



Public Facilities Committee Agenda

City of Newton In City Council

Wednesday, February 17, 2021

The Public Facilities Committee will hold this meeting as a virtual meeting on Wednesday, February 17, 2021 at 7:00 pm. To view this meeting using Zoom use this link: <https://us02web.zoom.us/j/86338150164> or call 1-646-558-8656 and use the following Meeting ID: 863 3815 0164

Item Scheduled for Discussion:

#62-21 Appointment of Barbara Lietzke to the Design Review Committee
PRESIDENT ALBRIGHT appointing Barbara Lietzke, 68 Highland Avenue, Newton, to the DESIGN REVIEW COMMITTEE as the Community Representative for the duration of the NewCAL project. (60 days: 04/17/21)

Referred to Public Facilities and Finance Committees

#65-21 Approve \$1,000,000 for snow and ice removal
HER HONOR THE MAYOR requesting authorization to transfer the sum of one million dollars (\$1,000,000) from Acct # 0110498-579400 Comptroller’s Reserve for Snow/Ice Removal as follows:

| | |
|--|-----------|
| Regular Overtime (0140123-513010)..... | \$500,000 |
| Rental Vehicles/Contractors (0140123-527300)..... | \$500,000 |

Referred to Public Facilities and Finance Committees

#66-21 Appropriate \$447,000 for the Sewer Pump Station Rehabilitation CIP Project 1
HER HONOR THE MAYOR requesting authorization to appropriate and expend the sum of four hundred and forty-seven thousand dollars (\$447,000) from the Sewer Fund Surplus- available for appropriation account to fund the Engineering Design of the Sewer Pump Station Rehabilitation CIP Project 1.

The location of this meeting is accessible and reasonable accommodations will be provided to persons with disabilities who require assistance. If you need a reasonable accommodation, please contact the city of Newton’s ADA Coordinator, Jini Fairley, at least two business days in advance of the meeting: jfairley@newtonma.gov or (617) 796-1253. The city’s TTY/TDD direct line is: 617-796-1089. For the Telecommunications Relay Service (TRS), please dial 711.

Chair's Note: *The Public Safety & Transportation and Programs & Services Committees will join Public Facilities to discuss the following item.*

#60-20 Update on the Climate Action Plan
PUBLIC FACILITIES COMMITTEE requesting updates on the status of the Climate Action Plan.
Public Facilities Held 6-0 on 02/05/20

#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.

Respectfully submitted,

Alison M. Leary, Chair



City of Newton, Massachusetts
Office of the Mayor

Ruthanne Fuller
Mayor

62-21

Telephone
(617) 796-1100
Fax
(617) 796-1113
TDD/TTY
(617) 796-1089
Email

January 29, 2021

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

To the Honorable City Councilors:

I am pleased to appoint Barbara Lietzke of 68 Highland Avenue, Newton as a community representative member of the Design Review Committee for the Newton Center for Active Living (NewCAL) project. Her term of office shall expire upon completion of the building project and her appointment is subject to your confirmation.

Thank you for your attention to this matter.

Warmly,

Ruthanne Fuller
Mayor

CITY CLERK
NEWTON, MA, 02459

2021 FEB - 8 PM 12:52

RECEIVED

Barbara Lietzke



Barbara Lietzke
Sales Vice President
William Raveis Real Estate

Professional Association

- National Association of Realtors – Member
- Massachusetts Association of Realtors – Member
- Greater Boston Real Estate Board – Member

Achievements & Certifications

- CHP – Certified Home Ownership Professional
- Power Pricing Positioning and Presentation Strategy; Schweppe
- International Sterling Society Award – Coldwell Banker
- Chairman’s Elite Club Member – William Raveis
- Luxury Property Specialist – William Raveis
- ASP – Accredited Staging Professional

Business Experience

- Full-time Realtor since 2003
- Director of Development; Newton Free Library, MA
- Director of Development; West Suburban YMCA, Newton
- AT&T International, Basking Ridge, NJ
- AT&T Communications, Basking Ridge, NJ

Education

- BS Mathematics, Florida State University

Community Involvement

- Newton Free Library – Trustee
- West Suburban YMCA – Board of Directors
- Newton Community Chorus – Member
- League of Women Voters – Past President and Board Member
- Singer, Rhythm & Pearls Trio
- Newton Cultural Alliance – Board Member

Telephone
(617) 796-1100

Telefax
(617) 796-1113

TDD
(617) 796-1089

E-mail
rfuller@newtonma.gov



City of Newton, Massachusetts
Office of the Mayor

RUTHANNE FULLER
MAYOR

February 8, 2021

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

Councilors:

I respectfully submit a docket item to your Honorable Council requesting authorization to transfer the sum of \$1,000,000 from Acct # 0110498-579400 Comptroller's Reserve for Snow/Ice Removal as follows:

| <u>Amount</u> | <u>To Account #</u> | <u>Account Description</u> |
|---------------|---------------------|-----------------------------|
| \$500,000 | 0140123-513010 | Regular Overtime |
| \$500,000 | 0140123-527300 | Rental Vehicles/Contractors |

As of February 5, 2021, the city has responded to 18 snow and ice events totaling 39.7 inches of snowfall this fiscal year/winter. The city has spent a total of \$2,731,282.93 on snow and ice events. In addition, we had previously transferred \$400,000 from the reserve to cover Forestry storm related expenditures from the fall.

The FY2021 Budget contains \$4.5 million in Snow & Ice funds in two places:

- \$3.0 million in the DPW Budget
- \$1.5 million in the Comptroller's Reserve for Snow & Ice Removal

In addition, there is \$1.6 million available from the two additional sources that will be held in reserve for the FY2021 winter season so the City has \$6.1 million available to address snow, ice and storm costs before Free Cash will be required:

- \$0.7 million Carry-Forward funds available from the FY2020 Snow & Ice appropriation
- \$0.88 million in FEMA reimbursements for costs incurred in 2018 Winter emergencies caused by snow and ice storms

We are requesting these funds now as the next few weeks include a number of snow events.

Thank you for your consideration of this matter.

Sincerely,

Ruthanne Fuller
Mayor

RECEIVED
2021 FEB - 8 PM 5:02
CITY CLERK
NEWTON, MA 02459

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: Jim McGonagle, Commissioner of Public Works

Subject: Snow

Date: 2/5/21

I write to respectfully request that the Mayor docket for consideration a request to authorize the transfer of \$1,000,000 for snow and ice operations. As of February 5, 2021, the city has responded to 18 snow and ice events totaling 39.7 inches of snowfall. The city has spent a total of \$2,731,282.93. The current snow expenses are detailed below:

| | Budgeted | Expenses |
|--------------------------|------------------------|------------------------|
| Total Personnel | \$ 700,000.00 | \$ 549,259.29 |
| Total Contractors | \$ 1,375,720.78 | \$ 1,415,471.00 |
| Salt | \$ 400,000.00 | \$ 117,500.00 |
| Equipment | \$ 617,470.85 | \$ 649,052.64 |
| Total | \$ 3,093,191.63 | \$ 2,731,282.93 |

Sincerely,

Jim McGonagle
 Commissioner of DPW

Jim McGonagle
 Commissioner

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



RUTHANNE FULLER
MAYOR

City of Newton, Massachusetts
Office of the Mayor

66-21

Telephone
(617) 796-1100

Telefax
(617) 796-1113

TDD
(617) 796-1089

E-mail
rfuller@newtonma.gov

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

Councilors:

I respectfully submit a docket item to your Honorable Council requesting authorization to appropriate and expend the sum of \$447,000 from the Sewer Fund Surplus - Available for Appropriation Account to fund the Engineering Design of the Sewer Pump Station Rehabilitation CIP Project 1.

As you will see from the attached, the City commissioned an assessment to evaluate the mechanical, electrical and HVAC components of our eleven wastewater pump stations, one stormwater pump station, and three potable water booster stations which were last rehabilitated 30 years ago. These funds will be used to move forward with the design for the first phase of projects that the assessment identified.

Backup includes the Pump Station Condition and Performance Assessment Final Report.

Thank you for your consideration of this matter.

Sincerely,

Ruthanne Fuller
Mayor

RECEIVED
2021 FEB - 8 PM 4: 55
CITY CLERK
NEWTON, MA. 02459

DEPARTMENT OF PUBLIC WORKS
OFFICE OF THE COMMISSIONER
1000 Commonwealth Avenue
Newton Centre, MA 02459-1449

February 8, 2021

To: Maureen Lemieux, Chief Financial Officer

From: James McGonagle, Commissioner of Public Works
Theodore J. Jerdee, Utilities Director
Jack Cowell, Financial Director DPW

Subject: Request to Docket funding in the amount of \$447,000.00 for the City of Newton Pump Station Rehabilitation CIP Project 1-Engineering Design.

Brief Description:

The City of Newton Department of Public Works-Utilities Division operates and maintains eleven (11) wastewater pump stations, one (1) stormwater pump station and three (3) potable water booster stations throughout the City. The mechanical, electrical and HVAC components of these stations were last rehabilitated in 1990-1991. The City entered into an engineering agreement with Brown & Caldwell to perform a Pump Station Condition and Performance Assessment in order to develop a 10-year Capital Improvement Plan

The scope of work for the design (attached) for CIP Project 1 consists of the following:

- Replace heating, ventilation and dehumidification at Quinobequin Road, Elliot Street, Islington Road and Edgewater Park wastewater pump stations.
- Replacement of the discharge piping within the wet wells of the Hamlet Street and Grayson Lane wastewater pump stations.
- Replacement of the main influent gate valves at the Quinobequin Road and Elliot Street wastewater pump stations.
- Replacement of the wet well isolation gate valves at the Elliot Street wastewater pump station.
- The replacement of the Oldham Road Pump Station.

Please docket this request with the Honorable City Council for their consideration.

Sincerely,

James McGonagle
Commissioner Public Works

Attachment: Pump Station Condition and Performance Assessment Final Report Executive Summary, dated February 2020
Pump Station CIP Spending Per Year (mid-point of probable costs)
Brown & Caldwell Scope of Design for CIP Project 1

Pump Station Condition and Performance Assessment Final Report

Prepared for
City of Newton, Massachusetts
February 2020



Executive Summary

This Pump Station Condition and Performance Assessment Report (Report) summarizes the assessments performed by Brown and Caldwell (BC) on the sanitary, stormwater, and potable water pump stations operated by Weston & Sampson in the City of Newton, Massachusetts (City), and provides short-term and long-term recommendations to increase the reliability of these stations. The Report identifies areas within each pump station that need repairs or upgrades and provides an organized and defensible method to justify and prioritize a list of improvements to support the City's future Capital Improvement Program (CIP). The following information is provided for each station evaluated:

- Results of station assessment and asset criticality analysis, including physical condition and operating performance for the structural; mechanical; electrical; heating, ventilation, air conditioning (HVAC); and Instrumentation disciplines.
- A prioritized list of repairs/refurbishment or upgrade projects needed to prolong life expectancy and ensure efficient, economic, and environmentally compliant operation.
- Information to assist the City with implementing a CIP and Operations and Maintenance (O&M) Improvements for each station.

The pump stations evaluated as part of this project include:

- Eleven sanitary pumping stations
 - Quinobequin Road Pump Station (Quinobequin Rd)
 - Quinobequin Road Sub Station (Quinobequin Rd Sub)
 - Elliot Street Pump Station (Elliot St)
 - Edgewater Park Pump Station (Edgewater Park)
 - Islington Road Pump Station (Islington Rd)
 - Prairie Ave. Pump Station (Prairie Ave)
 - Longfellow Road Pump Station (Longfellow Rd)
 - Waban Ave Pump Station (Waban Ave)
 - Oldham Road Pump Station (Oldham Rd)
 - Hamlet Street Pump Station (Hamlet St)
 - Grayson Lane Pump Station (Grayson Ln)
 - One stormwater pumping station ^a:
 - Dresser Pond Pump Station (Dresser Pond)
 - Three potable water stations:
 - Manet Road Pump Station (Manet Rd)
 - Langley Road Pump Station (Langley Road)
 - Engine No. 10 Fire House Pump Station (Engine No. 10)
- a. *Flowed Meadow Pump Station (Storm Water) was not evaluated due to the upgrade project currently under construction*

Additionally, an emergency generator located at 60 Elliot Street (Utilities Building Generator) was evaluated as part of this project. A general summary of the stations and their features is presented in Table ES-1.

Brown and Caldwell

ES-1

| Table ES-1. Summary of Pump Stations Evaluated | | | | | | |
|---|--------------|------------------------------------|--|------------------------|---------------------|------------------------|
| Station Name | Service Type | Year Built/ Most Recent Upgrade(s) | Type of Pumps | Capacity (gpm) | | Pumps (quantity/ hp) |
| | | | | All Pumps ^c | Firm ^d | |
| Quinobequin Road | Sanitary | 1958/1992 | Dry Pit Centrifugal (4) | 19,200 | 12,000 ^b | 4/200 |
| Quinobequin Road Sub-Station | Sanitary | 2012 | Submersible grinder (2) | 90 | 45 | 2/2 |
| Elliot Street | Sanitary | 1991 | Dry Pit Centrifugal (4) | 16,800 | 12,600 | 4/100 |
| Edgewater Park | Sanitary | 1957/1992 | Dry Pit Centrifugal (2) | 600 | 300 | 2/3 |
| Islington Road | Sanitary | 1960/1992 | Dry Pit Centrifugal (3) | 900 | 600 | 3/5 |
| Prairie Avenue | Sanitary | 1950/1992 | Dry Pit Centrifugal (2) | 500 | 250 | 2/5 |
| Longfellow Road | Sanitary | 1965/1992 | Vertical Non-Clog Dry Pit (2) | 150 | 75 | 2/7.5 |
| Waban Avenue | Sanitary | 1963/1992 | Vertical Non-Clog Dry Pit (2) | 150 | 75 | 2/1.5 |
| Oldham Road | Sanitary | NA/1992 ^a | Vertical Non-Clog Dry Pit (2) | 600 | 300 | 2/1.5 |
| Hamlet Street | Sanitary | 1994 | V-Belt Driven (2) | 200 | 100 | 2/3 |
| Grayson Lane | Sanitary | 1992 | V-Belt Driven (2) | 200 | 100 | 2/3 |
| Dresser Pond | Stormwater | NA ^a | Submersible (1) | NA ^a | NA ^a | 1/1 |
| Manet Road | Potable | NA ^a | Dry Pit Centrifugal (2) | 2,400 | 1,944 | 2/25 |
| Langley Road | Potable | NA/2001 ^a | Jockey (1) Fire Duty (1) Booster (2) | 3,250 | 3,250 | 1/7.5 1/125 2/50 |
| Engine No. 10 Firehouse | Potable | NA/2015 ^a | Single Case (1) | 750 | 750 | 1/60 |
| 60 Elliot St Utilities Building Emergency Generator | Generator | NA ^a | | | | |

a. Not all information was available from City records or could not be determined from site visits.

b. Although each pump at Quinobequin Road is capable of 4,800 gpm, the estimated firm capacity with 3 pumps running is 12,000 gpm.

c. Total of all pumps' rated capacity.

d. Firm pumping capacity is defined as the anticipated working capacity of the station with the largest unit out of service.

1. Report Organization

The Report is divided into the following sections:

- **Section 1: Introduction.** This section describes the data reviewed and field assessments conducted at each station.
- **Section 2: Criticality Assessment and Modeling.** This section describes the methodology and results for prioritizing the condition of the assets at each pump station using a systematic process that combines the results of the condition and performance scores with asset and station criticality scores.

Brown AND Caldwell

ES-2

*Newton Pump Station Assessment Report_2020_02_19 FINAL

- **Section 3: Summary of Pump Station Assessment Findings.** This section provides a list of the key findings organized by station and asset type.
- **Section 4: Prioritized and Recommended O&M and Capital Improvement Program Projects.** This section provides a summary of the recommended improvements and includes an opinion of the most probable project costs.
- **Section 5: Recommended Next Steps.** This section provides a summary of the recommended next steps for the City to take to address the evaluations described in this Report.
- **Appendices:** The appendices include the following:
 - A. Detailed Pump Station Condition Assessments
 - B. Photo Logs (for each station)
 - C. Vibration Report and Data
 - D. Ranked Assets Criticality Score (grouped and prioritized by station)
 - E. Recommended Contract Packaging for Asset Replacement Projects

2. Assessment Approach and Methodology

The assessment was performed using a step-by-step approach for gathering data and assessing the condition and performance of critical assets within the City's 16 pump stations and generator. The assessment and prioritization for upgrade projects follows a well-accepted asset management methodology, which is commonly described as follows:

1. Review existing O&M data for each station
2. Build asset inventory
3. Assess asset condition and performance (C&P)
4. Identify deficiencies and corrective actions
5. Determine business risk (criticality assessment)
6. Prioritize corrective actions/optimize capital and O&M investments
7. Establish preliminary funding requirements

After review of available data, BC developed and tailored an electronic condition assessment form, which included major asset types within each of the pump stations and the emergency generators. Key asset types reviewed included; Site, Structures, Pumps, Motors, Piping, Valves, HVAC, Electrical, Instrumentation, Variable Frequency Drives (VFDs), Supervisory Control and Data Acquisition (SCADA), Generators, and Wet Well Measurements.

During June and July 2019, the assessment team visited 15 of the 16 stations and the emergency generators and assessed asset condition and performance and documented on printed assessment forms. Flowed Meadow was not included in the assessment due to ongoing upgrades and construction at the station. Key subtasks included wet well assessments, testing (vibration analysis, pump capacity testing), and condition and performance ranking for each asset. The City and Weston & Sampson staff participated with the assessment team to help support equipment C&P ranking, equipment operation, health-and-safety-related concerns, and O&M-related concerns.

During the site visits, assets at each station were evaluated and scored based on their physical condition and operating performance. Members of the team prepared scores for each asset using a condition rating score (1 to 5, where 5 is the lowest) and performance rating score (1 to 5, where 5 is lowest). These scores were established based on observations during the visits, knowledge from review of

Brown AND Caldwell

ES-3

*Newton Pump Station Assessment Report_2020_02_19 FINAL

historical data, discussions with operators, and tests performed at the stations. The scoring system is defined as follows:

Condition Ranking

- 1: Excellent
- 2: Minor local degradation – no action required
- 3: Degradation requires action
- 4: Integrity of component moderately compromised
- 5: Integrity of component severely compromised

Performance Ranking

- 1: Component functioning as intended
- 2: In service, but higher than expected O&M
- 3: In service, but function is impaired
- 4: In service, but function is highly impaired
- 5: Component not functioning as intended

The assets were then categorized into five likelihood of failure priority regions as indicated below, corresponding to the overall condition and performance of the asset.

- **Region 1: good condition and performance.** The assets with low C&P ranking scores of 1 or 2 are in this category. No immediate action required as no failure is expected for assets categorized in this region.
- **Region 2: moderate condition and performance.** The assets with at least one moderate ranking score of 3 are in this category. Generally, assets in Region 2 should receive a more detailed inspection and ongoing monitoring in order to determine the potential risks for failure.
- **Region 3: poor condition ranking.** The assets with poor condition ranking scores of 4 or 5, but that are performing well (performance ranking scores of 1, 2, or 3), are in this category. A corrective action work order for the near term should be scheduled for these assets. Although the assets are in service and functioning, issues related to the condition of these assets should be monitored and addressed.
- **Region 4: poor performance ranking.** The assets with poor performance ranking scores of 4 or 5, but with condition ranking scores of 1, 2, or 3, are in this category. Immediate corrective action is required for these assets, as the asset is not functioning properly, or failure is imminent.
- **Region 5: poor condition and performance.** The assets with poor condition and poor performance scores of 4 or 5 are in this category. These assets should be replaced or refurbished, as the asset is not functioning properly, and the integrity of its components is either moderately or severely compromised.

These rankings are illustrated graphically in Figure 1.

Brown AND Caldwell

ES-4

*Newton Pump Station Assessment Report_2020_02_19 FINAL

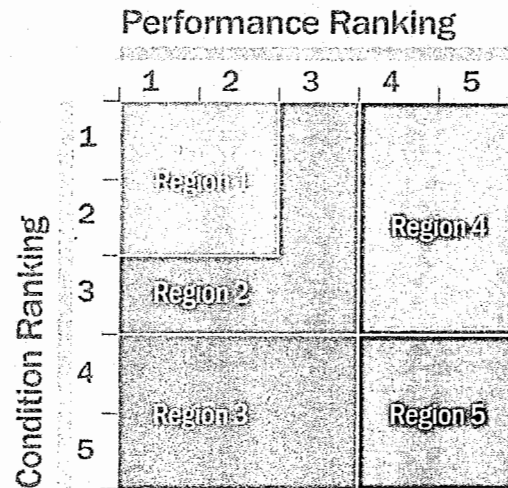


Figure 1. Condition and performance rankings

Following the condition and performance scoring, asset criticality was determined. For the purposes of this Report, criticality is expressed as a function of (1) the "likelihood" that a pump station asset will fail to meet its level of service requirement, (2) the "consequence" that the asset failure would have on the City's level of service, and (3) the impact of a station failure based on the importance and location of the pump station. The following equation was used to determine asset criticality:

$$\text{Individual asset criticality score} = (1) \text{ Likelihood of failure} \times (2) \text{ Asset type consequence of failure} \times (3) \text{ Pump station consequence of failure}$$

$$(1) \text{ Individual asset likelihood of failure region (likelihood of asset failure}^a) = \text{Function (asset condition}^a, \text{ asset performance}^a)$$

$$(2) \text{ Asset type consequence of failure}^b \text{ score} = \text{Function (asset type}^b)$$

$$(3) \text{ Pump station score (consequence of station failure}^c) = \text{Function (station parameter score}^c, \text{ station parameter weight}^c)$$

- a. See Appendix A and Appendix D for asset priority regions, asset condition scores, and asset performance scores.
- b. See Table 5 for asset type consequence of failure score.
- c. See Table 6 for station parameter weight and station parameter score.

3. Overall Findings, Prioritized Recommendations, and Costs

A total of 324 assets were evaluated for this Report. Based on the overall assessment process, asset upgrade projects have been grouped based on their Priority ranking. Table ES-2 shows the number of assets in each of four project priority categories. Priority 1 represents the top 10 percent of ranked asset criticalities; it is recommended that these asset upgrades be incorporated into a CIP in the next 1-2 years. Priority 2 represents the next 20 percent of ranked asset criticalities; it is recommended that these assets upgrades be incorporated into a CIP in the next 3-5 years. Priority 3 and 4 projects represent the remaining 70 percent of ranked asset criticalities; it is recommended that Priority 3

Brown AND Caldwell

ES-5

projects be incorporated into a CIP in the next 5-10 years and Priority 4 projects incorporated into a CIP in the next 10-15 years.

| Priority | Percentile Total Asset Score | Number of Assets (Number of Projects) ^a | Total Cost (\$) ^c |
|--------------|------------------------------|--|-------------------------------|
| Priority 1 | ~90% to 100% | 35 (16) | 4,726,000 - 18,904,000 |
| Priority 2 | ~70% to 90% | 68 (26) | 1,177,000 - 4,709,000 |
| Priority 3 | ~50% to 70% | 65 (N/A) ^b | No cost estimate developed |
| Priority 4 | ~0% to 50% | 156 (N/A) ^b | No cost estimate developed |
| Total | | 324 (42) ^b | 5,903,000 - 23,613,000 |

a. The specific projects for Priority 1 assets are shown in Table ES-5 (also Table 15 in Section 4 of this Report). The projects for Priority 2 assets are shown in Table 16 in Section 4.

b. Projects for Priority 3 and Priority 4 were not developed. Cost estimates were not developed for most Priority 3 and Priority 4 assets.

c. Total cost includes a range from the low end (-50% of total estimated cost) to the high end (+100% of the total estimated cost) for Priority 1 and Priority 2 assets.

It is useful to group asset upgrade projects according to pump stations and asset class to assist in developing a CIP by grouping similar-type assets. The grouping of projects, according to pump station and asset types, is presented in Table ES-3 and Table ES-4.

| Station | Criticality: Priority 1 ^a | | Criticality: Priority 2 ^b | | Total Cost (\$) ^c |
|---|--------------------------------------|-------------------------------|--------------------------------------|------------------------------|--------------------------------|
| | Number of Assets | Total Cost (\$) ^c | Number of Assets | Total Cost (\$) ^c | |
| Quinobequin Road | 15 | 2,214,000 - 8,855,900 | 11 | 355,700 - 1,422,900 | 2,569,700 - 10,278,800 |
| Quinobequin Road Sub-Station | 0 | | 0 | | |
| Elliot Street | 15 | 2,259,200 - 9,036,600 | 10 | 234,700 - 938,800 | 2,493,900 - 9,975,400 |
| Edgewater Park | 1 | 23,100 - 92,500 | 7 | 108,100 - 432,200 | 131,200 - 524,700 |
| Islington Road | 1 | 73,200 - 292,900 | 4 | 95,900 - 383,400 | 169,100 - 676,300 |
| Prairie Avenue | 0 | | 0 | | |
| Longfellow Road | 0 | | 1 | | |
| Waban Avenue | 0 | | 0 | | |
| Oldham Road | 1 | 62,200 - 249,000 | 9 | 66,800 - 267,300 | 129,000 - 516,300 ^d |
| Hamiet Street | 0 | | 3 | 101,600 - 406,400 | 101,600 - 406,400 |
| Grayson Lane | 0 | | 3 | 101,700 - 406,900 | 101,700 - 406,900 |
| Dresser Pond | 0 | | 0 | | |
| Manet Road | 2 | 94,100 - 376,600 | 9 | 45,600 - 182,500 | 139,700 - 559,100 |
| Langley Road | 0 | | 11 | 67,200 - 268,900 | 67,200 - 268,900 |
| Engine No. 10 Firehouse | 0 | | 0 | | |
| 60 Elliot St Utilities Building Emergency Generator | 0 | | 0 | | |
| Grand Total | 35 | 4,725,800 - 18,903,500 | 68 | 1,177,300 - 4,709,300 | 5,903,100 - 23,612,800 |

a. Priority 1 represents the assets in the top 10% of all criticality scores.

b. Priority 2 represents the assets that score between the top 10% and 30% of all criticality scores.

c. Total cost includes a range from the low end (-50% of total estimated cost) to the high end (+100% of the total estimated cost).

Brown and Caldwell

ES-6

d. Costs indicated are related to direct equipment replacement, additional cost is anticipated for complete replacement of the facility.

| Table ES-4 Cost Summary by Asset Type | | | | | |
|---------------------------------------|--------------------------------------|-------------------------------|--------------------------------------|------------------------------|-------------------------------|
| Asset Type | Criticality: Priority 1 ^a | | Criticality: Priority 2 ^b | | Total Cost (\$) |
| | Number of Assets | Total Cost (\$) | Number of Assets | Total Cost (\$) | |
| Centrifugal Pumps | 11 | 3,518,800 - 14,075,000 | 12 | 302,100 - 1,208,500 | 3,820,900 - 15,283,500 |
| Cranes | 0 | | 0 | | |
| Electrical General | 0 | | 0 | | |
| Electrical Power | 3 | 352,700 - 1,410,900 | 0 | | 352,700 - 1,410,900 |
| Generators | 0 | | 1 | 182,700 - 730,800 | 182,700 - 730,800 |
| HVAC | 5 | 398,700 - 1,594,800 | 4 | 91,900 - 367,700 | 490,600 - 1,962,500 |
| Instrumentation | 0 | | 0 | | |
| Motors ^d | 8 | - | 4 | - | - |
| Odor Control | 0 | | 0 | | |
| Piping and Valves | 4 | 59,600 - 238,500 | 39 | 321,500 - 1,285,900 | 381,100 - 1,524,700 |
| SCADA | 0 | | 0 | | |
| Site | 0 | | 0 | | |
| Structures | 0 | | 4 | 147,400 - 589,700 | 147,400 - 589,700 |
| Structures (Wet Well) | 3 | 375,800 - 1,503,000 | 4 | 131,700 - 526,800 | 507,500 - 2,029,800 |
| Submersible Pumps | 0 | | 0 | | |
| VFD | 1 | 20,300 - 81,400 | 0 | | 20,300 - 81,400 |
| Total^e | 35 | 4,725,900 - 18,903,600 | 68 | 1,177,300 - 4,709,400 | 5,903,200 - 23,613,000 |

a. Priority 1 represents the assets in the top 10% of all criticality scores.

b. Priority 2 represents the assets that score between the top 10% and 30% of all criticality scores.

c. Total cost includes a range from the low end (-50% of total estimated cost) to the high end (+100% of the total estimated cost).

d. Motor replacement costs are included in pump replacement costs.

e. Slight variations in Totals between Tables ES-3 and ES-4 are due to rounding.

4. High Priority Projects and Recommendations for Contract Packaging

Priority 1 asset upgrades are provided in Table ES-5, including both O&M-related upgrades, which represent short-term low-cost improvements, and longer-term capital improvements. These asset upgrades are presented in ranked order according to the calculated asset criticality score. Ranked Priority 1 recommended asset projects are also presented in Table 15 (included after Section 4 of this Report), and ranked Priority 2 recommended asset projects are presented in Table 16 (also included after Section 4). In addition to ranked Priority 1 and Priority 2 asset upgrades listings, recommended groupings for contract packaging were also considered and are provided in Appendix E. The groupings were developed with City staff and represent an effective means for grouping projects of similar asset type and location into a single construction project. Given the extreme importance of Quinobequin Road and Elliot Street Pump Stations, the high priority asset upgrades for these two stations have been grouped into one construction project. It is recommended that contract documents (specifications and drawings) for these grouped projects be developed into one large project that could be released and bid together. The asset upgrades for Oldham Road have also been separated out into their own project, as the recommended upgrades to that station included complete replacement of most of the station

Brown AND Caldwell

ES-7

*Newton Pump Station Assessment Report_2020_02_19 FINAL

assets, including all electrical equipment and all pumps and valves. The remaining Collection System Pump Stations and the Potable Water Booster Stations have been separated and grouped together respectively. It is recommended that these groups of projects be contracted separately or where beneficial and appropriate; the groupings should be combined with similar asset types. For example, the grouping of piping related projects could be grouped with the pump projects.

Brown AND Caldwell

ES-8

^Newton Pump Station Assessment Report_2020_02_19 FINAL

Pump Station CIP Spending Per Year
(mid-point of probable costs)

**CIP PROJECT 1
ENGINEERING
ACTIVITIES**

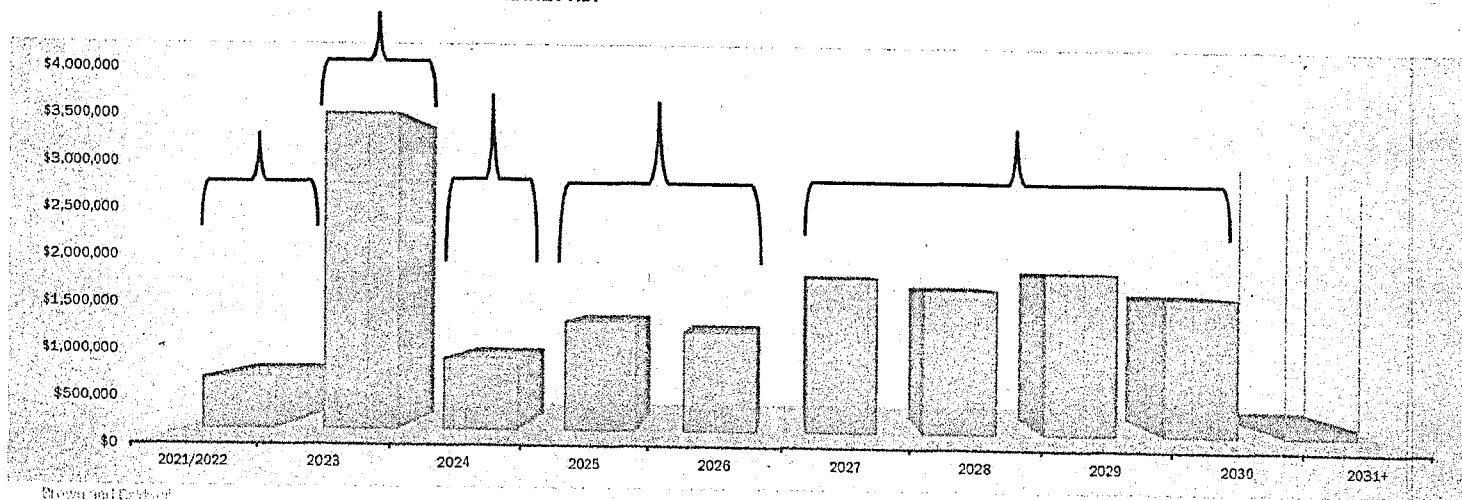
**CIP PROJECT 1
CONSTRUCTION**
MOST CRITICAL
ISSUES ARE
ADDRESSED
NON-REACTIVE
STATE ACHIEVED

**ENGINEERING
AND
CONSTRUCTION**
QUINOBEQUIN
BUILDING
REHAB.
ELLIOT ST.
VALVE
REPLACEMENT
PUMP
REPLACEMENT
AT ISLINGTON
AND MANET RD.

**ENGINEERING
AND
CONSTRUCTION**
QUINOBEQUIN
ELECTRICAL
REPLACEMENT
ELLIOT ST.
BUILDING REHAB
ADDITIONAL
PUMP
REPLACEMENTS

**ENGINEERING AND
CONSTRUCTION**
REPLACEMENT OF PUMPS
AT QUINOBEQUIN AND
ELLIOT ST. PUMP STATIONS

2029 AND BEYOND
REPLACEMENT OF PUMPS
AT PRAIRE AVE.,
LONGFELLOW RD., WABAN
AVE.
REASSESS FACILITIES.
BEGIN SYSTEMATIC
ELECTRICAL AND
INSTRUMENTATION
REPLACEMENTS.



Attachment A**Scope of Work for City of Newton Pump Station
Rehabilitation CIP Project 1**

May 14, 2020

The Brown and Caldwell (BC) scope of work is provided below. The objective of the conceptual design project is to provide the City of Newton with engineering design services for critical rehabilitation and improvements work identified in the recent pump station condition and performance assessment.

Project Understanding

The proposed scope is comprised of design for two projects to address issues with critical equipment/infrastructure identified during the recent pump station condition and performance assessment.

Pump Station Rehabilitation

The scope for this project is to provide rehabilitation and replacement work critical to improving the serviceable lifespan of the aging equipment at Newton's largest pump stations, as well as mitigating issues at multiple facilities that severely threaten the reliable operation of the pump station. The scope of this work will include the following:

Quinobequin Road, Elliot Street, Islington Road, Edgewater Park Pump Stations

- Demolish existing exhaust fans and install new supply and exhaust fans sized to provide air changes required by NFPA 820 or as allowed by electrical and spatial constraints.
- Install ductwork to provide supply ventilation and modify existing exhaust ductwork if required.
- Demolish the existing failed dehumidifiers and replace with units sized appropriately.
- Demolish unit heaters and replace with units sized for the improved air change rate.
- Demolish and replace existing carbon filters.
- Install gas monitoring and loss of ventilation alarming where required and wired back to SCADA.

Hamlet Street and Grayson Pump Stations

- Replacement of the force main and suction piping within the wet well of both pump stations.

Quinobequin Road and Elliot Street Pump Stations

- Replacement of the main influent gate at Quinobequin Road Pump Station which does not reliably close.
- Replacement of the main influent gate at Elliot Street Pump Station which is currently damaged and in danger of failing and sealing off flow to the pump station.
- Replacement or complete removal of wet well isolation gates within Elliot Street Pump Station which have not been operated in years and are damaged from corrosion.

Brown AND Caldwell

Replacement of Oldham Road Pump Station

The scope for the replacement of Oldham Road Pump Station Project is to replace the failing pump station with a facility that eliminates the need for confined space entry. The scope of this project will include the following:

- Evaluation of whether or not existing structures can be reused or if a new wet well structure is required.
- Development of a performance base bypass specification
- Demolition of the existing pumps and piping within the pump station interior.
- Rehabilitation/demolition/replacement of existing subsurface structures and utilities.
- Installation of a new valve vault.
- Replacement of electrical equipment.
- Installation of two 300 gpm submersible pumps.

Phase 100 Project and Design Management

The purpose of this task is to provide for the initiation and overall management of Project and Design activities. An overall schedule and work plan will be implemented so that work activities are completed in a properly-integrated and timely manner. In addition, this task includes those elements necessary to properly manage, lead, and control the Project.

- A project kickoff conference call will be organized to discuss the project goals and objectives, scope of work, deliverables, schedule, critical success factors, and establish lines of communications with the project team.
- A Project Schedule showing conceptual dates for deliverables and anticipated dates for workshops, QC reviews, meetings, and submittals will be prepared and provided.
- BC will share monthly status updates with City staff and provide information on the activities, information needs, schedule, and budget for the various tasks. The monthly status update will be included with the invoice.
- Conference calls will be scheduled as needed to resolve questions, obtain direction, and communicate with City staff.
- Communicate changes in scope of project if new information is identified that changes the proposed alternatives for evaluation or scope of conceptual design.
- BC will manage the health, safety, and environmental activities of its staff to achieve compliance with applicable health and safety laws and regulations. In accordance with standard procedures, BC will prepare Field Safety Instructions that contain fundamental health and safety information that must be followed by employees involved in field activities.
- BC will maintain Project records, manage and process Project communications, and coordinate Project administrative matters.
- As part of the Project Management Plan for this project, BC will develop and implement a quality assurance/quality control (QAQC) program. Senior reviewers will participate and perform internal QAQC review of work products for project deliverables and milestones. Issues identified during the formal internal QAQC review will be addressed prior to submittal to the City of Newton. Formal QAQC periods will be included in the project schedule and this project schedule will be revisited at all internal team meetings.

Phase 200 Evaluations

Objective: Confirm or adjust the critical projects identified in the project understanding section.

- Determine the presence of buried utilities surrounding Oldham Rd. Pump Station to define constraints and obstacles that would impact the installation of new buried structures or utilities associated with a new pump station.
- Determine soil condition and ground water depth at potential locations for new buried structures relating to the replacement of Oldham Rd. Pump Station.
- Perform site survey within an area 120' feet north and south of the Oldham Rd. Pump Station within the public right-of-way.
- Perform a geotechnical survey at determined locations. Assume two (2) soil borings and analysis.
- Develop 3D Revit model of the Quinobequin Road and Elliot Street Pump Stations.
- Perform field visit with design staff to confirm assumptions.

Activities: This task includes the following activities:

- Lead a project kickoff meeting with City of Newton, gather data, and discuss the approach for the project evaluations.
- Key design staff will perform a tour of the project sites.
- Perform site and geotechnical survey at Oldham Rd. Pump Station.
 - BC will hire a surveying firm to perform a full utility survey 120' feet north and south of the existing pump station the entire width of the right-of-way, approximately 19,000 square feet.
 - BC will hire a geotechnical engineering firm to collect soil samples and determine soil and ground water level conditions to assist in structural design if required. Two borings are assumed at a depth of 30'.
- Develop 3D Revit model
 - BC will hire a survey firm to laser scan the interiors of both the Quinobequin Road and Elliot Street Pump Stations. The survey information will then be used to develop a 3D Revit model of each station and will serve as the base for current and future designs.

Deliverables:

- Project Kickoff Meeting Minutes
- Survey drawings
- Geotechnical report
- Revit Model

City of Newton responsibilities:

- Be available during field visits
- Some electrical equipment may need to be opened for inspections and an electrician may need to be available/provided.

Phase 300 Design Documents

Objective: Prepare detailed design drawings, specifications and contract documents at 30%, 60%,

90% and 100% design stages.

Activities: This task includes the following activities:

- Meetings with the City after delivery of the 30%, 60%, and 90% design documents.
- Review of available drawings previously furnished by the City.
- Preparation of final plans, sections, and job specific details drawings.
- Preparation of contract specifications.
- Development of a performance base bypass specifications for Hamlet St., Grayson ave., and Oldham Rd. Pump Stations.
- Preparation of a quantity take-off and opinion of probable construction cost provided with the delivery of the 30% design document and updated at the 90% design document.
- Obtaining Massachusetts Prevailing Wage Rates and inserting them into the specifications.

Deliverables: .PDFs and Four (4) hardcopy sets of review copies of the drawings, specifications and other contract documents during the 30%, 60%, 90% and 100% design.

- CADD files
- Design meeting minutes

City of Newton responsibilities:

- Assist with identifying key scheduling milestones
- Participate in meetings
- Review, and provide comments

Phase 500 Bidding Services

Objective: Support the City during the bidding phase by facilitating a pre-bid meeting, answering questions, issuing addenda, and reviewing bids and recommending award.

Activities: This task includes the following activities:

- Facilitate a pre-bid meeting.
- Formally respond to bidder questions.
- Prepare and distribute addenda as required to clarify, correct, or change the issued documents.
- Aid the City in securing bids, tabulating bid results, analyzing bid results, and making recommendations on the award of each construction contract.

Deliverables:

- Ten (10) sets of final construction documents (contract drawings, final specifications, and other documents) required for bidding and construction purposes
- Digital .pdf file of final construction documents
- Pre-bid meeting minutes

Phase 600 Services During Construction

Objective: BC will provide general engineering services during construction for the duration of the construction Projects.

Activities: This task includes the following activities:

- Provide overall project management. Task includes monthly reports, invoicing, team and subcontractor coordination, contract communications, scheduling, and oversight.
- Provide general construction administration. BC shall provide consultation and advice during construction and provide technical engineering support during construction activities. Update and modify the Contract Documents to meet changed site and project conditions or variations in State/Federal requirements as necessary to supplement and/or provide clarity to the Contract Documents during the construction phase of the project (to address RFIs, Change Orders, and other issues requiring modified Contract Documents). This does not include revisions required for Record Drawings as required in subsequent sections of this Scope.
- Attend pre-construction conference and distribute minutes
- Attend progress meetings, BC shall assume progress meetings are held once per month during active construction. In addition to attendance at the progress meetings, BC shall facilitate the meetings, prepare a package for each meeting containing agenda, submittals log, RFI logs, and PCO/Change Order logs (Excel spreadsheets or Primavera logs) to be reviewed at each meeting, and a 3-week look ahead schedule (to be provided by General Contractor), and other documentation that may be required for meetings that are not specified. Meeting minutes will be prepared by BC and provided to the City.
- Coordination with other municipal agencies as required during monthly progress meetings. BC assumes no effort beyond typical tasks associated with monthly progress meetings.
- Attend monthly project management meetings. BC shall assume that Project Management Meetings will be held subsequent to Construction Progress Meetings on an as-needed basis.
- Attend issue resolution meetings. BC assumes construction related issues will arise that will require formal meetings between the contractor, the City and BC to reach an agreeable resolution. BC shall assume no effort beyond typical tasks associated with monthly progress meetings.
- Perform Field Visits. BC assumes that periodic visits to site will be required to observe progress and assure compliance with the contract documents and design intent. BC shall assume a maximum of two (2) field visit per week through the duration of the construction project. BC shall make visits to the site at intervals appropriate to the various stages of construction as BC deems necessary to monitor the Contractor's work for compliance with the contract documents as outlined above. The visit may coincide with the progress meeting if the progress meeting is held on site. Such visits and observations are not intended to be exhaustive or to extend to every aspect of the work in progress, or to involve detailed inspections of the work beyond the responsibilities specifically assigned in this scope of services and the Contract Documents, but rather are to be limited to spot checking, selective sampling and similar methods of general observation of the work based on BC's exercise of professional judgment as assisted by the City. Based on information obtained during such visits and such observations, and from the City, BC shall determine in general if such work is proceeding in accordance with the Contract Documents and BC shall keep the City informed of the progress of the work.
- During the site visits, BC shall notify the City if BC believes that work should be rejected because such work will not produce a completed Project that conforms generally to the Contract Documents or that it will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents.

Brown AND Caldwell

- BC shall review all shop drawing submittals prepared by the contractors along with associated illustrations, samples, and other submittals required by the Contract Documents. BC shall assume 50 submittals requiring review. A table listing the submittals and number of reviews will be included as an attachment for the City's review. BC shall review and respond to all submittals, shop drawings, samples within fourteen (14) calendar days. BC shall coordinate and track submittals, including preparing and maintaining a submittal log, and BC will distribute the shop drawings and submittals. Copies of each submittal including subsequent revisions shall be provided to the City.
- BC shall respond to Requests for Information submitted by the contractor. BC shall assume 5 RFIs. BC shall coordinate and track RFI's, including preparing and maintaining a RFI log. Copies of each RFI including responses and subsequent revisions shall be provided to the City. Review and provide recommendations for approval of payment requisitions. BC shall issue necessary clarifications and interpretations of the Contract Documents as appropriate for the orderly completion of the work. Such clarifications and interpretations will be consistent with the intent of and reasonably inferable from the Contract Documents. BC may issue Field Orders authorizing minor variations from the requirements of the Contract Documents through coordination with City. BC shall recommend Change Orders and Work Change Directives to the City as appropriate, and shall prepare written recommendations concerning Change Orders and Work Change Directives as required in consultation with the City.
- Development of RFP has not been included in BC's scope of work.
- Review applications for payment. Based on BC's observations and on review of Applications for Payment and accompanying supporting documentation: Determine the amounts that Engineer recommends Contractor be paid. Recommend reductions in payment based on the provisions stated in the Construction Contract. Such recommendations of payment will be in writing and will constitute Engineer's representation to Authority, based on such observations and review, that, to the best of Engineer's knowledge, information and belief, Contractor's Work has progressed to the point indicated, the Work is generally in accordance with the Construction Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, and to any other qualifications stated in the recommendation), and the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work. In the case of unit price Work, Engineer's recommendations of payment will include final determinations of quantities and classifications of the Work (subject to any subsequent adjustments allowed by the Contract Documents).
- Attendance of commissioning team meetings. BC shall attend meetings with the City, contractors, and any necessary vendors or equipment representatives to coordinate system and equipment startups. BC assumes these meetings will be scheduled in conjunction with progress meetings and will require no additional effort.
- Provide field support during start-up. BC shall provide on-site personnel during equipment startups to provide assistance to the contractor and equipment vendors as needed and to confirm that equipment is performing as designed and expected. The work of this item shall also include the development of a process start-up plan that will be used as a guide and to coordinate equipment startups. BC will schedule period site visits to coincide with startup activities. BC shall provide technical engineering support and on-site personnel for specific functional and performance testing that may be required by the Contract Documents to confirm that specified process systems are performing as designed and specified. This shall include providing assistance to the City in coordination of required testing with the contractor, City, and other agencies (as may be required). The work associated with this item shall include all the development of process start-up plans, testing forms/documentation, scheduling, observing testing, compiling results, and other activities required by the Contract Documents.

- Instrumentation check out services. BC shall perform checkout services of the instrumentation and control equipment installed by the contractor. BC shall witness and document control loop check-outs, perform a check of the control strategy (remote manual/remote auto/final testing), and provide follow-up control systems work as needed after the system is started up and running. BC will perform checkouts in conjunction with periodic site visits and assumes no additional effort.
- Prepare record drawings. BC shall prepare record drawings that reflect as-built conditions based on information provided by the City, the construction contractor, and BC's own on-site inspections. BC shall reconcile and log that all construction document changes (i.e., shop drawings, RFIs, Field Change Orders, etc.) have been incorporated into the record drawings.
- Determination of substantial completion. Following notice from the Contractor that the Contractor considers the entire work ready for its intended use, BC and the City, accompanied by the Contractor, shall conduct an inspection to determine if the work is substantially complete. BC shall deliver a certificate of Substantial Completion to the City and Contractor after the resolution of any objections of the City and BC and after it is mutually agreed upon by the City and BC that the certificate of Substantial Completion shall be issued. Before BC issues a Certificate of Substantial Completion, submit to Contractor a list of observed items requiring completion or correction (Punch list). Determine whether necessary inspections and approvals by public agencies having jurisdiction over the Work have been performed and advise the City accordingly.
- Final site inspection. BC shall perform a final site inspection and walk-through of all the project areas with the City, CM, Resident and Contractor to determine final completion status. BC shall prepare a final report and submit it to the City for review and acceptance. BC shall assume one 4-hour day on site.
- Provide final notice of acceptability of the work. BC and City shall conduct a final inspection to determine if the completed work of Contractor is acceptable so that BC may recommend, in writing, final payment to Contractor. Accompanying the recommendation for final payment, BC shall indicate that the work is acceptable to the best of BC's knowledge, information and belief and based on the extent of the services performed and furnished by BC under this scope of services.
- Attendance of closeout meeting. BC shall attend a close out meeting with the City and construction contractor to officially close-out the project and to discuss warranty procedures.

Deliverables: Meeting minutes, submittal reviews, RFI reviews, pay application review, record drawings, substantial and final completion recommendations

Overall Project Assumptions

1. Project documents will be developed into filed sub-bids in accordance with Massachusetts state law.
2. It is assumed that the construction of pump station rehabilitation project and the replacement of Oldham Road Pump Station overlap to provide inspection efficiencies. If the projects are built during separate timeframes, then additional effort is anticipated.
3. BC shall utilize the City's "front-end" documents, specifications and drawings will be developed in accordance with BC's standards.
4. City of Newton will provide safe access to all required areas of the site for the purposes of project design.
5. HAZMAT surveys are not included in the design. It is assumed that Hazardous materials are not present based on the previous upgrade projects being conducted in 1992.

6. The City's Integrator will be responsible for integrating new signals resulting from this project, this would include HVAC related alarms and sensors and additional inputs as part of the replacement of Oldham Rd. pump station.
7. Cad drawings related to Quinobequin Rd. and Elliot St. PS will be developed in 3D. 2D drawings will be utilized for all others. Replacement of wet well piping for Hamlet Street and Grayson lane Pump Stations will be shown schematically if record drawings do not exist.
8. City of Newton will review the draft deliverables for accuracy of understanding of the issues and data assumptions. City of Newton will provide one set of compiled written comments.
9. BC is not responsible for any schedule or cost impacts related to delays caused by protracted reviews, changes in scope of work, or other situations outside of our control.
10. BC is not responsible for additional effort that may be required for issues related to unknown conditions that may impact the design or construction.

Schedule

Project will commence with written notice to proceed (NTP) provided by the City of Newton. 12 months is estimated for design and bidding of the project. The construction period has an estimated duration of 12 months.

Preliminary Drawing List

Pump Station Rehabilitation

| Drawing No. | Title |
|-------------|---|
| G-000-01 | Cover Sheet |
| G-000-02 | Location plans – Quinobequin Rd. PS, Elliot St. PS, Edgewater Park PS, Islington Rd. PS |
| G-000-03 | Abbreviations |
| G-000-04 | General Notes and Symbols |
| G-000-05 | Structural Notes |
| G-000-05 | Structural Continued |
| G-000-06 | Process Mechanical Notes and Symbols |
| G-000-06 | Process Mechanical Notes Continued |
| G-000-07 | HVAC Notes |
| G-000-07 | HVAC Notes Continued |
| G-000-08 | Electrical Notes and Symbols |
| G-000-08 | Electrical Notes Continued |
| G-000-09 | I&C Notes and Symbols |
| M-100-01 | Quinobequin Rd. Pump Station Gate Replacement – Demolition |
| M-100-02 | Quinobequin Rd. Pump Station Gate Replacement – Wet Well Plan |
| M-200-01 | Elliot St. Pump Station Gate Replacement – Demolition |
| M-200-02 | Elliot St. Pump Station Gate Replacement – Wet Well Plan |
| M-500-01 | Hamlet St. Pump Station – Wet Well Plan and Section - Demo |
| M-500-02 | Hamlet St. Pump Station – Wet Well Plan and Section |
| M-600-01 | Grayson Lane Pump Station – Wet Well Plan and Section - Demo |
| M-600-02 | Grayson Lane Pump Station – Wet Well Plan and Section |
| H-100-01 | Quinobequin Rd. Pump Station HVAC Schematics |
| H-100-02 | Quinobequin Rd. Pump Station HVAC Schedule |
| H-100-03 | Quinobequin Rd. Pump Station HVAC Demolition |
| H-100-04 | Quinobequin Rd. Pump Station HVAC Plan |
| H-100-05 | Quinobequin Rd. Pump Station HVAC Plan – Lower Levels |
| H-200-01 | Elliot St. Pump Station HVAC Schematics |
| H-200-02 | Elliot St. Pump Station HVAC Schedule |
| H-200-03 | Elliot St. Pump Station HVAC Demolition |
| H-200-04 | Elliot St. Pump Station HVAC Plan |
| H-200-05 | Elliot St. Pump Station HVAC Plan – Lower Levels |

Brown AND Caldwell

| | |
|----------|--|
| H-300-01 | Edgewater Park Pump Station HVAC Schematics |
| H-300-02 | Edgewater Park Pump Station HVAC Demolition |
| H-300-03 | Edgewater Park Pump Station HVAC Plan and Schedule |
| H-300-04 | Edgewater Park Pump Station HVAC Plan – Lower Levels |
| H-400-01 | Islington Rd. Pump Station HVAC Schematics |
| H-400-02 | Islington Rd. Pump Station HVAC Demolition |
| H-400-03 | Islington Rd. Pump Station HVAC Plan and Schedule |
| H-400-04 | Islington Rd. Pump Station HVAC Plan – Lower Levels |
| E-100-01 | Quinobequin Rd. Pump Station Electrical One-Line |
| E-100-02 | Quinobequin Rd. Pump Station Electrical and I&C Plan |
| E-200-01 | Elliot St. Pump Station Electrical One-Line |
| E-200-02 | Elliot St. Pump Station Electrical and I&C Plan |
| E-300-01 | Edgewater Park Pump Station Electrical and I&C Plan |
| E-400-01 | Islington Rd. Pump Station Electrical and I&C Plan |

Replacement of Oldham Road Pump Station

| Drawing No. | Title |
|-------------|--------------------------------------|
| G-000-01 | Cover Sheet |
| G-000-02 | Location plan |
| G-000-03 | Abbreviations |
| G-000-04 | General notes and Symbols |
| G-000-05 | Structural Notes |
| G-000-06 | Structural Notes Continued |
| G-000-07 | Process Mechanical Notes and Symbols |
| G-000-08 | HVAC Notes and Symbols |
| G-000-09 | Electrical and I&C Notes and Symbols |
| C-700-01 | Existing Site Plan |
| C-700-02 | Demolition Plan |
| C-700-03 | Site Plan |
| C-700-04 | Standard Details |
| S-700-01 | Demolition Plan and Sections |
| S-700-02 | Structural Plans |
| S-700-03 | Structural Sections and Details |
| S-700-04 | Standard Details I |
| S-700-05 | Standard Details II |
| M-700-01 | Demolition Plan |

Brown AND Caldwell

| | |
|----------|-------------------------------|
| M-700-02 | Wet Well and Valve Vault Plan |
| M-700-03 | Sections |
| M-700-04 | Standard Details I |
| M-700-05 | Standard Details II |
| H-700-01 | HVAC Plan |
| H-700-02 | HVAC Section |
| H-700-03 | Standard Details |
| E-700-01 | Existing Site Plan |
| E-700-02 | Site Plan |
| E-700-03 | Plan and details |
| E-700-04 | Wiring Details and Diagrams |
| E-700-05 | System Riser Diagram |
| E-700-06 | Electrical Details I |
| E-700-07 | Electrical Details II |
| E-700-08 | Schedules |

The Public Facilities Committee will be getting an update on the Climate Action Plan at our regularly scheduled meeting on 2/17. In addition, there will be a discussion on a separate docket item #294-20 on how the City may encourage or require the use of efficient electric technologies in new or substantially renovated buildings.

The following items are included in the Friday packet:

The Climate Action Plan Power Point Presentation.

A memo from Attorney Andrew Lee outlining the procedural steps to seek special legislation (Home Rule Petition) for discussion purposes.

A cost comparison Table by Co-Sustainability Director Ann Berwick.

There is an additional page with links and information pertaining to item #294-20.

Please don't hesitate to contact me with any questions.

Regards,

Alison M. Leary
Newton City Council
Ward 1



Ruthanne Fuller
Mayor

City of Newton, Massachusetts
Department of Planning and Development
1000 Commonwealth Avenue Newton, Massachusetts 02459

Telephone
(617) 796-1120
Telefax
(617) 796-1142
TDD/TTY
(617) 796-1089
www.newtonma.gov

Barney S. Heath
Director

MEMORANDUM

DATE: February 12, 2021

TO: Councilor Leary, Chair
Members of the Public Facilities Committee

FROM: Barney Heath, Director of Planning and Development
Jennifer Steel, Chief Environmental Planner

RE: Update on Climate Action Plan Implementation

MEETING DATE: February 17, 2021

Newton adopted its Climate Action Plan in December 2019. Despite limitations due to COVID-19, City staff and numerous community partners have worked to lay the foundation for strategies and continue to implement priority actions laid out in the plan.

At this meeting, Councilors will receive an update on that progress and an outline of priority actions for the upcoming year.



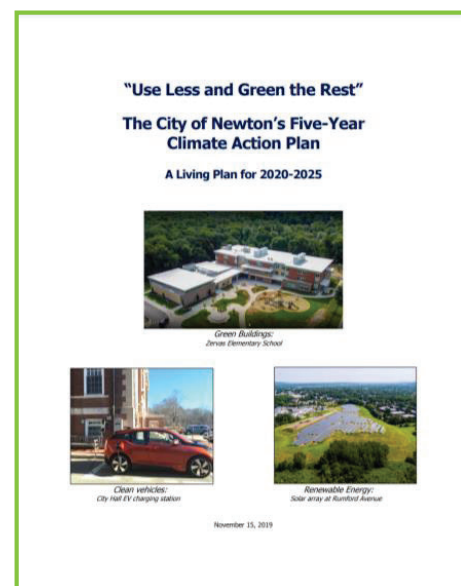
City of Newton's Climate Action Plan Annual Status Report

February 2021

Background

The City's 5-Year [Climate Action Plan \(CAP\)](#) outlines the steps the City will take from 2020-2025 to significantly reduce greenhouse gas emissions across the community and meet our goal of a carbon-neutral Newton by 2050.

- **Adopted December 2019**
- **Sets strategies, milestones, and metrics**
- **Has 60+ actions** over the following areas
 - A. Administration
 - B. Clean/Renewable Energy
 - C. Green Transportation
 - D. New Construction
 - E. Existing Buildings
 - F. Consumption & Disposal
- **Actions and metrics are added as we learn**



Top 10 Strategies

2020 was a year of laying foundations ... and dealing with COVID-related challenges. These are the strategies identified in the CAP.

1. Form City **implementation team**
2. Work with **NCCE** and other **partners**
3. Increase **green mobility** (biking, walking, shuttles, etc.)
4. Advocate for more **progressive building codes**
5. Update zoning to incentivize **high-efficiency performance**, such as Passive House and/or net-zero new construction
6. Increase the amount of electricity provided by New England renewable energy resources through **Newton Power Choice** and the **City's municipal energy contract**.
7. **"Green" municipal operations**
8. **Incentivize EV ownership** to achieve 10% goal
9. Encourage **electrification of heating and cooling**
10. **Engage residents and businesses** to reduce GHG emissions

The Team

Creating and implementing this vision is a **collaborative effort** of City staff, the Newton Citizens Commission on Energy, and many other invaluable partners.

► City

- Mayor's Office
- Schools
- Sustainability
- Planning
- Inspectional Services Dept. (ISD)
- Public Works
- Public Buildings
- Transportation
- Newton Citizens Commission on Energy (NCCE)

► Partners

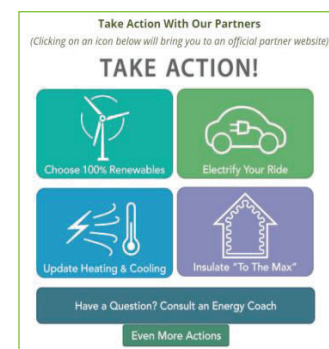
- Building Standards Committee
- Green Newton
- HeatSmart Newton
- EV Task Force
- 350 Mass-Newton Node
- Communications Strategy Group
- Mothers Out Front
- Volunteer Citizen Advisors/Coaches
- Eversource & National Grid
- ... and so many more!



Actions Taken To-Date

A. Administration (Actions Taken)

- ▶ Formed **City team** which meets bi-weekly
- ▶ Work closely with **volunteer team** which meets regularly
- ▶ Organized **project-based working groups (City staff & partners)**
- ▶ Developed a master **tracking** spreadsheet
- ▶ Created and filled **City Energy Coach** position
- ▶ Secured **MOU w/ Utilities** & began implementation
- ▶ Partnered with **UMass/Mt. Ida's Living Lab** courses
- ▶ Created **City Sustainability website** linked to:
 - Green Newton & MassEnergize's **Take-Action website**
 - **Volunteer Energy Coach website**
 - **EV Taskforce website**



B. Clean Energy (Actions Taken)

- ▶ **Solar Phase 1 & 2 = 12 projects (*complete*)** →
- ▶ **Solar Phase 3 = 17 projects (*in progress**)** →
 - Roof Installations
 - **FD #3, Ed Center, Zervas, Cabot*, Carr*, Angier*, and Williams* Schools**
 - Carport Installations
 - **NNHS #1, NNHS #2, Newton Free Library*, Ed Center*, Pleasant Street Parking Lot*; Wheeler Road Parking Lot*; and Memorial-Spaulding*, Mason Rice*, Brown*, Oak Hill* Schools**

4.4
MkWh/yr

\$ 577 K
per year

3.7
MkWh/yr

\$ 167 K
per year

Total Municipal Solar Production (all phases) = 40% of annual municipal electricity use



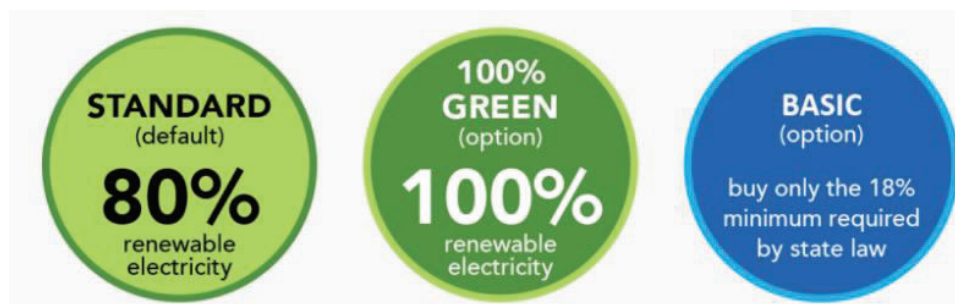
8.0
MkWh/yr

\$ 740 K
per year

B. Clean Energy (Actions Taken, cont'd)

▶ **Newton Power Choice**

- Adopted **1st contract** with **62% MA Class 1 RECS** as default
 - 8 % (1,974 customers) opted to 100% under 1st contract
- Adopted **2nd contract** with **80% MA Class 1 RECS** as default, see graphic



C. Green Transportation (Actions Taken)

- ▶ **Bluebikes bikeshare and Park & Pedal stations**
 - Installed 8 Bluebikes bikeshare stations (2020)
 - Installed 3 Park & Pedal electric bike rental stations – Albemarle Field, Forte Park, City Hall (2020)
- ▶ **Bike Lanes**
 - Installed 4.3 miles of bike lane - NSHS, Walnut St., Comm. Ave Nahanton St., Braeland Ave., Washington St., (2019)
 - Installed 0.4 miles of bike lane - Hagen Rd., Crafts St. (2020)
- ▶ **Bike Racks**
 - Installed 28 racks in multiple village centers (2018)
 - Installed 35 racks and 2 shelters installed at 19 schools and 3 village centers (2019)



C. Green Transportation (Actions Taken cont.)

- ▶ **Electrifying the City Fleet**
 - Currently all non-emergency sedans are EVs (32 vehicles)
- ▶ **EV charging stations**
 - Installed 7 chargers - War Memorial 5, NSHS, and Elliot Yard (2018)
 - Installed 3 chargers - Richardson, 110 Crafts, and Lexington lots (2019)
- ▶ **Electric car-share: GreenSpot public-private partnership**
GreenSpot pays the City for space to provide cars and charging stations
 - Operational: Richardson and Lexington
 - Pending: Adams, Pearl, and Austin
- ▶ **Private electric vehicles**
 - Newton (at 1.3%) is ahead of many other municipalities in EV ownership



D. New Construction (Actions Taken)

► City Zoning Ordinance Amendments

- Passed **Setbacks** (Ch. 30 §1.5)
 - Heat pump compressors, exterior insulation & vestibules may project
- Passed **Sustainable Development Design** (Ch. 30 §5.13)
 - Purpose: Increase renewable energy, electrification, EV chargers, and high-efficiency buildings; and minimize embedded carbon and waste in and from construction
 - Requires a green building rating system for new construction > 20K sf & major renovation
- Docketed **Special Permit Review** (Ch. 30 §7.3)
 - Grant of Permit, 5th criterion: “contribute significantly to the efficient use and conservation of natural resources and energy” (§7.3.3.C.5)
 - Site Plan Approval, criterion: “Significant contribution to the efficient use and conservation of natural resources and energy” (§7.4.5.B.8)



► Major Developments

- **Riverside** will meet LEED Neighborhood and be partly electrified and Passive House
- **Northland** will meet LEED Neighborhood standard and be partly electrified and Passive House
- **Riverdale** will meet LEED Residential standards and be partly electrified and Passive House
- **Dunstan East** (under appeal) will undertake a Passive House feasibility study

E. Existing Buildings (Actions Taken)

► Support Residents/Contractors in Energy Performance Upgrades

- **City Energy Coach hired – Welcome Liora Silkes!**
 - Assist residents, contractors, and developers
- **Energy Coach website** (*City and NCCE*)
 - Expert citizen coaches and City Energy Coach provide 1:1 advice
- **HeatSmart Program**
 - 2 installers, webpage, marketing initiatives,
 - 36 contracts signed (~1/3 for “whole house” installations)
- **Home Energy Rating System (HERS) rating in Assessor’s database and on map**
- **City website**
 - Links to **City programs, MassEnergize Take Action webpage** (*Green Newton*) & **Energy Coach website** (*NCCE*)



E. Existing Buildings (Actions Taken)

- ▶ **Improve City Buildings** (*Public Buildings Dept.*)
 - Converted the **Auburndale Library** from oil/steam heating to an electric heat pump
 - Developed **heating transition plan for 687 Watertown St** (Horace Mann School) using electric heat pumps
 - Implemented “**Public Building Design & Construction Sustainability Guidelines**”
 - Converted to **LED lighting** at NSHS and DPW/Utilities Dept. building
 - Implemented **Solar Phases 1 and 2 (complete)**, and **Phase 3 (in progress)**

F. Consumption & Disposal (Actions Taken)

- ▶ **Composting**
 - **Black Earth Compost** curbside collection program subscriptions rose from 1,200 to 2,000 households
 - Launched **organics drop-off pilot** at Resource Recovery Center on Rumford Ave.

- ▶ **Tree Planting**
 - Advertised a tree planting program in **Newton’s Sister City, San Juan del Sur, Nicaragua** for cost-effective carbon sequestration



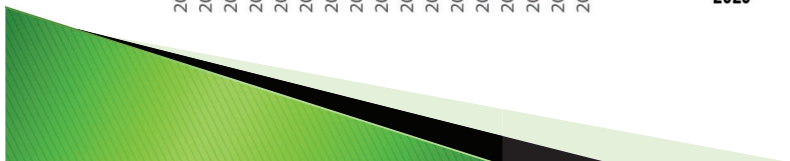
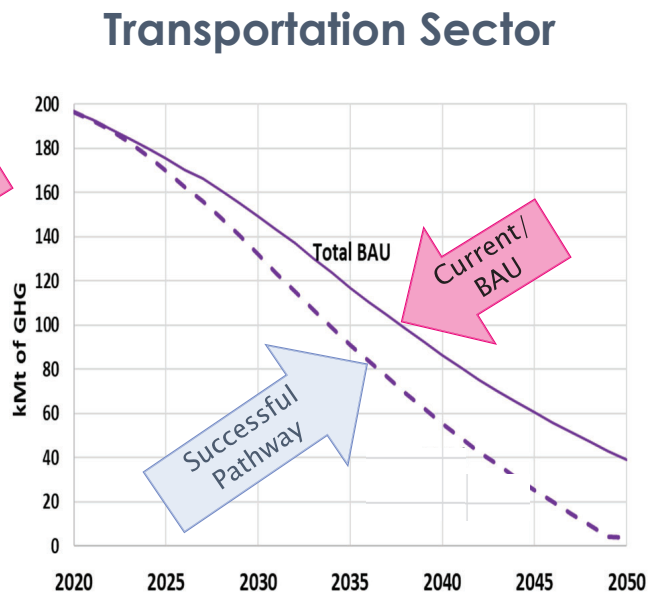
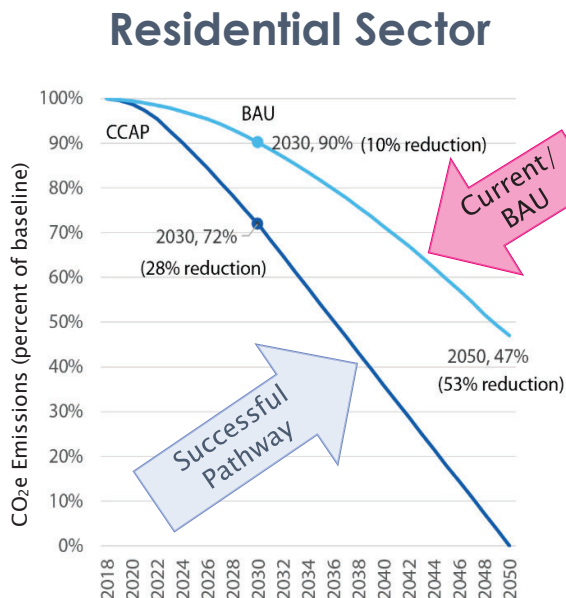


Outcomes



Pathways to Success: Dramatic Changes Needed

Graphic from the Citizens' Climate Action Plan



Original Metrics from CAP

| Metrics | 2025 Milestones | 2050 Goals |
|---|-----------------|---------------------------|
| B. Clean Energy | | |
| Percent renewables as Newton Power Choice base | 100% | 100% |
| Percent of residents opted up to 100% NPC match | 15% | n.a. |
| C. Transportation | | |
| Percent reduction in vehicle miles traveled | 5% | 20% |
| Percent of private cars in Newton that are electric | 10% | 100% |
| D. New Construction | | |
| Percent of all-electric buildings | 100% | 100% |
| E. Existing Residential Buildings | | |
| Number of home energy (re)assessments/year | 4000 | TBD |
| Number of insulation installations/year | 800 | all homes are insulated |
| Number of heat pump installations/year | 450 | all homes have heat pumps |
| Percent reduction in total energy consumption | 3% | 20% |
| Percent of all-electric buildings | 5% | 100% |
| F. Existing Commercial Buildings | | |
| Percent reduction in total energy consumption | 15% | 50% |

New Metrics Going Forward

| Metric | Occurrences 2020 | MOU 2021 Goal | 2025 Milestone | 2050 Goal |
|--|-------------------|---------------|----------------|-------------|
| B. Clean energy | | | | |
| 1. Default or standard level of MA Class 1 RECs under NPC | 80% | N/A | 100% | 100% |
| 2. # of small-scale solar installations in Newton | 177 | No goal set | No goal set | No goal set |
| 3. # of large-scale solar installations in Newton | 29 | No goal set | No goal set | No goal set |
| C. Transportation | | | | |
| 4. % (and #) of vehicles registered in Newton that are EVs | 1.3% (913) | N/A | 10% | 100% |
| 5. # of EV charging stations available to the public in Newton | 102 ports, 16 loc | No goal set | No goal set | No goal set |
| 6. # (and % reduction) of vehicle miles traveled | No data yet | N/A | 5% | 20% |
| D. New Construction and Major ("Gut") Renovations | | | | |
| 7. Average HERS rating in Newton (compare to requirement of 55) | 50.4 | N/A | No goal set | No goal set |
| 8. % per year new housing units that are heat pump electric-heated | No data yet | N/A | 100% | 100% |
| 9. % per year of commercial/retail buildings heated using all-electric | No data yet | N/A | 100% | 100% |
| 10. # of Mass Save RNC* project participations (low rise 1-4 units) | No data yet | 75 | ~100 | No goal yet |
| 11. # of Mass Save RNC* project participants (renovations/additions) | No data yet | 15 | ~50 | No goal yet |
| E. Existing Residential Buildings | | | | |
| 12. # of Mass Save energy assessments per year (2019 + 2020) | 1964 | 2135 | 4000 | TBD |
| 13. # of insulation installations per year (2019 + 2020) | 580 | 640 | 800 | all homes |
| 14. # of heat pump installations per year (through HeatSmart, 2020) | 36 | 62 | 450 | all homes |
| F. Existing Commercial Buildings | | | | |
| 15. # of Mass Save energy assessments | No data yet | 175 | 225 | N/A |
| 16. # of Mass Save project implementations | No data yet | 95 | N/A | N/A |

*RNC= Residential New Construction

New Metrics – Data Sources

| Metric | Source of data |
|--|---|
| B. Clean energy | |
| 1. Default or standard level of MA Class 1 RECs under NPC | Peregrine Energy Group |
| 2. # of small-scale solar installations in Newton | Production Tracking System https://www.mass.gov/doc/smart-solar-tariff-generation-units |
| 3. # of large-scale solar installations in Newton | |
| C. Transportation | |
| 4. % (and #) of vehicles registered in Newton that are EVs | https://mor-ev.org/program-statistics and Assessing database |
| 5. # of EV charging stations available to the public in Newton | Plugshare https://www.plugshare.com/ |
| 6. # (and % reduction) of vehicle miles traveled | https://datacommon.mapc.org/browser/datasets/330 |
| D. New Construction and Major (“Gut”) Renovations | |
| 7. Average HERS rating in Newton (compare to requirement of 55) | Assessor’s Database |
| 8. % per year new housing units that are heat pump electric-heated | Special Permits and Building Permits |
| 9. % per year of commercial/retail buildings heated using all-electric | Special Permits and Building Permits |
| 10. # of Mass Save RNC* project participations (low rise 1-4 units) | Utility Quarterly Reports |
| 11. # of Mass Save RNC* project participants (renovations/additions) | Utility Quarterly Reports |
| E. Existing Residential Buildings | |
| 12. # of Mass Save energy assessments per year (2019 + 2020) | Utility Quarterly Reports |
| 13. # of insulation installations per year (2019 + 2020) | Utility Quarterly Reports |
| 14. # of heat pump installations per year (through HeatSmart, 2020) | Utility Quarterly Reports |
| F. Existing Commercial Buildings | |
| 15. # of Mass Save energy assessments | Utility Quarterly Reports |
| 16. # of Mass Save project implementations | Utility Quarterly Reports |

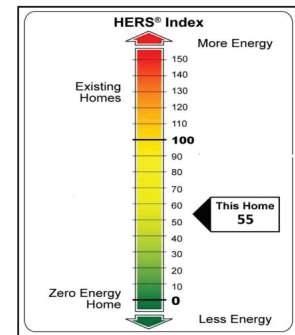


Next Steps: Priority Actions for 2021

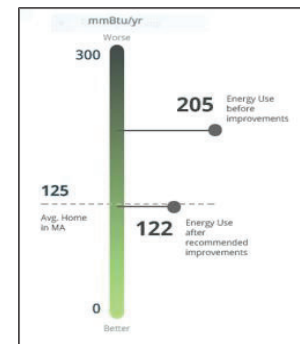
Priority Actions for 2021

► Existing Buildings (E): Heat Pumps & Insulation

- Conduct **targeted marketing** (*Energy Coach with grassroots organizations, realtors, and utilities*)
- Facilitate **training of contractors** in heat pumps and energy saving (*Energy Coach through Utilities MOU*)
- Investigate **regulatory policies regarding efficiency retrofits** (*NCCE and Sustainability*) e.g.:
 - Requiring contractors to include energy saving options in their proposals
 - Requiring (and posting) a Scorecard for home renovations above a yet-to-be-determined size
- Implement the **UMass/Mt Ida's Living Lab course** (*City Team with UMass/Mt. Ida and Jumbo Capital*)



HERS Index used by construction industry



Scorecard developed by MA Dept of Energy Resources (DOER)

Priority Actions for 2021 (continued)

► New Construction/Major Renovations (D)

- Promote **building electrification**
 - Consider regulatory means to require electrification (*State Leg. & City Council*)
 - Educate regarding electrification during design and review (*Energy Coach and Planning Dept., DRTs*)
- Promote **building efficiency**
 - Update Zoning Ordinance to increase energy efficient and electrified construction and appropriately dense village centers (*City Council*)
 - Develop a sustainability special permit criterion for residential buildings (*City Council*)
 - Streamline HERS data management using new system (*ISD*)
 - Continue to promote Passive House and electrification in large developments (*Building Standards Committee and City Council*)
 - Continue advocacy for Net Zero Stretch Code (*Mayor, City Council*)

Priority Actions for 2021 (continued)

► Green Transportation (C)

- **Install more EV chargers** in public locations (*Public Buildings and DPW*)
 - 3 at public parking lots (Adams Lot = 1, Pearl Lot = 1, Austin Lot = 1)
 - 8 at public buildings (NNHS = 4, Library = 4)
 - 14 at the municipal solar canopies
- **Advance 7.9 miles of bike lanes** (*Planning and DPW*)
 - Beacon Street, Parker Street
 - Protected: West Newton Square, Needham Street, Hammond Pond Parkway, Washington Street, Carriageway
- Develop a plan to **promote adoption of EVs** (*grassroots organizations*)
- **Purchase 3 PHEV SUVs & 1 PHEV sedan** for City use (*DPW*)

Priority Actions for 2021 (continued)

► Administrative (A)

- Activate **Implementation Strategy Group**, take advantage of talent
- Initiate **Energy Coach communications**, e.g., e-mails, DRTs (*Energy Coach*)
- **Advocate** for state climate/energy legislation and building codes (*Sust.*)
- Strengthen City **messaging**, e.g., “Climate in Everything” (*Sustainability*)
- Develop a plan to include **equity** in the City’s energy programs (*Sust.*)
- Update **GHG inventory** and analysis (*NCCE*)
- Work with Utilities to develop **data sharing** protocols (*Sustainability*)
- Develop an integrated system for effective data gathering and **metrics tracking** (*Sustainability*)

Priority Actions for 2021 (continued)

► Clean Energy (B)

- Celebrate **City's electricity supply** increasing its share of "100% Massachusetts Class 1 Renewables" from 5% to 10% (*everyone*)
- Discuss **City's next electricity contract** and the most effective use of City funds (*Mayor's Office, Sustainability*)
- Finish **Solar Phase 3** (*Sustainability, Public Buildings*)
- Oversee **Newton Power Choice 2nd contract** at 80% green energy default (*Sustainability*)



**Use Less, Green the Rest:
Accomplishments,
Challenges, and
Opportunities**

Thank you, City Council.

60-20

We look forward to working closely with you to achieve the goals of the CAP!



**CITY OF NEWTON
LAW DEPARTMENT MEMORANDUM**

DATE: February 11, 2021

TO: Allison Leary, Chair of Public Facilities Committee
All Members, Public Facilities Committee

FROM: Andrew S. Lee, Assistant City Solicitor

RE: Home Rule Petition

The Chair of the Public Facilities Committee has requested that the law department explain the requirements and procedural steps for the City of Newton to seek special legislation.

1. The Home Rule Amendment

The Home Rule Amendment to the Massachusetts Constitution, adopted in 1966, affirmed the right of municipalities to self-government and to the exercise of powers not inconsistent with Massachusetts law. M.G.L. c. 43B. Under the Home Rule Amendment “any city or town may, by the adoption, amendment, or repeal of local ordinances or by-laws, exercise any power or function which the General Court has power to confer upon it, which is not inconsistent with the constitution or laws enacted by the general court in conformity with the powers reserved to the General Court...” Bloom v. City of Worcester, 363 Mass. 136, 145 (1973).

The clear limitation on a municipality’s authority under the Home Rule Amendment is that any local legislation must not be inconsistent with state law. A local ordinance is beyond the scope of a municipality’s general Home Rule authority if it is either: 1. facially inconsistent with state law; or 2. The ordinance frustrates the purpose of state legislation that was intended to preempt local regulation of the subject matter.

Section 8 of the Home Rule Amendment authorizes a municipality to petition the General Court for special legislation, known as a Home Rule Petition. A Home Rule Petition may seek specific authority for a municipality to enact local legislation that would otherwise be beyond the municipality’s general Home Rule authority. If the special legislation is approved, the resulting local action or ordinance is safe guarded against attacks to the enacting municipality’s legal authority.

2. Home Rule Petition Process

Local Approval – Section 8(1) of the Home Rule Amendment requires that a Home Rule Petition must be approved by the City Council. In Newton, the approval to file the petition with the General Court requires a simple majority vote of all City Councilors present and voting, provided a quorum is present. The petition must also be filed with the approval of the Mayor. The Mayor's decision to not approve the filing of the petition cannot be overridden by local veto procedures.

Form of the Home Rule Petition – There is no particular form of a Home Rule Petition prescribed in Section 8(1). Typically, the vote of the City Council authorizing the Mayor to petition the General Court is accompanied by a draft bill. The draft bill often identifies the state law that either requires or is inconsistent with the proposed special legislation and sets forth the requested local authority. The law department assists the City Council or the Mayor in drafting the petition. Although not required, a municipality may add a condition on the draft bill that the special legislation, once approved by the General Court, requires acceptance by the municipality's voters at an election. Whether to add such a condition is a policy decision and is recommended for controversial proposals.

Filing the Home Rule Petition – Once the City Council and Mayor approve the submission of the Home Rule Petition, a copy of the Petition certified by the City Clerk will be sent to a representative of Newton's local legislative delegation with a request that it be filed on the City's behalf. The General Court has its term to approve the special legislation.

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**¹:

1. Which is more expensive to purchase and install: a gas-fueled² 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.

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

² 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.³ 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)⁴.
- 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 costs⁵.
- 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

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

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

⁵ “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 ducting⁶; 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)⁷, 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)⁸ 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.⁹

⁶ 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).

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

⁸ 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.

⁹ 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.¹⁰
- 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.

¹⁰ 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.¹¹ 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

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

¹¹ 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.

| | | | | | | |
|--|---|---|---|-----------------|---------------------------------------|---|
| NMR report, tankless water heater | \$11,724 | \$12,478 | Heat pump system system \$754 more expensive | \$1,511 | \$2,007 | Heat pump system, \$496 more expensive |
| Koo/Newton, 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 |
| Bill's estimates, 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

| | Gas system | Heat pump system | |
|---|-------------------|---------------------------------|--|
| RMI REPORT COMPARISON OF 15-YEAR NET PRESENT COSTS OF WATER HEATING AND SPACE CONDITIONING FOR PROVIDENCE RI (THOUSAND \$) | \$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 |
|---|--|---|--|-------------------------------|-------------------------------------|--|
| Gray/Brookline (no separate water heater costs provided) | | | | | | |
| Bill's estimates, Rheem 50-gal tank style gas (no annual cost estimates provided) | \$1700 | \$2,700 | Heat pump \$1,000 more expensive | Not provided | Not provided | |
| NMR report (tankless gas) | \$2,512 ¹² | \$1,680 | Gas heater \$832 more expensive | \$127 | \$146 | Heat pump \$19 more expensive |
| Koo/Newton (tankless gas) | \$2,900 ¹⁰ | \$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) |
| Consumer Reports (tankless gas) | \$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 |
| Consumer Reports (tank style gas 50-gal) | \$600 plus \$700 = \$1,300 | \$1,200 for equipment but doesn't specify | Difficult to ascertain, because installation | \$245 | \$240 | Gas \$5 more expensive |

¹² 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 | | | |
|--|--|------------------------|----------------------|--|--|--|

Below are links and information regarding item #294-20.

1. Brookline bylaw on electrification:
<https://www.brooklinema.gov/DocumentCenter/View/20839/ARTICLE-21-as-voted-per-Town->

Note that the bylaw itself is at pp. 12-14, but the discussion that precedes the bylaw is also informative. Also note that the bylaw excludes cooking.

2. Brookline Home Rule
petition: <https://www.brooklinema.gov/DocumentCenter/View/22348/Home-Rule-Petition-WA-v41>
3. Cost comparison: attached to the 02/17/21 Public Facilities Agenda
4. Governor's Interim Clean Energy and Climate Plan for 2030, www.mass.gov/doc/interim-clean-energy-and-climate-plan-for-2030-december-30-2020/download, pp. 27-34
5. A net-zero stretch code (included in the Climate Bill that the Governor vetoed and that has now been re-filed), although representing important progress in reducing GHG emissions from buildings, would not eliminate the need for an electrification requirement. This is because the devil is in the details: at one end of the spectrum, a net-zero stretch code could be written so as to explicitly require electrification; at the other end, a net-zero code could allow low-value offsets to compensate for significant on-site deficits. It is highly unlikely that a net-zero code will require electrification, and likely that it will include a good deal of flexibility.