to transition to cleaner energy sources understanding the need to expand the electric grid?

Councilors made the following comments:

The Council should be careful on banning gas all together because the City may not have the authority to do so. This was shown in the AG's decision on Brookline's Bylaws. The City should continue to give resident choices.

The Committee has changed the docket item to not use the language of an all-out ban. This will be a lengthy process and the committee will continue to discuss possible exceptions to this rule. There will also be further conversations about the impact of the City's energy consumption and what that will look like with all electric homes and buildings. The Law Department will continue to advise the committee on the legal aspect of this issue. The Energy Coach will be able to educate residents on what their choices are.

This conversion will not happen overnight but there seems to be no reason that there can not be a requirement for new construction or substantial renovation to wire for electrification.

There will still be a need to rely on gas until this conversion can happen. The City should also should further investigate the renewable pilot programs that gas companies are running.

Mr. Kiley noted that National Grid is putting funds into renewable energy and he noted that a representative from National Grid could educate the committee on this program.

The amount of gas leaks is still a concern. It was also questioned what the money could go towards if these repairs did not have to made. Additionally, there is a concern of the health risks related to the usage of natural gas. These are the reasons why the transition to all electric is so important.

Regarding the previous comment, Mr. Kiley noted that they do have an obligation to maintain the existing infrastructure to be able to serve the customers as the transition occurs.

It was also noted that the State Legislature will have a large role on what ordinances and regulations will be allowed.

Councilors thanked Mr. Kiley for his time and knowledge on this matter.

After the conclusion of the meeting, Mr. Kiley submitted the attached questions and answers regarding the electrification of buildings.

The Committee went on to discuss next steps for this docket item:

It was noted that the attached Brookline Bylaws do show a list of exemptions that Newton may want to consider.

It was also been discussed that Newton should put together a Home-Rule petition and a draft ordinance which should be submitted to the State Legislature for review. Lexington and Arlington have already submitted a Home-Rule petition request to the legislature. The committee should have a discussion while drafting the ordinance on what exceptions should be considered. It was also noted that this ordinance would deal with new construction and substantially renovated buildings.

Ann Berwick, Co-Director of Sustainability addressed the question regarding why the City would not just adopt the net-zero building code at the state level. Ms. Berwick explained that the net-zero stretch code does not solve this problem. There are multiple ways for the City to get net-zero. She explained that there is a scenario to not have stringent building requirements and let the rest of the problem be solved by nonvaluable offsets. Electrification needs to happen to get to a meaningful net-zero.

She also noted that there may be a reliability problem but not with new construction or substantial renovations with the offshore winds that will be a part of electrification. Ms. Berwick explained that she herself owns a heat pump in her house in New Hampshire and it has been a reliable source for heat.

There should be a sense of the committee on several key issues and then this should be passed to the Law Department and the Co-Directors of Sustainability to form the language necessary for a Home-Rule petition and/or a draft ordinance. There is a question if this should be for all new construction or just 1 to 2 family homes. Then will this be all substantial renovation or again just for 1 to 2 family homes. There should also be a legal definition for substantial renovation. The one other decision that the committee should make is if there should be an exemption for cooking. It was noted that Brookline did decide to exempt cooking.

There may be the need to have more guidance from the Law Department on how far this proposed ordinance can go. If the City would require the electrification of new construction and substantially renovated buildings, then this would prohibit new gas hookups. The legality of doing this is in question. If this is legal to do and once the City has able to form a draft ordinance there should be a public hearing.

It was noted that going forward with the Home-Rule petition will deal with some of the legal issues. Ms. Berwick explained that an ordinance would be illegal if it was not accompanied by a Home-Rule petition. The Home-Rule petition asks state legislatures to allow Newton to adopt this kind of ordinance. This is what the AG's office told Brookline they had to do. Lexington and Arlington have just filed their Home-Rule petitions within the last few weeks.

It was asked if the Law Department has weighed in on the issue of a Home-Rule petition? Ms. Berwick noted that they do agree with her above comments on a Home-Rule petition.

It was also noted that a Home-Rule petition should be submitted before a public hearing is scheduled. This will be an important aspect of this project; not only residents need to be educated but also developers.

The Chair asked the committee if they would like to exempt cooking from the potential ordinance.

Cooking should be exempt from any potential ordinance. It was noted that the Brookline Bylaw also exempts back-up generators, outdoor cooking, outdoor heating, large central hot water heaters, labs/certain medical offices, repairs of unsafe conditions and waivers when electrification is not feasible. The Law Department should look at these exemptions and what other cities/towns have decided to exempt.

Ms. Berwick explained that the administration would like to exempt cooking for a number of reasons. There has been push-back from residents in other towns if cooking is included in this ordinance. Additionally, the emissions related to cooking are relatively small compared to the emissions associated with heating and cooling. For these reasons cooking is reasonable to exempt. She also noted that Brookline's other exemptions are also reasonable.

It was noted that there is unhealthy air quality that does come from having gas stoves but if this is what is stopping the committee from moving forward then cooking should be exempt.

It was asked if there should be exemption around small scale 1 to 2 family water heaters. Ms. Berwick explained that the communities that have put forth Home-Rule petitions did not make this exemption. She explained that all of those towns have exempted central hot water heaters over a certain size. This is because the technology is developed for the smaller buildings. Mr. Berwick also addressed the attached cost-comparison memo. She explained that if a new home is built in Newton the additional costs to make the home all electric is very small.

There should be as few as possible exemptions to this ordinance. Cooking should not be one of the exemptions because there are viable options for cooking with electrification. There are also health impacts to burning gas in homes.

It is important to get support from residents on this issue so if cooking is an issue it should be exempt. This is an ordinance that could change overtime as more technologies develop.

The subcommittee will be drafting ordinance language and a Home-Rule petition to bring before the committee. There is a plan to have a public hearing after submitting a Home-Rule petition.

Councilor Crossley motioned to hold item #294-20 which passed unanimously.

The Committee adjourned at 9:42 p.m.

**Respectfully Submitted,**

**Alison M. Leary, Chair**



167-21

City of Newton, Massachusetts  
Office of the Mayor

Ruthanne Fuller  
Mayor

Telephone  
(617) 796-1100  
Fax  
(617) 796-1113  
TDD/TTY  
(617) 796-1089  
Email  
rfuller@newtonma.gov

Honorable City Council  
Newton City Hall  
1000 Commonwealth Avenue  
Newton, MA 02459

2021 APR 26 PM 5:00  
RECEIVED  
CITY CLERK  
NEWTON, MA 02459

Honorable City Councilors:

I respectfully submit this docket item to this Honorable Council requesting the authorization to appropriate and expend \$2,500,000 to supplement funding for the Transportation Network Improvement Plan. Funding will come from the City's first tranche of American Rescue Plan Act funds set to arrive in City accounts shortly. In the last few years, this supplemental funding has come from Free Cash, Overlay Surplus or the Capitalization Fund. The pandemic-related revenue shortfalls left the City with much less Free Cash this fiscal year.

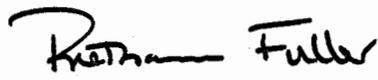
Below is a table showing the Transportation Network Improvement Plan's sources of funding since FY2018. The FY2021 budget for the program, revised when the pandemic hit, was \$5.5 million. This additional \$2.5 million increases it to \$8.0 million.

Newton Transportation Network Improvement Program Funding FY18-FY21				
Source	FY18	FY19	FY20	FY21
Chapter 90	\$ 2,445,000	\$ 2,309,000	\$ 1,850,000	\$ 2,750,000
2013 Override and Operating Budget	\$ 2,154,873	\$ 1,640,117	\$ 1,710,000	\$ 1,350,000
Reclassified Revenues/Savings	\$ 982,903	\$ 669,235		\$ 400,000
Free Cash	\$ 3,929,011	\$ -	\$ 3,000,000	\$ 1,000,000
Overlay Surplus	\$ -	\$ 5,000,000	\$ 1,750,000	
Capital Stabilization			\$ 1,250,000	
ARPA	\$ -	\$ -	\$ -	\$ 2,500,000
<b>TOTAL</b>	<b>\$ 9,511,787</b>	<b>\$ 9,618,352</b>	<b>\$ 9,560,000</b>	<b>\$ 8,000,000</b>

As noted in Commissioner McGonagle's attached memo and road listings, the additional funds will allow the city to address high priority road and sidewalk improvements in village center areas. The American Rescue Plan Act is designed in part to allow municipalities to move forward with economic recovery projects and to fund projects hurt by lost revenues. The City is anticipating approximately \$65 million in total ARPA funding, as well as grant program funds that are expected at the state level.

Thank you for your consideration of this matter.

Sincerely,

A handwritten signature in black ink that reads "Ruthanne Fuller". The signature is written in a cursive style with a large, looping initial "R".

Mayor Ruthanne Fuller

City of Newton

DEPARTMENT OF PUBLIC WORKS

OFFICE OF THE COMMISSIONER

1000 Commonwealth Avenue  
Newton Centre, MA 02459-1449

Ruthanne Fuller  
Mayor

To: Maureen Lemieux, Chief Financial Officer  
Jonathan Yeo, Chief Operating Officer

From: James McGonagle, Commissioner of Public Works

Subject: Request to Appropriate \$2,500,000 for the Transportation Network  
Improvement Plan

Date: April 26, 2021

---

I respectfully request that the Mayor docket the following request to appropriate and expend two million five hundred thousand dollars (\$2,500,000) to supplement funding for the Transportation Network Improvement Plan.

The Department of Public Works will use the funds to increase the number of streets being paved. In addition, these funds will allow for additional bicycle accommodations, sidewalk safety improvements and curb ramp adjustments to increase ADA compliance.

Given the American Rescue Plan Act's focus on economic recovery, DPW has highlighted sections of the city near village centers that need substantial road and sidewalk improvements based on the latest road condition assessment. Please see the attached list of streets.

Thank you for your consideration of this matter.

James McGonagle  
Commissioner

Telephone: (617) 796-1009 • Fax: (617) 796-1050 • [jmcgonagle@newtonma.gov](mailto:jmcgonagle@newtonma.gov)

## 2021 ARPA-Funding: Roadways in Economic Development Areas

- Albemarle Road (between Watertown Street and Crafts Street) – This portion of Albemarle Road is the access and parking for a major recreation area used by residents and visitors to the City. The recreation area includes soccer, football, baseball, and softball fields, tennis courts, a playground, and a public pool. In addition, this portion of Albemarle Road is the bus and parent drop-off for a public preschool and middle school. This road project will include paving, sidewalk and ramp improvements, new pavement markings including ADA symbols, potentially a new bike path, and a refreshed parking area that will better serve the residents and visitors.
- The following pavement management projects are roadways that serve as gateways to village centers and serve several small businesses. Roadway improvements and new pavement markings including ADA symbols to these streets will provide better access for pedestrians, cyclists, and motor vehicle users to retail shops, restaurants, community centers, and houses of worship in these centers.
  - Parker Street and Cypress Street – Newton Centre
  - Centre Street (from the Route 9 ramps to Walnut Street) - Highlands
  - Washington Street from Commonwealth Avenue to Perkins Street – West Newton
  - Curve Street from Prospect Street to Auburn Street – West Newton
- Auburndale: Grove Street from Woodland Road to just before Hotel Indigo – This portion of road serves a large commuter rail/bus station, several large office buildings, a college, and an assisted living center. Roadway and pavement marking improvements to this area will benefit employees of the businesses, public transportation users, and residents and visitors to both the college and assisted living center.
- Nonantum: Watertown Street (between Pearl Street to Walnut Street) – This portion of roadway runs through a village center with a variety of retail shops, small businesses, restaurants, and a small but well-utilized park. The pavement project and new pavement markings will compliment recent ADA improvements along this portion of Washington Street and will encourage shopping and dining.
- Newton Corner: Belmont Street, Arlington Street, Ricker Road, Marlboro Street, and Ricker Terrace (cluster of streets in Newton Corner) are major walking routes to a nearby village Center with small businesses, restaurants, and a transportation node. In addition, these roadways are in proximity to Bigelow Middle School and are walking routes for the students. Improvements to roadways, sidewalks, and pavement markings will encourage visits to the village center and use of public transportation.

**RESOLUTION NO. [REDACTED]  
RESOLUTION OF THE CITY OF NEWTON  
SUPPORTING EXTENDED PRODUCER  
RESPONSIBILITY AND AN EXPANDED BOTTLE BILL**

RECEIVED  
2021 MAR 24 AM 10:03  
CITY CLERK  
NEWTON MA 02459

**WHEREAS**, in FY20, 18,175 tons of discarded materials and products were sent to disposal from our community, and the cost per ton is currently \$68.97, but is expected to significantly increase by 2028; and

**WHEREAS**, in FY20, 9,400 tons of discarded packaging and printed paper were collected at the curb through single stream recycling from our community, and the processing cost per ton has increased from \$30 to approximately \$75 since 2020; and

**WHEREAS**, our community has paid over \$92,000 in contamination fees for our recycling from late 2017 to early 2019; and

**WHEREAS**, local governments must arrange and pay for the management of waste and recycling, and state policies currently make local governments responsible for achieving waste diversion goals; and

**WHEREAS**, municipal recycling programs have expanded, diverting more waste materials from landfills and incinerators; and

**WHEREAS**, the U.S. faces a solid waste crisis stemming from overconsumption of material goods, excess packaging and reliance on single-use plastics; and

**WHEREAS**, Massachusetts faces a finite and dwindling amount of landfill space and capacity at waste-to-energy disposal facilities; and

**WHEREAS**, municipalities must find alternative ways of managing products banned from disposal or incineration through the MassDEP Waste Disposal Bans using taxpayer funding; and

**WHEREAS**, China's National Sword policy and the policies of other international purchasers of recyclables from the U.S., limiting the types and amount of recyclable materials exported from the U.S., has made recycling more expensive throughout the country, and in Massachusetts specifically; and

**WHEREAS**, excess packaging, single-use products, products designed for disposal, and hazardous products contaminate recycling streams, increasing costs to municipalities; and

**WHEREAS**, local governments do not have the resources to adequately address the contamination rates of recycling streams, nor hard-to-manage and hazardous products; and

**WHEREAS**, costs paid by local governments to manage products are, in effect, subsidies to the producers of products designed for disposal or recycling, and hard-to-manage or hazardous products; and

**WHEREAS**, there are significant environmental and human health impacts associated with improper and inefficient management of all categories of waste, and the costs of such impacts are externalized with the burden placed on taxpayers; and

**WHEREAS**, Extended Producer Responsibility (EPR) is a policy approach in which producers are obligated to pay for and manage the end-of-life collection and disposal/recycling of their products and/or product packaging, reducing costs to municipalities, and which has been shown to be effective at increasing recovery of materials and reducing costs of recycling systems overall; and

**WHEREAS**, when the higher costs of responsible management for products are placed on the producer, there is an incentive to design products that are more durable, easier to repair and recycle, and less toxic; and

**WHEREAS**, there has been national support for EPR legislation in the form of resolutions and policies (National Association of Counties, July 2008; National League of Cities, November 2009; US Conference of Mayors, June 2010); and

**WHEREAS**, in January 2019, the Massachusetts Municipal Association passed a resolution which supports statewide product stewardship legislation; and

**WHEREAS**, the Massachusetts Bottle Bill, a type of EPR program enacted in 1982, has incentivized the collection and recycling of up to 70% of deposit containers, reducing litter and lowering the cost of recycling or disposal for deposit containers from municipal government and taxpayers,

**NOW, THEREFORE BE IT RESOLVED BY THE NEWTON CITY COUNCIL**, that by adoption of this Resolution, the City of Newton urges MassDEP and the Massachusetts Legislature to continue taking timely action to promote a circular economy in Massachusetts to manage excess packaging, single-use products, products designed for disposal, and hazardous products; and

**BE IT FURTHER RESOLVED**, that the Newton City Council instructs the Massachusetts Legislature to enact product specific and framework legislation to have producers share in the responsibility for product waste management costs by passing extended producer responsibility laws, including bills currently under consideration, which will shift costs from municipalities and give producers the incentive to design products to make them easier to reuse and recycle and less toxic; and

**BE IT FURTHER RESOLVED**, that the Newton City Council instructs the Massachusetts Legislature and the Governor to support and vote in favor of updating the Massachusetts Beverage Container Law by adding to the definition of beverage containers

bottled water, sports drinks, tea, wine, spirits, 'nips' and others, and an increase in the deposit fee to 10 cents to further reduce litter and waste management costs for municipal governments; and

**BE IT FURTHER RESOLVED**, that the Director of Sustainable Materials Management of the City of Newton Department of Public Works be authorized to send letters to the Massachusetts Municipal Association, MassDEP, the State legislature, and any other local government and to use other advocacy methods to urge support for EPR Framework or product legislation and related regulations when deemed appropriate; and

**BE IT FURTHER RESOLVED**, that the City of Newton encourages all manufacturers to share in the responsibility for eliminating waste through minimizing excess packaging, designing products for durability, reusability, repairability and the ability to be recycled; using recycled materials in the manufacture of new products; and providing financial support for collection, processing, recycling, or disposal of used materials; and communicating with waste haulers and local governments about end-of-life management of their products and product packaging.

PASSED AND ADOPTED by the Newton City Council, Commonwealth of Massachusetts on \_\_\_\_\_ by the following vote:

AYES:  
NOES:  
ABSENT:  
ABSTAIN:

Signed: \_\_\_\_\_  
(Name), Chair

Date: (mo/day/year)

ATTEST: \_\_\_\_\_  
(Jurisdiction name)

(Name), Clerk

# Extended Producer Responsibility & Expanding the Bottle Bill

Public Facilities Committee Meeting  
May 5, 2021

Waneta Trabert  
Sustainable Materials Management Division  
City of Newton DPW



## Sustainable Materials Management Division

- Residential Service
  - Curbside collections
  - Permanent drop-off site – RRC
  - Multi-family properties (some, not all)
- Municipal Service
  - City buildings, including public schools
  - City operations
  - Public spaces (operated by PRC, waste managed by SMM)
- Non-Profit Service
  - Curbside (optional, for a fee)



# Residential Curbside Collection Services

- Weekly trash – 64gal blue cart
  - Overflow bags available for purchase
- Weekly single stream recycling – 64gal green cart
- Yard waste – 38 weeks per year + Christmas tree pickup
- Bulky waste pickup (\$20/item)
- Appliance/E-waste/ scrap metal item (\$25/item)
- Organics Subscription Program
  - 2,266 households subscribing
  - Preferred vendor: Black Earth Compost



## Product Stewardship & EPR

### Product stewardship

The act of minimizing the health, safety, environmental, and social impacts of a product and its packaging throughout all lifecycle stages, while also maximizing economic benefits. The manufacturer, or producer, of the product has the greatest ability to minimize adverse impacts, but other stakeholders, such as suppliers, retailers, and consumers, also play a role. Stewardship can be either voluntary or required by law.

### Extended Producer Responsibility (EPR)

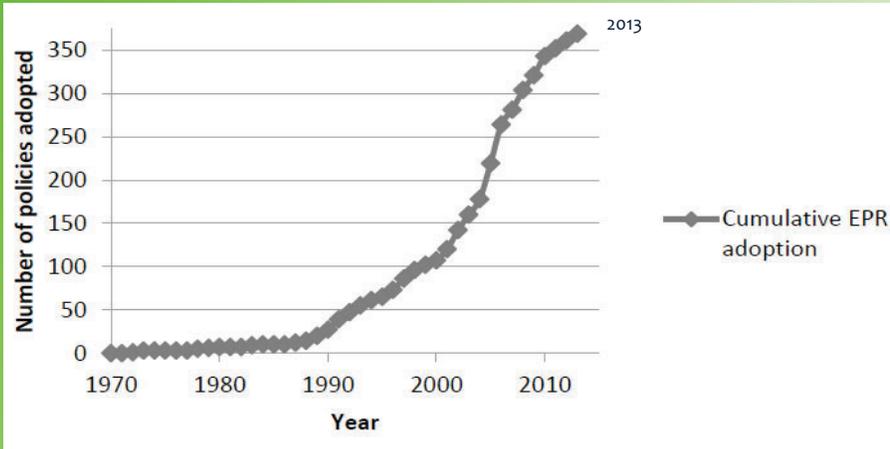
a mandatory type of product stewardship that includes, at a minimum, the requirement that the manufacturer's responsibility for its product extends to post-consumer management of that product and its packaging. There are two related features of EPR policy: (1) shifting financial and management responsibility, with government oversight, upstream to the manufacturer and away from the public sector; and (2) providing incentives to manufacturers to incorporate environmental considerations into the design of their products and packaging.

*In short: "Polluter pays" principle*



# Worldwide EPR Adoption

Cumulative EPR Policies Worldwide



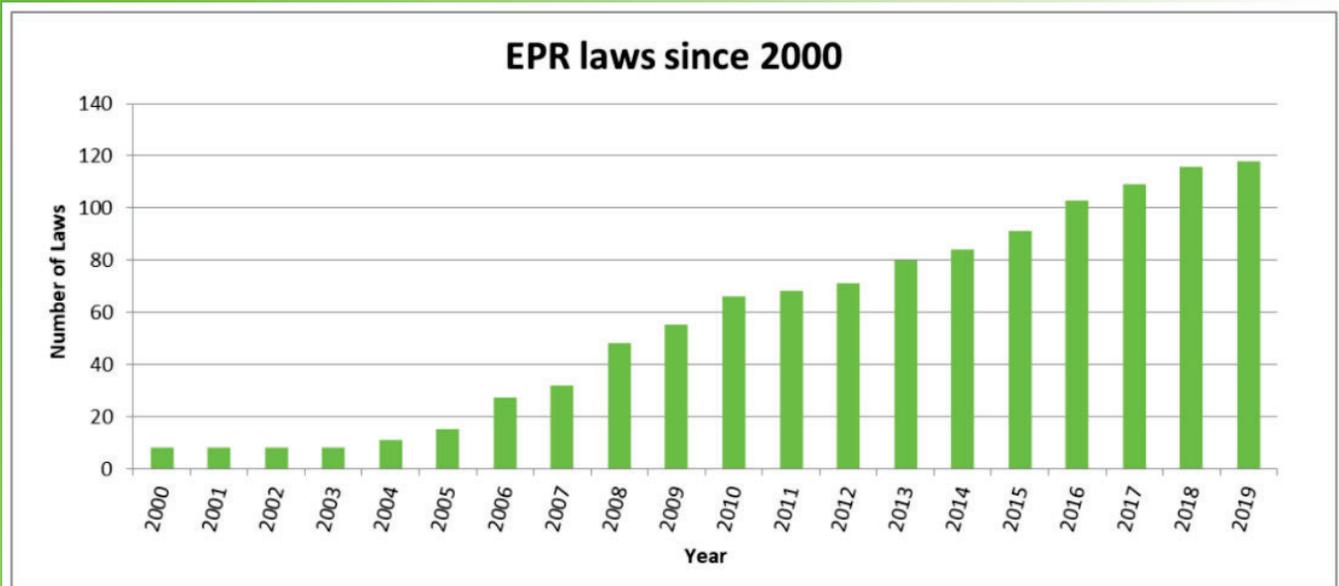
**369**  
programs  
worldwide

**24%**  
of worldwide  
programs  
(90) in the US  
as of 2013



Source: OECD, 2013; Product Stewardship Institute, 2016

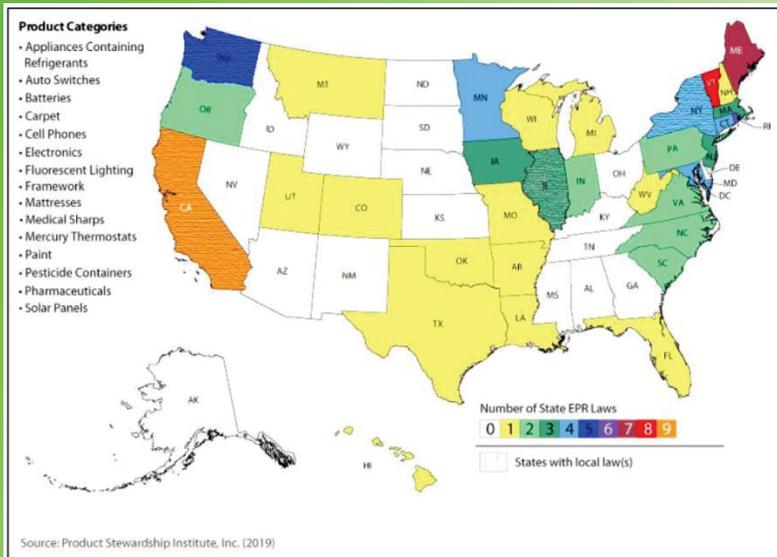
# U.S. EPR Law Trend



Source: Product Stewardship Institute, 2019



# U.S. EPR Laws as of 2019



- 118 EPR laws
- Covering 14 products
- In 33 states +D.C.



Source: Product Stewardship Institute, 2019

## Top Covered Products for U.S. EPR Laws



Source: Product Stewardship Institute, 2019



# Principles of EPR

- Producer responsibility
- Level playing field among producers
- Results-based
- Transparency and accountability
- Roles defined for government, retailers, and consumers

Source: Product Stewardship Institute, 2019



# Benefits of EPR

- Reduce or eliminate cost burden for municipalities
- May relieve administrative/labor burden from municipalities
- Typically increases convenience for consumers/residents
- May incentivize producers to develop longer lasting products
- May incentivize producers to reduce waste/incorporate recycled content/increase recyclability
- Generates specific metrics to track system performance

Source: Product Stewardship Institute, 2019



## 2021-2022 EPR Bills in MA

- Paint
- Mattresses
- Packaging & Printed Paper
- Electronics
- EPR Study Commission
- Smoke Detectors



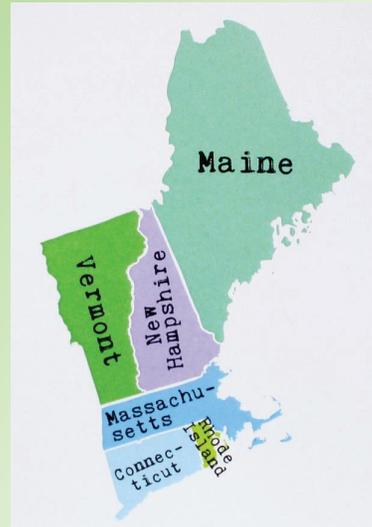
## Recent History of EPR Bills in MA

- 2015 Pharmaceuticals EPR program included in opioid omnibus bill
  - Program has not been implemented, stalled in DPH
- 2016 Paint EPR bill passed the Senate, did not pass the House
- Electronics EPR bills introduced for 5 sessions, never passed
- Mattress study bill introduced in 2 sessions, did not pass



# New England EPR Laws

- Vermont: 8
- Maine: 8
- Rhode Island: 6
- Connecticut: 4
- Massachusetts: 3
- New Hampshire: 1



In MA: mercury devices, pharmaceuticals, bottle bill



# MA Bottle Deposit Program

- 50% redemption rate in 2019
  - OR and MI have 10¢ deposits and have 86% and 89% redemption
- 42% of beverage containers are covered by deposit
  - Compared to ME at 91% and OR and HI at 88%
  - Lowest coverage out of the 10 existing U.S. programs
- Beverages covered: beer, malt, carbonated soft drinks, mineral water
- Implemented in 1983, no updates since that time



# Packaging & Printed Paper

- Bills introduced in 11 states currently – Massachusetts included



## BREAK FREE FROM PLASTIC POLLUTION ACT

Introduced by Senator Merkley and Representative Lowenthal

### What *The Break Free From Plastic Pollution Act* Will Accomplish:

- 1 Strengthen Environmental Justice
- 2 Test Reuse & Refill Programs
- 3 Hold Companies Accountable For Products/Create Transparency
- 4 Incentivize Good Design
- 5 Require Real Recycling
- 6 Reduce The Toxics
- 7 Reduce Pollution
- 8 Reduce Single-Use
- 9 Manage Our Own Waste



# Packaging Producers Are Getting Involved

**PLASTICS**  
RECYCLING UPDATE

A Resource Recycling, Inc. publication

The Recycling Partnership and ACC back fees to lift recycling

Published: October 7, 2020

Updated: October 7, 2020

by [Colin Staub](#)



**PACKAGING**  
WORLD

Extended Producer Responsibility Legislation Update

Nearly a dozen proposals for packaging producer responsibility have been brought forth already this year. Learn how they differ and how they are alike in their strategies.

Feb 23rd, 2021

**Newsday**

NEWS/REGION/STATE

**LI pols: Shift recycling costs from local governments to packaging producers**

Waste **360**

**Flexible Packaging Industry Considers Producer Responsibility Bill Terms**



**RECYCLEBC**<sup>TM</sup>



Massachusetts	British Columbia
7.033 million	5.153 million
10,565 sq mi	364,764 sq mi
840 people/sq mi	13 people/sq mi

US recycling rate: 34%

Source: Recycle BC 2019 Annual Report, 2019



# EPR is Behind the Most Successful Recycling Systems in the World

- There are 40 plus jurisdictions around the world that have some form of EPR for paper products and/or packaging
- Including five (soon to be six) Canadian provinces
- The entire European Union
- China, Russia, Japan, and Brazil
- Many of these programs have been in place for decades



Source: [www.newmoa.org](http://www.newmoa.org), 2021

## Questions?



Waneta Trabert

Director of Sustainable Materials Management

Newton DPW

[wtrabert@newtonma.gov](mailto:wtrabert@newtonma.gov)

[www.newtonma.gov/recycling](http://www.newtonma.gov/recycling)

*Recycle Right Newton app*





**TO:** Councilor Deborah J. Crossley

**FROM:** Thomas M. Kiley

**DATE:** May 12, 2021

**RE: Responses to Questions re: Natural Gas**

.....

I appreciated the opportunity to speak with you and your colleagues on the City of Newton Public Facilities Committee of the City Council on May 5 regarding natural gas issues. You posed a series of questions to me during the discussion, and I promised to provide further detail on each – and I am pleased to do so in this memorandum.

Please let me know if you have any further questions at any time.

### **1.) Explanation of Renewable Natural Gas (RNG)**

Renewable Natural Gas, or RNG, also known as bio-methane or biogas, is pipeline quality gas derived from biomass that is fully interchangeable with natural gas. The future natural gas network could include renewable gas from:

- dairy farms,
- wastewater treatment plants,
- landfills,
- wood waste and
- food waste plants.

In an April 2021 report from the Columbia Center on Global Energy Policy, co-authors Erin Blanton, Dr. Melissa Lott and Kirsten Nicole Smith noted that “Biogas is upgraded to pure methane by removing water, carbon dioxide, hydrogen sulfide, and other trace elements. This upgraded biogas is comparable to conventional natural gas and thus can be injected into the pipeline grid interchangeably with natural gas or used as a transportation fuel in a compressed or liquefied form.”

The authors go on to note that “The United States currently has 2,200 operating biogas systems across all 50 states and has the potential to add over 13,500 new systems.”

The U.S. Department of Energy observes that “like conventional natural gas, RNG can be used as a transportation fuel in the form of compressed natural gas (CNG) or liquefied natural gas (LNG). RNG qualifies as an advanced biofuel under the Renewable Fuel Standard.”

Two years ago, the Northeast Gas Association (NGA) and the Gas Technology Institute (GTI) released a report called “Interconnect Guide for Renewable Natural Gas in New York State.” The report was sponsored by and developed in coordination with several New York State natural gas utilities. While developed for New York State, this report provides a guideline for RNG pipeline interconnections that will be applicable and of value throughout the U.S. and Canada. The guidance document provides a framework and technical guidance by which all parties - including project developers and the local gas utility - can work together utilizing

common core principles and a rigorous technical framework to facilitate maximizing the acceptance and introduction of RNG into the natural gas pipeline network. The report and further general information on RNG can be found on NGA's website:

[https://www.northeastgas.org/renewable\\_natural\\_gas.php](https://www.northeastgas.org/renewable_natural_gas.php)

## 2.) Emissions from various segments of the gas network.

There are two detailed data sources available to respond to this question – one from the U.S. Environmental Protection Agency (EPA) for national data, and the other from the MA Department of Environmental Protection (MassDEP) for state data.

Each April, EPA releases its *Inventory of U.S. Greenhouse Gas Emissions and Sinks*. The latest report, released in April 2021, reflects data for the period 1990 through 2019, the most recent data year.

In Table 3-62, EPA identifies total greenhouse gas emissions (CH<sub>4</sub>, CO<sub>2</sub>, and N<sub>2</sub>O) from natural gas systems. By a percentage basis, the emissions from each segment of the U.S. natural gas network are as follows:

Production, 53.7%  
 Processing, 19%  
 Transmission and storage, 19.5%  
 Distribution, 7.1%.

I will provide some greater focus on two aspects of the gas network pertaining to Massachusetts: transmission and distribution.

Transmission refers to the interstate natural gas pipeline network. Massachusetts is served by two primary systems: Algonquin Gas Transmission, part of Enbridge; and Tennessee Gas Pipeline, part of Kinder Morgan.

Regarding emissions from the transmission sector, EPA notes:

“Methane emissions from the transmission and storage segment accounted for approximately 23 percent of emissions from natural gas systems, while CO<sub>2</sub> emissions from transmission and storage accounted for 3 percent of the CO<sub>2</sub> emissions from natural gas systems. CH<sub>4</sub> emissions from this source decreased by 35 percent from 1990 to 2019 due to reduced compressor station emissions (including emissions from compressors and leaks) and increased 6 percent from 2018 to 2019 due to increased emissions from transmission compressors.”

Distribution refers to the local natural gas distribution company or utility, such as National Grid.

Regarding emissions from the distribution sector, EPA notes:

“Distribution system emissions, which accounted for 9 percent of CH<sub>4</sub> emissions from natural gas systems and less than 1 percent of CO<sub>2</sub> emissions, result mainly from leak emissions from

NGA update on natural gas questions, raised by  
 Councilor Crossley during May 5 committee discussion  
 May 12, 2021  
 Page 3

pipelines and stations. An increased use of plastic piping, which has lower emissions than other pipe materials, has reduced both CH<sub>4</sub> and CO<sub>2</sub> emissions from this stage, as have station upgrades at metering and regulating (M&R) stations. Distribution system CH<sub>4</sub> emissions in 2019 were 69 percent lower than 1990 levels and 1 percent lower than 2018 emissions. Distribution system CO<sub>2</sub> emissions in 2019 were 69 percent lower than 1990 levels and 1 percent lower than 2018 emissions.”

The EPA’s annual GHG inventory can be found here:

<https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks>

MassDEP maintains the state GHG inventory. It can be found online here:

<https://www.mass.gov/lists/massdep-emissions-inventories>

The relevant data table is Appendix C within the GHG section.

It reports that natural gas emissions have declined by 68% from 1990 through 2018. For the natural gas distribution sector, emissions have declined by 80%.

### **3.) Degree to which the gas companies are investing in renewable technology.**

My answer is two-fold.

First, to the extent that several natural gas utilities in the Commonwealth are also electric utilities as part of the same company, they are quite directly involved in renewable technology implementation. National Grid and Eversource, for example, are both actively involved in the state’s efforts to expand clean energy through investments in projects ranging from imported hydropower from Canada to offshore wind – in the form of direct project investment or in adding the electric transmission needed to bring offshore wind resources onshore to be interconnected to the electric grid.

Secondly, the state’s natural gas utilities are working to reduce their carbon footprint through a variety of measures. As I noted in my remarks to the Committee last week, National Grid, for example, released its “Net Zero by 2050” Plan last October. In the plan, Grid referenced 10 pillars which it will be progressing against over the coming years. Five of those pillars relate to the future of heat and how the utility will be addressing lowering emissions going forward:

- (1) energy efficiency & demand response;
- (2) decarbonizing its gas network with RNG and hydrogen;
- (3) reducing methane emissions from its own network while working with the industry to reduce emissions through the entire value chain;
- (4) integrating innovative technologies to decarbonize heat, including electrification (e.g., ASHP, geothermal, hybrid gas-heating systems); and
- (5) investing in large-scale carbon management.

National Grid has also proposed a pilot for a geothermal project to the MA DPU 21-24.



#### **4.) Decrease in emissions from increased energy efficiency measures.**

Massachusetts has long been a national leader in energy efficiency – in the electric sector and also in natural gas.

Some of the best efficiency metrics are monitored by the American Council for an Energy-Efficient Economy (ACEEE), based in Washington, D.C. Each year they issue a report – or scorecard - on how states in the nation are progressing on efficiency investments. The most recent report, for data year 2019, was issued in December 2020.

In terms of net incremental fuel savings on the natural gas side through efficiency investments, Massachusetts ranked #2 in the nation in the most recent report, just behind California. The savings in terms of Million Btus in MA in 2019 totaled 3,364,493 MMBtu. In terms of total spending, Massachusetts again was second in the nation, behind California; while Massachusetts led the nation in dollars spent per residential natural gas customer for efficiency.

According to MassDEP's GHG inventory, CO<sub>2</sub> emissions from fossil fuel combustion in buildings in the Commonwealth have declined over the period of 1990-2017. Reasons would include the displacement of higher-intensity carbon heating oil by natural gas, as well as efficiency gains.

The Mass Save website has some detailed data on utility efficiency programs, both gas and electric, and measures multiple metrics, including emissions. The data can be found here:

<https://www.masssavedata.com/Public/GHGReductions>

#### **5.) Overall system reliability.**

As I mentioned in my remarks, natural gas is a key part of the Commonwealth's energy system, providing 50% of home heating and power generation. System reliability has been strong which has supported energy affordability in the state and region.

Today and in the coming years, in my view natural gas will remain an essential component of the energy network and essential to supporting the advance of greater inputs of renewable energy sources.

As the U.S. EIA noted in August 2020: "Natural gas is a key power generation resource because it has the flexibility to supply electricity at any time, including at times of peak demand. In contrast, some renewable energy technologies and nuclear power plants may be non-dispatchable and not able to adjust their generation to meet load. For example, nuclear power plants may already be running at or near maximum capacity and may be unable to respond to shifts in load."

## ARTICLE 21

### SELECT BOARD'S SUPPLEMENTAL RECOMMENDATION

Article 21 is a petitioned article asking the Town to create a new by-law that would prohibit the installation of fossil fuel infrastructure in new buildings and gut/significant rehabilitation projects in Brookline. For these types of construction projects, installing gas or oil piping would be prohibited. This will have the effect of preventing the installation of new major appliances (e.g., boilers, furnaces, clothes dryers) or other systems that require on-site combustion of fossil fuels (e.g., natural gas or oil) for these types of projects. Specific exemptions are outlined in the By-Law, and construction project can also seek a waiver from a to-be-created Sustainability Review Board.

Specific exemptions in the By-Law include exemptions for piping required to fuel backup electrical generators, cooking and related appliances, centralized hot water systems in buildings with floor areas of at least 10,000 square feet (provided that the Engineer of Record certifies that no commercially available electric hot water heater exists), any building being constructed subject to a Waldo-Durgin Overlay District Special Permit, research laboratories for scientific or medical research or to medical offices regulated by the Massachusetts Department of Public Health as a health care facility, among other exemptions.

The Sustainability Review Board will be a three or more member Town Board established and appointed by the Select Board with expertise in affordable housing; commercial development; high-performance sustainable design; architecture; mechanical, electrical, and plumbing engineering; or other technical areas as determined by the Select Board.

The effective date will be the later of (1) January 1, 2021, (2) 5 months after written approval is received from the Attorney General's Office, or (3) the date upon which the Sustainability Review Board and its procedures have been established.

Significant consensus has been built between various boards, committees, commissions, community stakeholders and co-petitioners during the vetting of this Article. The Board appreciates the efforts of the petitioners and the Advisory Committee to craft language that can be supported by a wide range of stakeholders.

The Select Board unanimously voted FAVORABLE ACTION on the motion offered by the Advisory Committee.

ADVISORY COMMITTEE’S SUPPLEMENTAL RECOMMENDATION

SUMMARY:

Article 21 is intended to be a major step towards achieving Brookline’s goal of reducing its carbon emissions to zero by 2050. It would, with limited exemptions, prohibit the installation of new fossil fuel pipe infrastructure (natural gas, propane, fuel oil) in new construction and so called “Significant Rehabilitations”.

The Advisory Committee recommends FAVORABLE ACTION on Article 21 in the form presented on November 5, 2019.

*As of November 11, the petitioners were considering revisions to the article that have not been reviewed by the Advisory Committee. No recommendation should be inferred for any version submitted subsequent to the November 5, 2019 vote.*

BACKGROUND:

Article 21 is sponsored by a team of petitioners which include architects, lawyers, members of various advocacy groups including Mothers Out Front and the Greenspace Alliance plus three members of the Select Board.

The proposal is intended to support the Brookline Climate Action Plan which states the Town’s intention to reducing its greenhouse emissions to zero by 2050. One strategy is to begin requiring the complete electrification of new buildings and buildings undergoing significant renovations. While the short term greenhouse emissions effects of this strategy is dependent on the fuels used to generate electricity, it is Massachusetts state policy to increase the percentage of electricity generated from renewable sources over time. Additionally, Brookline sponsors a community aggregation program in which the default choice has a higher percentage of renewable sources than the Eversource default. Plus Town electric customers can opt up to the Brookline Green Option which has 100% renewable source. Lastly, individual electricity consumers can make additional renewable investments on their own using strategies such as installation of onsite solar panels or participation in community solar.

The bylaw would prohibit installation of new fossil fuel piping in new buildings and “significant rehabilitation” of existing buildings. The original proposal had limited exemptions for (1) portable appliances for outdoor cooking and heating (ie., propane barbeque grills), (2) backup electrical generators and (3) the Waldo Durgin project (since that was the subject of a separate negotiation with the Town.) The original proposed effective date was June 1, 2020, but that has been revised to the later of:

1. January 1, 2021
2. 5 months after the Attorney General approves the bylaw

3. The date upon which the SRB is appointed by the Select Board and after a public hearing publishes its procedures and decision criteria.

The proposal does not affect existing piping, boilers, stoves or water heaters. However, in a covered project, the bylaw as originally proposed would prohibit new piping to accommodate relocating any existing appliances. For example, in a covered “gut” renovation project (called a “Significant Rehabilitation” in the bylaw) that includes a kitchen renovation, the homeowner would not be able to install pipes to relocate a gas stove to the other side of the room or to even move it a few inches.

Under the version of Article 21 adopted by the Advisory Committee and accepted by the petitioners, proposal, residential cooking appliances such as ranges, ovens and stovetops would not be covered even in a “gut” renovation, thus allowing renovated kitchens to continue to have gas appliances, no matter where in the kitchen the homeowner wishes to place them.

The petitioners, the Planning and Community Development Department plus various Town Boards and commissions have sponsored or participated in a number of “community feedback” sessions in addition to the normal vetting hearings that take place for Town Meeting warrant articles. As a result of the feedback prior to the Planning and Regulation Subcommittee’s public hearing, the petitioners added additional exemptions for (1) restaurant kitchens, (2) large central hot water systems (with an engineer’s statement) and (3) added a waiver process where it would be otherwise impractical or financially infeasible to go with all electric systems.

Additionally, with input from the Building Commissioner, they have attempted to clarify the definition of significant rehabilitation to generally correspond to a “Level 3” renovation as defined in the Building Code for commercial buildings. Exemptions proposed by others which the petitioners did not accept were (1) an exemption for all cooking, (2) a broad exemption for commercial buildings; (3) including only single family homes, and (4) including only new construction.

#### DISCUSSION:

Electrification of our infrastructure is one strategy to reduce and eventually eliminate our reliance on fossil fuels. Currently, fossil fuels (mainly natural gas in New England) are used to generate a percentage of our electricity, which percentage will decrease over time as more renewable generating sources come on line. No one on the Advisory Committee took issue with the need to reduce our carbon emissions and the electrification strategy. This report will now focus on the details of the proposed bylaw and the practical aspects of the proposal.

When the bylaw was originally submitted, the petitioners listed two exclusions; outdoor cooking and heating appliances and the Waldo-Durgin project. Waldo-Durgin was excluded because it was the subject of a Memorandum of Understanding with the Town

which specifically addressed how the approaches to energy efficiency are to be handled including involving the Town's Sustainability Program Administrator during the design phase.

Note that the bylaw only applies to new construction and so called gut renovations. No one is required to replace any existing gas appliances. Even in a gut renovation, a gas appliance can be replaced; but no new piping can be installed unless there is an exemption. But, in order for this to work, we need to have a sense of reality as to what can be replaced by electric appliances.

#### Heating and Cooling

In New England, space heating consumes the most energy in buildings. In Brookline, the predominant fuel source is natural gas and fuel oil. Many factors contribute to the amount of energy consumed including the efficiency of the heating appliance (furnace, boiler, heat pump, etc.) and how well the building envelope is insulated and sealed. This bylaw only addresses the fuel source, which is only one piece of the equation.

Typically, we think of electric heat as utilizing baseboard resistance heaters, which are cheap to install but very expensive to operate. The preferred electric heat sources now are either ground source or air source heat pumps. Heat pumps can be used for both air conditioning in summer and heating in winter. In winter, the refrigerant absorbs heat from the air outside (or the ground) and uses it to warm the space. Ground source heat pumps use heat drawn from geothermal wells to facilitate heat transfer. Generally, heat pumps are extremely efficient to operate (however as the temperature drops, heat pumps become less efficient and there is a point where they stop working though with today's heat pump they will work to as low as -25F degrees. The Planning and Regulation Subcommittee heard testimony that the industry is moving towards heat pumps as the preferred space heating and cooling technology and it works well for most applications.

Given the variety of commercial building types and their uses, blanket claims of practicality and financial feasibility of the technology for all uses are difficult to substantiate. The Planning and Regulation Subcommittee heard testimony that at least laboratories and certain types of medical offices have higher air circulation and replacement requirements, which heat pumps may not always be able to handle. We also need to balance the Town's critical financial need to be competitive with other communities with respect to promoting development of buildings devoted to medicine and science with its overall goal of reducing greenhouse emissions. The Town is in a unique position to leverage its close proximity to one of the world's great medical/science complexes.

The Advisory Committee therefore proposed, and the petitioner accepted, an exemption for such uses given the difficulty of quantifying the requirements to a degree sufficient to write into a bylaw in the timeframe of this Town Meeting. The failure to have a

lab/medical exemption could work to divert such development to other close-by communities.

#### Domestic Hot Water

For residential and smaller commercial uses, there are practical alternatives to a gas hot water heater. These include traditional resistance and the newer technology heat pump hot water heaters.

For large central hot water systems, there are currently no alternates to the traditional gas hot water heater. Many large buildings are moving away from central hot water to a distributed hot water system, (the water is heated just prior to the using fixture or for a floor or unit in a building.), For systems of this type, there are electric alternatives.

The proposed bylaw does not mandate moving away from a central hot water system, and it implicitly recognizes the lack of alternatives. However, if an alternative becomes available, there is an exemption in the proposal if the alternative is more than 150% of the capital or operating cost of a conventional gas water heater as certified by an engineer. While at first glance a 150% cost differential seems high, remember that the requirement is only in effect for new construction or a “significant rehabilitation,” where hot water will be a very small fraction of the total project cost.

#### Cooking

Cooking is where residents have the most interaction with natural gas. The bylaw, as originally submitted would have prohibited new fossil fuel infrastructure for cooking appliances.

There are two electric alternatives to the traditional gas range and stove top; the standard resistance electric range and the induction electric stove top. While resistance stoves work, they deliver a different, less controllable cooking experience. Induction stoves deliver a controlled cooking experience similar to natural gas but require cookware to be made of a magnetic based material such as cast iron or magnetic stainless steel. Aluminum or copper cookware does not work.

The subcommittee received an email and heard testimony from Dr. Jeffrey Macklis, Professor of Stem Cell and Regenerative Biology, Harvard University, and Professor of Neurology [Neuroscience], Harvard Medical School. Dr. Macklis researched induction stoves when he was considering purchasing one.

“In brief, I found that the EU regulations and analyses show that a single burner on is reasonably safe for an adult user if the pan is of “appropriate”-correct size (completely covering the burner) and is perfectly centered with precision, but that this safety disappears for a pregnant abdomen with fetal head (developing brain) closer than 1 foot away, or a small child whose head (developing brain) would get closer than 1 foot away from the front of a burner. The EU agencies all point out that pregnancy and small children position developing brains directly at the least safe position– adjacent to the cooktop and at its level. That is because the main

risk is within a foot or so (30 cm) of a burner, and electromagnetic field strength from the induction cooktop is limited by EU/Swiss/now US recommendation to approximately 6 uT (microTesla). While essentially all modern residential cooktops meet this standard for a single burner on with an optimally sized pot/pan that is perfectly centered, they fail under “real world” scenarios. Unfortunately exposure with a differently sized pot/pan or one that is not optimally centered is often found to be ~5X higher (>30 uT!) than the regulatory agencies use as their acceptable limit! This even exceeds adult “occupational limits” set by the agencies. If more than one burner is on (e.g. for a normal meal or worst at a Thanksgiving dinner), the leakage around centered or uncentered pans is additive, though some will be further away than others.”

Dr. Jesse Gray, disagreed with Dr. Macklis’s assertions as follows:

“The concern raised here is a hypothetical one, since induction cooktops have been in widespread global use for decades without any demonstrated adverse health effects. No health or consumer protection authorities have banned induction cooktops for health or any other reasons, and there isn’t a single peer-reviewed epidemiological study implicating induction cooking in any negative health impact. The petitioners brought this proposed by-law forward for climate reasons, not health reasons. However, in considering health, the competing technologies must be weighed against each other, since all technology has risks, and people are going to cook with one technology or another. As it stands, there is more substantial evidence about the dangers of gas cooking than there is about induction cooking. Gas cooking kills about 8,000 people every year in the United States due to fire. There are also well-documented health impacts from combustion byproducts of gas cooking, including asthma, that should be weighed against any hypothetical health impacts of induction cooking. These impacts of gas cooking are supported by numerous peer-reviewed epidemiological studies, unlike the speculative induction concerns.”

Given (1) the competing health arguments, (2) the strong feelings by some about gas as a cooking energy source and (3) the unintended effect of prohibiting even small relocations of gas appliances in some kitchen renovations, the Advisory Committee was not prepared to support a complete ban of gas cooking appliances in projects subject to the bylaw at this time, and the petitioner accepted a cooking appliance exemption that includes residential properties.

### Unsafe or Dangerous Condition Exemption

As originally submitted, the bylaw would not have permitted the repair of unsafe or dangerous existing gas infrastructure. An exemption has been added and agreed to by the petitioners.

### Waivers and Appeals

This is a new area with developing technology and an all-electric infrastructure may not be practical or financially feasible in all situations not explicitly exempted by the bylaw. The Advisory Committee proposal creates a waiver and appeal process for these situations.

The Planning and Regulation Subcommittee heard concerns from the Economic Development Advisory Board, with respect to commercial development, the Housing Advisory Board with respect to affordable housing and the Brookline Housing Authority with respect to their properties. For affordable housing in particular, capital funds may be limited to make investing in systems with lower operating costs in the long run difficult.

For all these Boards, a robust and effective waiver and appeal process is an essential component in coming to support the bylaw. The proposal establishes a “Sustainability Review Board” (SRB) to hear and decide waivers and appeals. The bylaw specifies that members shall possess areas of expertise with regards to affordable housing, commercial development, high-performance sustainable design, architecture, and mechanical, electrical, and plumbing engineering plus other technical areas as determined by the Select Board. The bylaw sets a general standard of review but requires the SRB to adopt procedural requirements with regard to filing waivers and appeals and criteria to evaluate projects. And one of the prongs for the effective date of the bylaw is the establishment of SRB and adopting procedures and criteria of review.

### Other Municipal Ordinances

The movement surrounding mandating fossil fuel free infrastructures by municipal ordinance is a new one with the first such ordinance being passed in Berkley, CA on July 16, 2019. To the best of our knowledge, in the United States, only three other municipalities, all located in California, have passed similar ordinances since then. Other municipalities are considering this kind of legislation. All enacted ordinances, to date, cover only new construction and have various exemptions. They are summarized in the chart below:

City	Ord. Name	Summary	Exemptions	Commercial Buildings?
Brookline, MA (Proposed)	Article 21	Bans new fossil fuel infrastructure in all new construction and “Significant Rehabilitation(s).”	<ol style="list-style-type: none"> <li>1. All cooking appliances</li> <li>2. Backup generators</li> <li>3. Outdoor cooking and heating</li> <li>4. Large central hot water heaters</li> <li>5. Waldo Durgin</li> <li>6. Labs and certain medical offices</li> <li>7. Repair unsafe conditions</li> <li>8. Waivers if “financially infeasible or impractical”</li> </ol>	Yes
Berkley CA	Ordinance No. 7.672–N.S.	The Berkley ordinance prohibits natural gas in <b>new</b> buildings. The ordinance is being rolled out gradually as the California Energy Commission (CEC) models different types of all-electric buildings. Currently, the ordinance bans installation of natural gas lines in low-rise residential buildings. As the CEC completes its modeling, the ordinance will expand to include additional building types.	Exemptions possible when a developer can demonstrate that all-electric isn't "physically feasible". There is also a general "public interest exemption" for cases where gas might be in the public interest to install vs. electric.	Eventually

City	Ord. Name	Summary	Exemptions	Commercial Buildings?
San Luis Obispo, CA	Clean Energy Choice Program	The Clean Energy Choice Program "encourages" all-electric <b>new</b> buildings. "Unlike some cities that are banning natural gas entirely, the Clean Energy Choice Program will provide options to people who want to develop new buildings with natural gas. New projects wishing to use natural gas will be required to build more efficient and higher performing buildings and offset gas use by performing retrofits on existing buildings or by paying an in-lieu fee that will be used for the same purpose.	Commercial kitchens are exempt. Various exemptions for "public health and safety" (e.g. hospitals) and an exemption for manufacturing that requires gas (see page 39 of ordinance for full list). The Clean Energy Choice Program also includes a "Public Interest Exemption", which allows the permitting authority to exempt projects should unexpected or unintended effects of the program arise.	Yes
Windsor, CA	Ordinance Adopting All-Electric Reach Code	All-electric requirement for <b>new</b> single-family homes, detached accessory dwelling units, and multi-family buildings up to three stories (also referred to as "low-rise residential")		No
San Jose, CA	Building Reach Code for New Construction	The passed ordinance will ban natural gas in the construction of <b>new</b> accessory dwelling units, new single family homes and new low rise and multifamily buildings.		Yes

City	Ord. Name	Summary	Exemptions	Commercial Buildings?
Menlo Park, CA	Ordinance No. 1057	Heating systems in all new homes and buildings in the city must run on electricity, and all new commercial, office and industrial buildings, as well as high-rise residences, must rely entirely on electricity. Although new one- and two-story homes will be allowed to have natural gas stoves, they must be built “electric ready” with the proper wiring to enable all-electric operation in the future.	Life sciences buildings and public emergency operations centers (e.g. fire stations) need to apply for an exemption, but are eligible. For single family and three stories or less multifamily: Natural gas can still be used for stoves, fireplaces or other appliances if desired (but prewiring for electric appliances is required where natural gas appliances are used.). Nonresidential kitchens, such as for-profit restaurants and cafeterias, may appeal under certain conditions to an appointed body designated by the City Council if they want to use natural gas stoves. The advisory body’s decision can be appealed to City Council.	Yes

What renovations should be covered in addition to new construction?

Other than the Brookline bylaw, all of the bylaws referenced in the chart above cover only new construction. With new construction, the entire project can be planned and designed to maximize energy conservation and take into account the design requirements of all electric systems. Renovations present a set of complications since an all electric system will need to be retrofitted into an existing building envelope which was, in all likelihood, designed around a fossil fuel infrastructure. This only begins to make sense if all the walls are open which would be the case in a so called “gut” renovation. The Advisory Committee worked with the Building Commissioner and other staff in coming up with a legal definition that is understandable, relatively easy to enforce and, hopefully,

minimizes the unintended consequence of creating a trigger where walls are not open to the degree necessary to perform a deep energy efficiency retrofit.

For buildings subject to the commercial building code (residential buildings with 3 or more families plus commercial buildings), there is already a well-defined trigger called a Level 3 renovation when triggered, requires a high degree of code compliance. Building professionals plus the Town Building Department are familiar with this trigger and it is easily computed. For those properties, it makes sense to incorporate a Level 3 renovation into the definition of “Significant Rehabilitation.”

In the residential building code, there is no parallel concept to a Level 3 commercial renovation. Our intent is to use the existing definition of Gross Floor Ratio in the zoning bylaw as the denominator to compute the percentage to define a “Significant Rehabilitation.” Since we do not want to have an inadvertent trigger, we are opting to set the trigger percentage to a very high 75%. As we gain experience with the bylaw and gather data on how it is working, the percentage trigger can be adjusted at a future Town Meeting, if appropriate.

#### Legal issues

In Massachusetts, municipal ordinances cannot supersede the state building code which covers plumbing and other aspects of the building envelope and components. This proposed bylaw is constructed in way that attempts not to supersede the code but it is breaking new ground. As such, according to Associate Town Counsel Jonathan Simpson, there is no history or case law that directly speaks to the legal analysis of whether this bylaw is preempted. However, Mr. Simpson has cautioned that there could be several statutes that may preempt what this bylaw is attempting to do. The Office of the Attorney General (OAG), which reviews bylaws passed at Town Meeting, will not issue preliminary opinions, so the only way to know for sure whether OAG will approve a By-Law such as this, is to pass it at Town Meeting and submit it for OAG review. Even if we receive a rejection from the OAG, we will have gained some clarity as to how to approach this issue in the future. Note that even if the Attorney General approves the bylaw, it would still be subject to challenge by other parties.

#### Effective Date

As noted above, sufficient lead time for homeowners and developers has been provided to adjust their plans to comply with this bylaw.

#### RECOMMENDATION:

By a vote of 21-4 with four abstentions, the Advisory Committee recommends FAVORABLE ACTION on Article 21 as follows:

Voted: That the Town amend the General By-Laws by adopting a new article 8.39 entitled “Prohibition on New Fossil Fuel Infrastructure in Major Construction” as set forth below.

### 8.39.1 Purpose

This By-Law is adopted by the Town of Brookline, under its home rule powers and its police powers under Massachusetts General Laws, Chapter 40, Sections 21 (clauses 1, 18) and 21D, and Chapter 43B, Section 13, to protect the health and welfare of the inhabitants of the town from air pollution, including that which is causing climate change and thereby threatens the Town and its inhabitants.

### 8.39.2 Definitions

“New Building” is defined as a new building or new accessory building (a building devoted exclusively to a use accessory to the principal use of the lot) that is associated with a valid building permit application on or after the Effective Date.

“On-Site Fossil Fuel Infrastructure” is defined as fuel gas or fuel oil piping that is in a building, in connection with a building, or otherwise within the property lines of premises, extending from a supply tank or from the point of delivery behind a gas meter (customer-side of gas meter).

“Significant Rehabilitation” is defined as a renovation project associated with a valid building permit application on or after the Effective Date of this article that:

- (1) For existing structures regulated by the current edition of the Massachusetts State Building Code 780 CMR 51.00, Massachusetts Residential Code, includes the reconfiguration of space and/or building systems, in which the Work Area, not including any added space, is more than 75% of the Gross Floor Area as defined in the Brookline Zoning By-Law;
- (2) For existing structures regulated by the current edition of the Massachusetts State Building Code 780 CMR 34, the Massachusetts State Basic/Commercial Code, includes the reconfiguration of space and/or building systems, in which the Work Area, not including any added space, is more than 50% of the building floor area prior to the project, as defined by the Massachusetts Building Code.

“Sustainability Review Board” (SRB) is defined as a Town Board established and appointed by the Select Board whose members shall, to the extent possible, possess areas of expertise with regards to affordable housing, commercial development, high-performance sustainable design, architecture, and mechanical, electrical, and plumbing engineering and other technical areas as determined by the Select Board. The SRB shall have at least three members with three year staggered terms. The mission charge of the SRB shall be set by the Select Board. The mission charge shall be broad enough to perform the requirements of Sections 8.39.5 and 8.39.6.

“Work Area” is defined as the portions of a building affected by renovations for the reconfiguration of space and/or building systems, as indicated in the drawings associated with a building permit application. Areas consisting of only repairs, refinishing, and/or incidental work are excluded from the Work Area.

### 8.39.3 Applicability

The requirements of this article shall apply to all permit applications for New Buildings and Significant Rehabilitations proposed to be located in whole or in part within the Town as follows.

- A. The requirements of this article shall not apply to utility service piping connecting the grid to a meter, or to a gas meter itself.
- B. The requirements of this article shall not apply to piping required to fuel backup electrical generators.
- C. The requirements of this article shall not apply to piping required for cooking appliances and related appliances.
- D. The requirements of this article shall not apply to the use of portable propane appliances for outdoor cooking and heating.
- E. The requirements of this article shall not apply to the piping required to produce potable or domestic hot water from centralized hot water systems in buildings with floor areas of at least 10,000 square feet, provided that the Engineer of Record certifies that no commercially available electric hot water heater exists that could meet the required hot water demand for less than 150% of installation or operational costs, compared to a conventional fossil-fuel hot water system.
- F. So long as new fossil fuel piping is not installed, the requirements of this article shall not apply to the extension or modification of heating systems via HVAC system modification, or modification of radiator, steam, or hot water piping.
- G. The requirements of this article shall not apply to any building being constructed subject to a Waldo-Durgin Overlay District Special Permit, as described in Section 5.06.4.k of the Zoning By-Law.
- H. The requirements of this article shall not apply to research laboratories for scientific or medical research or to medical offices regulated by the Massachusetts Department of Public Health as a health care facility.
- I. The requirements of this Article shall not apply to repairs of any existing portions of a fuel piping system deemed unsafe or dangerous by the Plumbing and Gas Fitting Inspector.

#### 8.39.4 Effective Date and Enforcement

Upon the Effective Date, no permits shall be issued by the Town for the construction of New Buildings or Significant Rehabilitations that include the installation of new On-Site Fossil Fuel Infrastructure, except as otherwise provided in Sections 8.39.3, 8.39.5, and 8.39.6. As used herein, "Effective Date" shall be the later of (1) January 1, 2021, (2) 5 months after written approval of Article 8.39 is received from the Attorney General's

Office, or (3) the date upon which the SRB has been appointed and, after a public hearing, has adopted procedural requirements with regard to filing waivers and appeals and criteria to evaluate projects under Sections 8.39.5 and 8.39.6.

8.39.5 Waivers

A waiver from Article 8.39 may be sought from the SRB on the grounds of financial infeasibility supported by a detailed cost comparison, inclusive of available rebates and credits, or impracticality of implementation. A waiver request may be made at any time and may be based upon submission of conceptual plans. The SRB shall apply its criteria to evaluate whether particular portions of a project are financially infeasible or impractical to implement under the requirements of Section 8.39 and shall issue waivers narrowly for those portions, where appropriate, rather than for an entire project. Particular consideration for waivers will be given to projects sponsored by the Brookline Housing Authority (BHA), given the BHA's limited sources of capital funds.

8.39.6 Appeals

An appeal may be sought from the SRB following a denial of a building permit on the grounds that Article 8.39 is not applicable to a project pursuant to Section 8.39.3. Any appeal shall be supported by detailed information documenting the basis of the appeal.

~~REV~~  
~~207-3-6~~  
211 - 3-6

Draft Warrant Article re: Fall 2019 Special Town Meeting Warrant Article 21

ARTICLE \_\_\_\_\_. To see if the Town will vote to authorize the Select Board to petition the Massachusetts General Court for special legislation, as set forth below, to (1) ratify the adoption, at the Fall 2019 Special Town Meeting under Warrant Article 21, an amendment to the Town's General By-Laws inserting Article 8.39 entitled "Prohibition on New Fossil Fuel Infrastructure in Major Construction;" (2) authorize the Town to adopt and further amend general or zoning by-laws that regulate natural gas infrastructure; and (3) authorize the Building Commissioner to administer such by-laws, including through the withholding of building permits; provided, however, that the General Court may make clerical or editorial changes of form only to the special legislation, unless the Select Board approves amendments to the bill before enactment by the General Court; and provided further that the Select Board is hereby authorized to approve such amendments that are within the scope of the objectives of this petition:

**AN ACT AUTHORIZING THE TOWN OF BROOKLINE TO ADOPT AND ENFORCE LOCAL REGULATIONS RESTRICTING NEW FOSSIL FUEL INFRASTRUCTURE IN MAJOR CONSTRUCTION.**

Be it enacted as follows:

SECTION 1. Article 8.39 of the Town of Brookline's General By-laws, entitled "Prohibition on New Fossil Fuel Infrastructure in Major Construction," is hereby ratified as adopted pursuant to Warrant Article 21 of the Town's Fall 2019 Special Town Meeting, and shall be in full force and effect as of the effective date of this act.

SECTION 2. Notwithstanding chapter 164 of the General Laws, section 13 of chapter 142 of the General Laws, the State Building Code, or any other general or special law or regulation to the contrary, the town of Brookline is hereby authorized to adopt and further amend general or zoning by-laws that restrict new construction or major renovation projects that do not qualify as fossil-fuel-free, as defined in section 4 of this act..

SECTION 3. Notwithstanding section 7 of chapter 40A of the General Laws, or any other general or special law or regulation to the contrary, the Building Commissioner of the town of Brookline, or any designee thereof, shall be authorized to enforce restrictions on new construction and major renovation projects that do not qualify as fossil-fuel-free, as defined in section 4 of this act, including through the withholding of building permits.

SECTION 4. As used in this act, the term "fossil-fuel-free" shall refer to construction or renovation that results in an entire building or an entire condominium unit that does not utilize coal, oil, natural gas or other fossil fuels in support of its operation.

SECTION 5. This act shall take effect upon its passage.

or to take any other action in relation thereto.

AGB draft, 10.2.20

To: Public Facilities Committee  
From: Ann Berwick, Co-Director of Sustainability  
Re: Relative Cost of Gas versus Heat Pump System for New Residential Construction  
Date: October 5, 2020

I've tried here to answer four questions for **new residential construction**<sup>1</sup>:

1. Which is more expensive to purchase and install: a gas-fueled<sup>2</sup> or an electric heat pump system for heating, cooling, and hot water?
2. What are the relative annual operating costs of these systems?
3. If only a water heater is installed, is a heat pump or gas water heater more expensive?
4. On this stand-alone basis, how do the annual operating costs of these hot water heaters compare?

### Executive Summary

It's impossible to give a precise answer to these questions. Everyone who tries to estimate these costs, as well as studies of the issue, make different assumptions (for example, size and design of the house, local labor costs, local climate, amount of home insulation, quality of system installed, future prices of gas versus electricity).

That said, here's what various estimates tell us about heat pump technology in new residential construction:

- Equipment/installation costs for gas versus heat pump heating, cooling, and hot water systems are comparable.
- Annual operating costs for a heat pump heating, cooling, and hot water system is probably at least \$500 more than for a gas system. That is largely a function of the relative cost of electricity and natural gas.
- Equipment/installation costs for a gas versus a heat pump water heater, on a stand-alone basis, are hard to determine. This is the area where the estimates are least aligned, perhaps because I've been able to find more estimates for water heaters than for whole system installations.

---

<sup>1</sup> For both annual operating costs and installation costs, it is important to note that estimates refer to new home construction and not to retrofits.

<sup>2</sup> Throughout, the comparison is of gas to heat pumps. No one would build a new home in Newton using oil or propane for heating. Heat pumps would always win on cost as compared to these other fuels.

- Comparing a more commonly used tank variety water heater to a heat pump water heater, the heat pump is more expensive by about \$1,000 to \$1,400.
  - Comparing a less commonly used tankless type of gas water heater to a heat pump water heater, by some estimates the gas heater is more expensive.
- Annual operating costs for a gas versus heat pump water heater, on a stand-alone basis, are very similar.

I draw two overall conclusions:

1. An expert from New Ecology, Inc.<sup>3</sup> opined to me, “There is more variability among the gas and electric system options than there is between the two on price.” This seems to me, when all is said and done, the most useful conclusion.
2. Heat pump technology is not, given current policy, a money-saver; nor are its additional costs, if any, burdensome in the context of new home construction in Newton (at well less than 1% of annual home ownership costs). Of course, all of these cost comparisons could look quite different—and more favorable for heat pump technology—with a price on carbon and a greener electric grid.

## Discussion

These are my information sources:

- Jeremy Koo (Cadmus Group) and Jesse Gray (Brookline Town Meeting member) presented their estimates to the Public Facilities Committee of the Newton City Council.
- The NMR Group published a report on the relative costs of gas versus heat pump systems (based on new home construction in Worcester)<sup>4</sup>.
- Bill Ferguson estimated costs separately from these three, based on empirical inquiry as opposed to modeling. (Bill’s estimates are for installation, but not annual operating expenses.)
- For different types of water heaters, Consumer Reports gives equipment, purchase, and operating costs<sup>5</sup>.
- I spoke with various energy experts.

However, it emerged that both Jeremy’s and Jesse’s estimates derive from the same NMR report, although they contain significant adjustments: in Jeremy’s case, for labor costs in

---

<sup>3</sup> Email communication from Tom Chase, New Ecology, Inc., to Ann Berwick, July 29, 2020.

<sup>4</sup> RLPNC 17-14: “Mini-Split Heat Pump Incremental Costs Assessment,” Final Report, NMR Group, Inc., November 27, 2018.

<sup>5</sup> “Tankless Water Heaters vs. Storage Tank Water Heaters,” Consumer Reports, January 25, 2019, <https://www.consumerreports.org/water-heaters/tankless-water-heaters-vs-storage-tank-water-heaters/>.

Newton (as compared to labor costs in Worcester, as modeled in the NMR report) and for ducting<sup>6</sup>; in Jesse's case, for the availability of State rebates and incentives.

I also reviewed the Rocky Mountain Institute (RMI) report, *The Economics of Electrifying Buildings* (2018)<sup>7</sup>, and discussed the relative cost issues with staff at New Ecology, Inc. and with other experts.

### **Equipment/installation costs for gas versus heat pump heating, cooling, and hot water systems**

Although I cannot answer the question precisely as to which system costs more to install in a new home, here's the available information:

- As among the estimates in Table 1 *for a heat pump system*, NMR's/Jesse's (approximately \$12,000) and Bill's (\$14,160)<sup>8</sup> are the most closely aligned. Jeremy's (\$23,300) is an outlier. Note that NMR's/Jesse's estimates derive from modeling and that Bill's are empirical, which should increase confidence in the estimates. It's possible that Jeremy over-adjusted for the cost of ducting/labor as between Worcester and Newton, in his (explicit) effort to be conservative.
- For a *gas system* as shown in Table 1, and putting aside Jeremy's high number for a gas system, the estimates range from \$11,700 to \$16,700. **In other words, the installation costs of the heat pump and gas systems are comparable.**
- There are at least two reasons why all of these estimates—and not just Jeremy's—may be on the high side for a heat pump system:
  - None of these estimates takes into consideration the cost of a gas hook-up, which a new all-electric home could avoid.<sup>9</sup>

---

<sup>6</sup> This includes a significant increase in total labor hours needed to install a new whole-building ductwork system (determined through RSMMeans and in consultation with Newton building experts), and an adjustment in labor costs to reflect the higher cost of labor in Newton compared to Worcester as assumed in the original NMR study (sourced from RSMMeans City Cost Index 2020).

<sup>7</sup> "The Economics of Electrifying Buildings: How Electric Space and Water Heating Supports Decarbonization of Residential Buildings," Rocky Mountain Institute.

<sup>8</sup> Bill's sources for his figures are unclear as to whether the costs of duct work are included in the heat pump system estimates. Those sources do not include an energy recovery ventilator (ERV). The NMR report (and, hence, Jeremy's and Jesse's estimates) does include ERV costs, which the NMR report lists at \$1,173.

<sup>9</sup> Most streets in Newton already have gas infrastructure, so the cost of a gas hook-up that could be avoided for an all-electric house is for a gas "service," not a gas main (highly variable for a service, but estimated at between \$1,500 and \$3,000).

- At least at present, Massachusetts rebates for heat pumps are higher than for gas systems.<sup>10</sup>
- As discussed in the section below on water heaters standing alone, NMR's and Jeremy's estimates include the assumption that the water heater is the tankless variety.

### **Annual operating costs for gas versus heat pump heating, cooling, and hot water systems**

As for annual operating costs, it appears that Jesse and Jeremy relied solely on the NMR report, concluding that **the heat pump system costs \$500 more per year than the gas system.** (Bill does not provide estimates for annual operating costs.) This is a function of the relative price of gas versus electricity. Gas prices are currently low, but it is difficult to predict the future price differential. Experts I've discussed this with believe this number may be on the slightly low side.

By contrast, one other observation comes from the Rocky Mountain Institute report, *The Economics of Electrifying Buildings* (2018), which concludes: "In many scenarios, notably for most new home construction,... **electrification reduces costs over the lifetime of the appliances** when compared with fossil fuels" (emphasis added). Table 2 reflects this, with cost estimates based on the city in the RMI study with a climate most similar to Newton's, i.e., Providence, RI. The RMI estimates suggest that electrification is cost-competitive with gas for new residential construction. However, we are aware that some of its assumptions are optimistic, e.g., for the installed cost of heat pumps.

### **Equipment/installation costs for gas versus heat pump water heater, on a stand-alone basis**

The equipment and installation cost estimates for a gas water heater, whether a tank or a tankless variety, versus a heat pump hot water heater are, frankly, hard to interpret.

The gas water heater cost estimate in the NMR report (\$2,512) is based on the less commonly used tankless heater as opposed to the more familiar tank variety. Consumer Reports' estimate for the purchase and installation of a tankless hot water heater is \$1,987. Consumer Reports' and Bill's estimates for a tank variety water heater are \$1,300 and \$1,700, respectively. Tankless water heaters are less common but growing in popularity, according to Consumer Reports. Thus, it seems clear that the NMR report, and Jeremy, are on the high side for the type of water heater that is most commonly installed.

---

<sup>10</sup> I have not included the availability of rebates in the calculations, because they may vary substantially over relatively short time periods.

For heat pump water heater equipment/installation, the numbers range from approximately \$1,600 (Consumer Reports and NMR) to \$2,700 (Bill), but experts I've conferred with seem to think that Bill's estimate is more accurate. I've been unable to explain the magnitude of this difference. If Bill's estimate is correct, a heat pump hot water heater is more expensive than both tank variety and tankless hot water heaters. If NMR is more accurate for a heat pump hot water heater, then the costs of a gas water heater and heat pump water heater are comparable, even using Bill's relatively high estimate for a heat pump water heater.

### **Annual operating costs for gas versus heat pump water heater, on a stand-alone basis**

As appears from Table 3, the annual operating costs for a gas water heater, whether a tank or tankless variety, as compared to a heat pump water heater, are extremely close.

### **Conclusion**

Having struggled to reconcile these various estimates, I think that to some extent the search for precision obscures rather than elucidates the meaningful conclusions.

From the discussion above, here's what the numbers tell us:

- Equipment/installation costs for gas versus heat pump heating, cooling, and hot water systems are comparable.
- The annual operating cost for a heat pump heating, cooling, and hot water system is probably at least \$500 more than for a gas system. That is largely a function of the relative cost of electricity and natural gas.
- Equipment/installation costs for a gas versus a heat pump water heater, on a stand-alone basis, are hard to determine. This is the area where the estimates are least aligned, perhaps because I have more estimates.
  - If we use Bill's figure for a gas water heater, assume the tank heater variety and, conservatively, use Bill's figure for a heat pump water heater, the heat pump heater is \$1,000 more expensive than the gas water heater.
  - If we use Consumer Reports' figure for a gas water heater, assume the tank heater variety and, conservatively once again, use Bill's figure for a heat pump water heater, the heat pump heater is \$1,400 more expensive.
  - However, according to some estimates, the heat pump water heater is less expensive than the tankless type of gas water heater, by varying amounts.
- Annual operating costs for gas versus heat pump water heaters, on a stand-alone basis, are very similar.

In all cases, the differences in cost are minimal when taken in the context of an important point that Jeremy makes. Recall that what we are discussing here is new construction. The median

price of a new home in Newton is approximately \$1.2 million.<sup>11</sup> Jeremy's calculations, which use his cost estimates for a gas versus mini-split heat pump system (which, as already noted, are higher than the other projections included here), estimate the annual cost of homeownership (including heating, cooling, water, sewer, electricity, insurance, property taxes, mortgage) for a gas home is \$72,969, as compared to \$73,544 for an all-electric home. This estimate implies a difference of \$575 in annual home ownership costs, or 0.78% of yearly homeownership costs. We emphasize that this is using Jeremy's cost estimate for a heat pump system, which is higher than the other estimates. In other words, whatever difference, up or down, exists between the costs of a gas and a heat pump system for a new home is extremely small compared to the annual costs of homeownership in Newton. This observation does not take into consideration the point made above, that a price on carbon and a greener electric grid would be favorable for the cost of heat pump technology.

\*\*\*

### Cost Estimate Tables

To the extent possible, the cost estimates that follow in the tables below are for a single-family home that complies with the Massachusetts Stretch Energy Code, with two floors, an unfinished basement, and 2,500 square feet of living space.

**Table 1: Cost comparison, installation and annual, for gas vs. ducted heat pump heating and cooling, and hot water**

	<b>Gas furnace and hot water, with central AC, installed cost</b>	<b>Heat pump system, installed cost</b>	<b>Difference in installed costs</b>	<b>Gas furnace and hot water, with central AC, annual cost</b>	<b>Heat pump system, annual cost</b>	<b>Difference in annual costs</b>
<b>Gray/Brookline</b>	\$11,700	\$12,100 adjusted to remove rebates)	Heat pump system \$400 more expensive	\$1,500	\$2,000	Heat pump system \$500 more expensive

<sup>11</sup> This figure appears to refer to new home sales in Newton, not to new construction alone. Many newly constructed homes in Newton are much larger than the existing homes sold, making Jeremy's estimate of the cost of an all-electric home as a percentage of the cost of home ownership likely to be conservative. However, his estimate is close enough for the purposes of the point made here.

<b>NMR report,</b> tankless water heater	\$11,724	\$12,478	Heat pump system system \$754 more expensive	\$1,511	\$2,007	Heat pump system, \$496 more expensive
<b>Koo/Newton,</b> tankless water heater	\$20,000 (adjusted for ductwork labor costs)	\$23,300 (adjusted for ductwork labor costs)	Heat pump system \$3,300 more expensive	\$1,511	\$2,007 (\$1,362 with solar)	Heat pump system \$496 more expensive
<b>Bill's estimates,</b> Rheem 50-gal tank style ( no annual cost estimates provided)	\$16,700	\$14,160	Heat pump system \$2,540 less expensive	Not provided	Not provided	

**Table 2: Another point of comparison (net present costs) for gas versus heat pump heating, cooling, and hot water**

	<b>Gas system</b>	<b>Heat pump system</b>	
<b>RMI REPORT COMPARISON OF 15-YEAR NET PRESENT COSTS OF WATER HEATING AND SPACE CONDITIONING FOR PROVIDENCE RI (THOUSAND \$)</b>	\$16,600	\$14,300	Heat pump system \$2,300 less expensive net present costs

**Table 3: Cost comparison, installation and annual, for gas vs. heat pump hot water, stand-alone installation**

	Gas water heater, installed cost	Heat pump water heater, installed cost	Difference in installation costs	Gas water heater, annual cost	Heat pump water heater, annual cost	Difference in annual costs
<b>Gray/Brookline</b> (no separate water heater costs provided)						
<b>Bill's estimates,</b> Rheem 50-gal <b>tank style</b> gas (no annual cost estimates provided)	\$1700	\$2,700	Heat pump \$1,000 more expensive	Not provided	Not provided	
<b>NMR report (tankless gas)</b>	\$2,512 <sup>12</sup>	\$1,680	Gas heater \$832 more expensive	\$127	\$146	Heat pump \$19 more expensive
<b>Koo/Newton (tankless gas)</b>	\$2,900 <sup>10</sup>	\$1,800	Gas heater \$1,100 more expensive	\$127	\$146 (\$99 with solar)	Heat pump \$19 more expensive (Heat pump \$28 less expensive with solar)
<b>Consumer Reports (tankless gas)</b>	\$525-\$1,150 plus \$800-\$1,500  Median = \$1,987	\$1,200 for equipment but doesn't specify installation amount	Difficult to ascertain, because installation cost not included	\$195	\$240	Heat pump \$45 more expensive
<b>Consumer Reports (tank style gas 50-gal)</b>	\$600 plus \$700 = \$1,300	\$1,200 for equipment but doesn't specify	Difficult to ascertain, because installation	\$245	\$240	Gas \$5 more expensive

<sup>12</sup> However, Jeremy's view is that for a tank style as opposed to a tankless hot water heater, Bill's estimate is "close" to what he "would guess." Email communication to Ann Berwick, September 15, 2020.

		installation amount	cost not included			
--	--	------------------------	----------------------	--	--	--