# Public Facilities Committee Report

## City of Newton
## In City Council

### Wednesday, June 17, 2020

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

City Staff Present: Chief Operating Officer Jonathan Yeo, Commissioner of Public Works Jim McGonagle, and Chief of Staff for the Department of Public Works Shawna Sullivan

**#276-20** **Appointment of John Lewis to the Solid Waste Commission**
HER HONOR THE MAYOR appointing JOHN LEWIS, 56 Lawmarissa Road, Newton, as a member of the SOLID WASTE COMMISSION for a term to expire May 31, 2021. (60 days 08/07/2020)
**Action:** **Public Facilities Approved 7-0 (Councilor Norton not voting)**

**Note:** Committee members invited John Lewis to discuss his appointment to the Solid Waste Commission. Mr. Lewis noted that he has been living in Newton for eleven years. Additionally, Mr. Lewis explained that he is interested in the work the City has done with composting and would like to be a part of this process. Mr. Lewis has been intrigued by the work Newton has been doing with Black Earth and composting. Mr. Lewis would like to expand this program to restaurants as well as in residential areas.

Committee members asked the following questions:

Q: Regarding composting and organic waste, what else could the City be doing?

A: Mr. Lewis explained resident 1,775 Newton residents have been using the green bins from Black Earth. Restaurants could also find these bins helpful when disposing of their food waste. Additionally, Mr. Lewis explained that he has spoken with Waneta Trabert, Director of Environmental Affairs about having a broader community event to bring together Black Earth and restaurant owners. Mr. Lewis noted that there should be more accountability for the producers of recycling at the State level.

Q: Since China is no longer receiving recyclables where do recycle goods go?

A: Mr. Lewis explained that due to this more has be incinerated and the fees for the City's have increased. Municipalities can create policies to limit what that they use so there are less items that can't be recycled.

The Committee thanked Mr. Lewis for his willingness to serve.

Councilor Kelley motioned to approve which passed 7-0, Councilor Norton not voting.

## Referred to Public Facilities and Finance Committees

**#277-20** **Discussion on the use of parking kiosks in municipal lots**
COMMISSIONER OF PUBLIC WORKS requesting a discussion on the use of parking payment kiosks in municipal lots as required by condition 1 of Council Order #446-19.
**Finance Held 6-0 on 06/15/2020**
**Action:** **Public Facilities Held 8-0**

**Note:** Commissioner of Public Works, Jim Mcgonagle presented the request to have a discussion on the use of parking payment kiosks in municipal lots. Commissioner Mcgonagle explained that in December 2019 the department requested funding for the replacement of all parking meters throughout the City. At the end of that discussion, there was concern about the use of kiosk throughout the City. The Commissioner committed to coming back to the Council before they spend anymore money on kiosks. The department is now at the point where they need to purchase kiosks.

Currently, the department is in the processes of replacing 1100 parking meters throughout the City. There is about 750-800 parking meters that are in lots. Commissioner Mcgonagle explained that currently the City does have kiosks in the lots that were purchased prior to requesting the funding. The additionally kiosks would be installed in five lots and would replace 400 parking meters. The cost savings, the locations of the lots that have kiosks and the location of the lots that the department would like to have kiosks in is attached. Commissioner Mcgonagle noted that there is a significant cost savings with the use of the kiosks instead of parking meters. The City will save approximately $350,000. Additionally, Commissioner Mcgonagle noted that he has spoken to the Commissioner of Public Works for the Town of Brookline and their issue was that people had to go to kiosks, print the receipt and place the receipt in your vehicle. Newton's kiosks will work electronically and will not run on the receipt system.

The kiosks also encourage the use of the Passport app, which anyone can use at any spot throughout the City. There will be a sign in front of each parking space indicating a number that can be used with the Passport app and the kiosks. Additionally, the kiosks will allow users to also pay with cash or credit card. The new meters also except credit cards. Commissioner Mcgonagle explained that they will locate the kiosks near the pedestrian crosswalks or near sidewalks, so it forces people to go to the kiosk and use the crosswalk. There is also a large saving in maintenance. The department has been using kiosks since 2017 and the program has been successful.

Committee Members asked the following questions:

Q: Which type of kiosk is the City using?

A: Commissioner Mcgonagle explained that the kiosks are ADA accessible and have a touch screen. These kiosks accept cash and credit cards. If the user is using the Passport app then they

would not need to go to the kiosk. The user will not need to put a receipt in their window if they are using the kiosk.

Q: If a parking space has a 2 hour limit, does the Passport app allow you to pay for additional time?

A: Commissioner Mcgonagle explained that with Passport that is not possible.

Committee Members made the following comments:

The fact that someone can pay for the parking space from their car using Passport is a good system.

Not being able to use change at a parking meter for 15 minute parking can be an inconvenience. If someone must walk to a parking meter they may not pay for parking.

Councilor Danberg motioned to hold item #277-20 which passed unanimously.

**#61-20** **Discussion to limit or prohibit the installation of fossil fuel infrastructure**
COUNCILORS CROSSLEY, KELLEY, LEARY, NORTON, ALBRIGHT, GREENBERG, AUCHINCLOSS, MARKIEWICZ, NOEL, DANBERG, KALIS, DOWNS & HUMPHREY requesting a discussion with the Sustainability Team to create an ordinance to limit or prohibit the installation of fossil fuel infrastructure in new construction and substantially renovated buildings, as well as to clarify the Council's authority to prohibit the extension of gas.
**Public Facilities Held 8-0 on 04/22/2020**
**Public Facilities Held 8-0 on 05/13/2020**
**Action:** **Public Facilities Held 6-0 (Councilors Norton and Gentile not voting)**

**Note:** Chair Leary presented the request to have a discussion with the Sustainability Team to create an ordinance to limit or prohibit the installation of fossil fuel infrastructure in new construction and substantially renovated buildings, as well as to clarify the Council's authority to prohibit the extension of gas.

**Jeremy Koo's Presentation**

Jeremy Koo, from CADMUS, presented his attached presentation on the technologies and costs in residential new construction regarding appliances. Mr. Koo explained that he will be focusing on the appliances for cooking and gas dryers. This presentation is just to provide information to the Committee and not give an opinion on the matter at hand.

Mr. Koo first explained that stoves/ovens are the appliances that residents interact with the most that involve gas. In new construction gas stoves hold approximately 50% of the market statewide. There is now research about the impact a gas stove can have on indoor air qualities and in addition to the greenhouse gas impacts.

Mr. Koo compared electric resistance and electric induction stoves in the attached presentation. Additionally, Mr. Koo explained that gas dryers do not hold a majority of the market in new construction. Gas dryers do provide higher heat than electric dryers that can reduce drying times. Mr. Koo explained electric and heat pump dryers in the attached presentation.

Mr. Koo provided a cost comparison on gas, electric and induction stoves and dryers. The gas stove/oven and gas dryer's lifetime costs are lower because of the high cost of electricity in Massachusetts. Mr. Koo also provided incremental cost scenarios. This does not account for the ability to use lower cost electricity and does not account for the cost of eliminating the need for a gas connection to a home.

**Melanie Renaud's Presentation**

Melanie Renaud, from Mothers Out Front, presented her experience with induction cooking. Ms. Renaud explained that induction has been around for many years and that commercial kitchens have been using induction cooktops for decades. Additionally, Ms. Renaud explained that under the burners on the cook-top there is tightly coiled copper that the current goes through which creates an electro-magnetic field. Then when a pan is placed, that has an iron bottom, on the cook top that current engages the iron and creates an eddy current which gives off heat. The induction stove-top is much more efficient than a gas and electric cook top.

Ms. Renaud explained that each one of the burners has twenty different settings, which can help with controlling the amount of heat that is being used. The induction stove top is also easy to clean. The glass stove top does take on some residual heat from the pan but most of the heat is localized to the pan.

There is also an option to buy smaller portable models that have one or two burners. A single burner can be bought for as low as $49. The induction cook-tops do start at about $1,000 and increase from there. Ms. Renaud explained that her four burner model uses 40 amps of electricity. A user does need cookware that has iron on the bottom of the pan.

Ms. Renaud did note that if you have a pacemaker than you should not be within two feet of the burner when it is on.

Committee Members asked the following questions:

Q: What is the maintenance like for the induction cooktop?

A: Ms. Renaud explained that other than cleaning it there is not much maintenance involved. The top is glass so the user would need to be careful with that.

Q: Is there a concern with pregnant women using the stove?

A: Ms. Renaud explained she does not believe that there is a concern with pregnant women using the stove. This is the same electricity that is used around anyone's home.

Q: Has the cookware being heavy ever been a compliant? Are their lighter versions of the cookware?

A: Ms. Renaud explained that her own cookware is not heavier than other cookware unless they are solid cast iron. The cookware she has bought are only iron on the bottom.

Committee Members made the following comments:

The Committee should further investigate pacemakers and using an induction stove because it does interfere with the electric-magnetic field.

There is a concern that someone would have to buy all new cookware to cook with the induction cooktop. The cookware also can be heavier than cookware using on an electric or gas stove.

**Hank Keating's Presentation**

Hank Keating, a board member of Passive House Massachusetts presented his attached presentation about the operating costs of all electric new construction.

Mr. Keating discussed his affordable housing project in Taunton, Massachusetts which he completed in spring 2014. The aspects of this project are listed in the attached presentation. These homes are all electric and were designed relative to the Passive House that Mr. Keating currently lives in.

Mr. Keating noted the cost per townhome for all heat, hot water, plug loads and cooling in the attached presentation. Plug loads is everything that is not an appliance that is a heating or cooling system, which vary from family to family. Mr. Keating explained that for the heating metrics his townhomes are 85% less energy devoted to heating then a comparable LEED Gold townhome.

The construction budget was similar to the original estimate. The budgets are closely analyzed by all of the funding agencies. Mr. Keating explained that they did need to value engineer some issues to be able to stay within budget. A chart comparing heating energy benchmarks is attached.

Mr. Keating explained that the cost per townhome for all heat, hot water and plug loads can be between $501 and $1,860 a year.

Committee Members asked the following questions:

Q: Is the budget the same to construct a non-passive house as it is to construct a passive house?

A: Mr. Keating explained that the budget would be the same because they value engineered some of the issues. This process can be repeated by other developers.

Q: What causes the heat cost to be so low?

A: Mr. Keating explained that this can be contributed to the basic passive house metrics that include meeting airtight requirements and insulation values. The homes also have a heat recovery ventilation system which provides constant fresh air to the units.

Committee Members made the following comments:

The Committee seems to be in support of this concept. The question seems to be whether or not the committee would require cooking in the ordinance. Additionally, the Committee needs to see what the costs would be for the resident to have an all-electric home. The Council needs to be able to build a case to bring to the residents.

Regarding the previous comment, Beverly Craig from the Massachusetts Clean Energy Center explained that there is no gas infrastructure to new construction which means that an all-electric home can save the resident thousands of dollars because they do not need to extend the gas infrastructure. Additionally, the cost of an induction stove-top can be similar to the cost of a gas stove.

The Brookline by-law is being used as template to decide what information needs to be presented to the Committee at each meeting. The Committee will need to decide what parts of the Brookline by-laws they will adopt into the Newton ordinance. This can include whether or not the Committee will include an electric requirement for domestic hot-water in multifamily homes. That is an issue that the Committee still needs to investigate. The Sustainability Directors has been working with experts to further analysis some of the cost information the Committee has been given.

There should be a new docket item that focuses on the drive towards electrification instead of discussing a ban on gas infrastructure.

It is important to be able to make compromises in these kinds of projects to be able to stay on budget and have a strong building envelope.

The cost of building a stretch code compliant building envelope versus a passive house certified building envelope would not be the same cost without making compromises while building. More funds would need to be spent to have a higher performing building envelope which means decisions have to be made in other areas of the budget.

Regarding the previous comment, Mr. Keating explained that this would be correct based on today's prices. Additionally, Mr. Keating explained that he has been working with members of the MassCEC to prove that someone will be able to make a passive house development with an increase to their budget of only 1% to 3%. The systems are less familiar which can increase the cost of the overall project. Once the systems become more familiar, they will be less expensive. The budget is a balancing game with the overall values of the project.

The Committee needs to hear from the opposing views on this issue. This can include a conversation with the utilities. If a resident wants to build an all-electric home that is a positive but there is a question if the Committee should be limiting the resident's choices when building a new home.

The Chair noted that the Committee will hear from experts with opposing views.

Jonathan Kantar, member of the Newton Citizen's Commission on Energy explained that the cost savings of not having to extend gas infrastructure is significant in new construction. This would make the increase cost of an induction stovetop minor.

Nick Falkoff, Auburndale Builders explained his company builds all electric buildings and was asked to speak at Brookline about the same matter. There is no cost-effective way to power electric buildings during a prolonged power outage. Mr. Falkoff explained that there is an option to allow residents to have a gas back-up generator with the plan to move to battery in the future. There is a concern with generating hot-water when there is a prolonged power outage when there is not a gas back-up generator.

**Craig Foley's Presentation**

Craig Foley, a real estate agent, explained that he is a part of Rethink 39 which is committed to lowering the 39% of the U.S. energy consumed by the built environment. Mr. Foley explained that there are realtors and builders that are not understanding that there is a transition happening to high performance homes. The main issue that has been discussed is affordability for the resident. Mr. Foley explained that he is in the process of bringing six new all-electric homes to the Mission Hill section of Boston. Those homes will also have solar panels on the roof. With the Massachusetts state incentives for 10 years those homeowners will not be paying anything for utility costs and will be paid by the utility company because of their commitment to the renewable portfolio standard. They could be paid $400-$500 annually for 10 years. Massachusetts is at the leading edge of the best building codes that are out there. There are developers that are building beyond code in this state as well. There is an opportunity to receive cost savings, have better air quality in their homes and the opportunity to positively contribute to the climate.

Mr. Foley's case study based on Jonathan Kantar's development is attached to this report.

Committee Members asked the following question:

Q: In Newton, how many floors up is there gravity feed and what would happen to all-electric buildings, on the higher levels, if there is an extended power outage?

A: Mr. Falkoff explained that he does not deal with high-rise buildings. There has been discussion on designing all -electric buildings that can survive storms and be comfortable even during power outages. Mr. Falkoff explained that there are other experts that would be better suited to answer this question.

Committee Members made the following comments:

There is a concern with trying to tell residents what decision they must make to be able to provide utilities within their home. Additionally, the Committee may not want to limit residents' option to just all-electric homes.

The Committee is not proposing a ban on natural gas and is not trying to limit how electricity is produced. The proposal is regarding new construction or complete gut renovations.

**Ellen Katz's Presentation**

Ellen Katz, a resident of Newton, explained her experience of building a fully electric historic home. Ms. Katz's presentation is on file at the City Clerk's Office.

Ms. Katz explained that her home was gut renovated in 2016 and the property was originally built in 1919. The design goals for the house included no direct use of fossil fuels. National Grid was able to disconnect the home's gas line. Additionally, Ms. Katz explained that she wanted to be able to balance historic preservation standards with needs of modern living and sustainability. The air quality of the home was also of a high priority. Ms. Katz explained that the roof was adapted for solar panels.

The energy improvements included converting systems from gas to electric and insulating the house. Ms. Katz noted that as an historic home they were exempt from energy codes, so all the improvements were made voluntarily. The previous owner had installed mini split heat pumps for air conditioning. The mini splits were unappealing due to the lower ceilings in the home and they produced unpleasant air flow.

Ms. Katz explained that they decided to use a ducted heat pump system instead. This system is designed to continuously circulate air and is nearly silent. The filters are able to collect dust to provide better air quality in the home. This system was also designed by an engineering firm not by the HVAC contractor. The system also uses no fossil fuel because of Newton Power Choice. The heat pump does cover the entire home and there is one hole through the concrete

foundation where refrigerant enters and goes to three in-door units for three zones. There are at least two vents in each room of the house.

Ms. Katz explained that an insulated house also needs ventilation and the heat pump system circulates air that is already in the home. Most homes that are similar to Ms. Katz also have an energy recovery ventilator (ERV). This will draw stale air and replaces it with fresh and filtered air from outside the home. The ERV is also able to recover some thermal energy that can significantly reduce the heat pumps load.

Ms. Katz explained that about 40% of their electric load is for heating and cooling, 25% is for hot water and 35% is everything else. They decided to buy a commercial grade 100-gallon hot water heater in 2016 but there are more options on the market now. For cooking they do use an induction range but again there are more choices in the market now then there were in 2016. Ms. Katz explained that they use LED lights for lighting and an electric washer/dryer. 70% of the home's electricity is produced by the solar panels on the roof. The remaining 30% is renewable through Newton Power Choice. Ms. Katz noted that their total electric bill for the year is approximately $800 that includes heating, cooling, and hot water. Ms. Katz explained that they have no electric bill from April to November. In Ms. Katz's case the financial breakeven for the solar system is approximately four years.

Ms. Katz did note that they made improvements to insulation and infiltration.

Committee Members asked the following question:

Q: Are there other residents that have made significant energy improvements to an older home?

A: Ms. Katz explained that she could come back to the Committee with that information. Mr. Falkoff explained that there are ways to improve a home's energy consumption without going to any great lengths.

**Dante Capasso's Presentation**

Dante Capasso, Capasso Reality, explained that they build, own, and manage buildings and properties throughout the City. In their new 24 unit development in Newton they have decided to use electric air source heat pumps. This development was permitted in December 2019 but there has been delays due to Covid-19.

Mr. Capasso explained that the technology updates to air source heat pumps was a factor on deciding to use them for the 24 unit development. The air source heat pumps that have been chosen are guaranteed to function fully down to -25 degrees. Mr. Capasso explained that the building codes are also becoming stricter and there have been advancements in insulation. Cost savings are also a factor when deciding on air source heat pumps. This system does allow them the ability to save costs up front and in the long-term. Mr. Capasso explained that they will be

using ductless units that can save them money during construction and less duct work means that the units can have higher ceilings. The tenant will be paying their own electric bill, so they only have to pay for what they use, which also involves them in the sustainability conversation. Mr. Capasso explained that heat pumps are a proven technology, but they are also relatively new.

Mr. Capasso noted that they are installing several electric vehicle charging stations and have committed to burying conduit and making the building upgradable to add more charging stations in the future.

Committee Members asked the following questions:

Q: Will these units be all-electric?

A: Mr. Capasso explained that this is not an all-electric building. Natural gas will still be used for hot water. Additionally, Mr. Capasso explained that there are not many large-scale hot water heaters on the market. The ones that are on the market ship under 100 units a year, which can cause a problem when trying to get parts for the unit. For cooking they are using induction.

The Committee thanked all the panelists that participated in the meeting.

Councilor Kelley motioned to hold which passed 6-0, Councilors Norton and Gentile not voting.

The Committee discussed a new docket item to replace item #61-20 that will read as follows:

> **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 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.

The Committee adjourned at 9:38 p.m.

**Respectfully Submitted,**

**Alison M. Leary, Chair**

City of Newton

# DEPARTMENT OF PUBLIC WORKS

Transportation Division
110 Crafts Street
Newton, MA 02460

Ruthanne Fuller
Mayor

To: James McGonagle, Commissioner of Public Works

From: Jason S. Sobel, P.E., PTOE, Director of Transportation Operations

Subject: Municipal Parking Lots – Parking Kiosk cost comparison

Date: June 16, 2020

At the December 4, 2019 Public Facilities Committee meeting, several City Councilors raised questions about the planned installation of multi-space parking meters (aka parking kiosks) at the remaining metered municipal parking lots.

Parking kiosks are currently installed in the following five municipal parking lots:

- Lexington Street lot
- Pleasant Street lot
- Pelham Street lot
- Cypress Street lot
- Austin Street lot

The Department of Public Works (DPW) has plans to replace the old individual parking meters with parking kiosks in the following five municipal parking lots:

- Langley Street lot
- Hartford Street lot
- Richardson Street lot
- Cherry Street lot
- Pearl Street lot

The only metered municipal parking lot in which individual parking meters would remain is the Waltham Street lot, due to its small size and lack of a good location to physically place a parking kiosk.

DPW prefers replacing individual parking meters with parking kiosks, primarily for more efficient regular maintenance, and more efficient collection. Parking kiosks result in far less physical equipment installed, and significantly reduces on-going maintenance costs and labor effort to keep the parking infrastructure in a state of good repair. From a parking meter collection perspective, it is also far more efficient for the parking meter crew to collect coin payments at a central location, rather than collecting coin payments from individual parking meters.

Lastly, the purchase and installation of individual parking meters is significantly more than the purchase and installation of parking kiosks. If new individual parking meters are installed at the five lo municipal parking lots where parking kiosks are currently planned, the additional costs would be approximately $350,000. Similarly, if individual parking meters were installed at the municipal parking lots that already have kiosks, the additional cost would be approximately $300,000 (note that this excludes the Austin Street lot. Due to the underground private parking and the concrete slab deck, individual parking meters are not possible at the Austin Street lot.). The costs for parking kiosks in the remaining municipal parking lots were included in the budget in $1.5 million approved by City Council in December 2019 (Item #446-19). However, if individual parking meters are desired, the additional costs noted here were not previously included in the estimated budget.

# City of Newton Municipal Parking lots

Multi-Space Parking Meter (Kiosk) vs. Individual Parking Meters - Cost Comparison

June 16, 2020

| Municipal Parking lots with individual parking meters, proposed to be replaced with parking kiosks | Number of metered parking spaces | Number of parking kiosks needed | Parking kiosk unit cost | Cost for parking kiosk installation | Individual Parking meter cost | Cost for individual parking meter installation | Additional cost for individual parking meters |
|---|---|---|---|---|---|---|---|
| Pearl Street lot | 69 | 2 | $10,000 | $20,000 | $1,200 | $82,800 | $62,800 |
| Langley Street lot | 148 | 6 | $10,000 | $60,000 | $1,200 | $177,600 | $117,600 |
| Hartford Street lot | 55 | 1 | $10,000 | $10,000 | $1,200 | $66,000 | $56,000 |
| Richardson Street lot | 59 | 2 | $10,000 | $20,000 | $1,200 | $70,800 | $50,800 |
| Cherry Street lot | 66 | 2 | $10,000 | $20,000 | $1,200 | $79,200 | $59,200 |
| Total | 397 | 13 | | $130,000 | | $476,400 | $346,400 |

277-20

CADMUS

BUILDING ELECTRIFICATION

# Technologies and Costs in Residential New Construction: Appliances

Newton Public Facilities Committee

June 17, 2020

## Gas appliance alternatives

## Cost comparisons

***Disclaimer:*** *This presentation has been developed to provide best available information to the City of Newton and its relevant committees and is not intended for advocating for or against any ordinance under consideration. Cadmus does not take any position on the issue presently being considered by the City.*

# Stoves/Ovens

### Gas

- 50+% of residential market statewide, expected to be majority of Newton new construction market
- Customers prefer faster heating with better control and precision than electric resistance
- Indoor air quality impacts

*Approx. 25% of MA homes use cooktops separate from ovens*

**Sources:** MA Residential Baseline Study (2018); Rocky Mountain Institute, Physicians for Social Responsibility, Mothers Out Front, and Sierra Club (2020). Health Effects from Gas Stove Pollution





# Stoves/Ovens

### Electric Resistance

- <50% of residential market statewide, not expected in new construction in Newton (unless area cannot get gas)
- Modern stoves are easier to clean and can provide comparable heat
- More uneven heat distribution, can be slower to heat up

### Electric Induction

- Low market share with rapid growth and decreasing costs
- More efficient due to heating pan directly (instead of burner and pan)
- Faster and more precise than gas/electric resistance
- Easy to clean and safer
- Requires compatible cookware

**Source:** CJ Sorg (cc-by-sa-2.0), MA Residential Baseline Study (2018)

# Dryers

### Gas

- Only approx. 24% of homes with dryers use gas dryers
- Higher heat leads to reduced drying times
- Reduced static cling and wrinkling
- Venting required

**Source:** MA Residential Baseline Study (2018)

CADMUS

# Dryers

### Electric

- Approx. 75% of homes use electric dryers, unclear about proportion in Newton new construction
- Lower cost and easy to install
- Longer drying time than gas
- More efficient ventless options available

### Heat Pump

- Very low penetration in MA (more common in Europe)
- Lower temperature leads to longer drying times, though also gentler on clothes
- Higher efficiency than standard dryers

**Source:** Images from Home Depot; MA Residential Baseline Study (2018)

CADMUS

# Cost Comparison

*Installed costs vary significantly by manufacturer, features, and more. Operating costs vary by user behavior.*

| Equipment | Installed Cost | Lifetime Cost |
|---|---|---|
| Gas Stove/Oven | $820 | $1,180 |
| Electric Stove/Oven | $920 | $2,040 |
| Induction Stove/Electric Oven | $1,900 | $2,950 |

*Installed Costs derived from National Residential Efficiency Measures Database (NREL, 2018). Operating costs modeled in BEOpt for a single-family home using National Grid and Eversource residential rates. 13 year lifetime assumed.*



# Cost Comparison

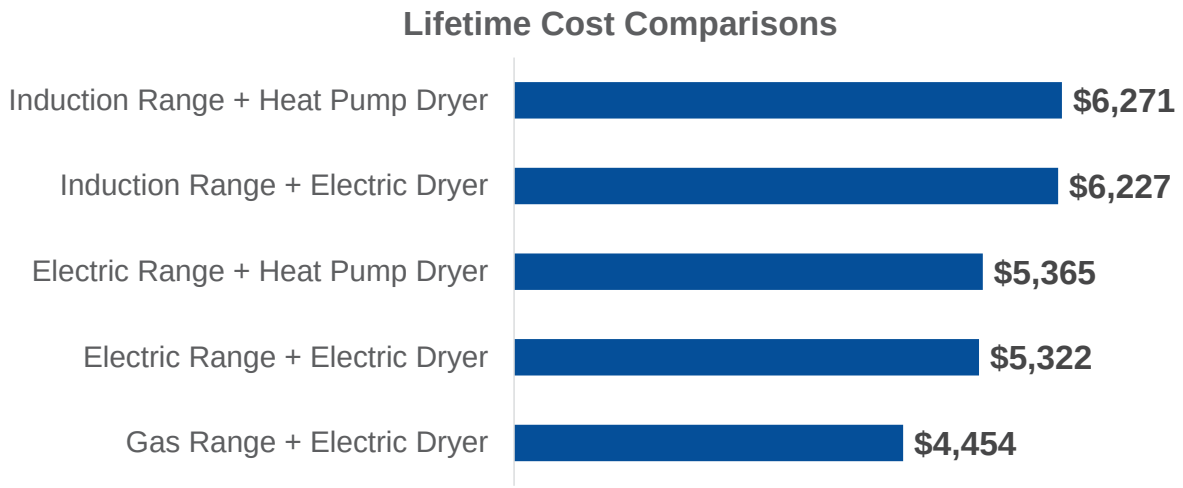
*Installed costs vary significantly by manufacturer, features, and more. Operating costs vary by user behavior.*

| Equipment | Installed Cost | Lifetime Cost* |
|---|---|---|
| Gas Dryer | $1,000 | $1,450 |
| Electric Dryer | $760 | $3,280 |
| Heat Pump Dryer | $1,520 | $3,320 |

*Installed Costs derived from National Residential Efficiency Measures Database (NREL, 2018). Operating costs modeled in BEOpt for a single-family home using National Grid and Eversource residential rates. 13 year lifetime assumed.*
**Operating costs included in lifetime cost only consider (for gas dryer) gas usage and (for electric dryers) incremental electricity consumption over gas dryer.*

# Incremental Cost Scenarios

*Assuming typical new home uses gas stove + electric dryer*




- Use of lower cost electricity (e.g. PV) will reduce or eliminate operating cost impacts
- Does not account for cost of eliminating need for gas connection to home





CADMUS

# Thank You / Q&A

**Jeremy Koo**
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# Operating Costs of All Electric New Construction

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PASSIVEhouse MASSACHUSETTS

Board Member
Chair, Public Policy Committee

1

# Affordable Housing New Construction Townhomes Taunton, MA

- 106 Townhouse Units
- 18 buildings
- 2-9 Units in Each Building
- Completed Spring 2014
- All Electric
- Air Source Heat Pump Mini-Splits for Heating and Cooling
- Electric Hot Water
- Near Passive House envelope
- Mostly 2 and 3 Bedroom Townhomes
- 1300 to 1500 sq. ft.
- Energy Recovery Ventilator in each unit

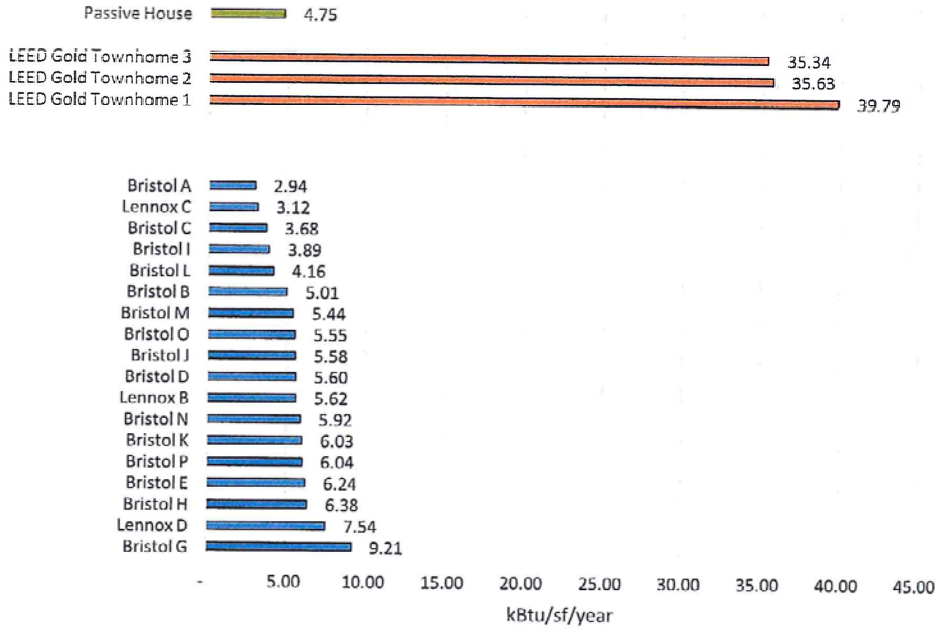
Bristol Commons/Lenox Green

2

- 5 Years of Energy Performance Monitoring
- Cost per townhome for all heat, hot water, and plug loads
  - ✓ Low of $501 per year ($43 per month)
  - ✓ High of $1,860 per year ($155 per month)
- Energy Use Per Square foot much better than LEED Gold similar townhomes
- Construction cost per sq. ft. brought in at original approved budget

3

FIGURE 5. COMPARING HEATING ENERGY BENCHMARKS




4

# High-Efficiency Homes Command a **22.7% Price Per Square Foot** Premium Compared to Code-Built Homes in Boston.

## **CASE STUDY //** 152-158 Highland Street, Boston, MA

The E+ Solutions LLC Highland St. project was an ideal opportunity to run a market comparison between two new construction home projects: one focused on the latest advancements high-performance building science versus a new construction project built to code. Two projects located within a quarter of a mile from each other were under construction at the same time. The E+ Solutions Highland St. project is four-units of LEED platinum certified housing developed with cutting-edge building science putting these four homes at the leading edge of sustainable, high-performance home technology. Nearby is the Marcella St. project, a seven-unit development built to fulfill the rigorous Massachusetts Stretch Code, a code voluntarily adopted by over 200 of the commonwealth's 351 communities and exceeds the state building code. Would a high-performance project built significantly above code like the E+ Solutions project be able to command a price premium versus new construction that meets the most rigorous building code in the country? Would buyers, agents, bank appraisers and underwriters recognize the value of a high-performance development over a built-to-code project in the same neighborhood?

### The Market

The E+ Solutions project was on the market during the fall of 2017 and all four units sold by early 2018. At the same time, the Marcella St development was directly competing for buyers in the Boston real estate market. Demand for homes in the area had been robust but had unexpectedly slowed by fall 2017. Many real estate professionals believed that the slowdown was due to the buyer fatigue of multiple competing offers in very active spring 2017 market. As of the writing of this analysis (March 2018), only two of the seven Marcella St. units have been sold and the project does not currently have any active listings in the local multiple listing service (MLS).

E+ Solutions Highland St. Project

Code Built Marcella St. Project

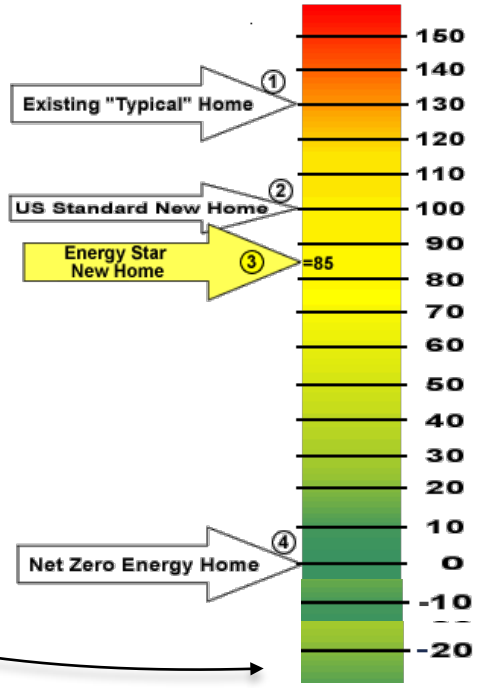
## Project Description E+ Solutions Condominiums:

**E+ Solutions LLC Highland St. Project** presents an opportunity for homeowners to enter 21st century living in a highly sustainable, ultra energy efficient, urban infill home that is healthy, handsome, and convenient. Located in the sought-after Fort Hill neighborhood of Roxbury, the project consists of two duplex homes with two condominiums in each building for a total of four units designed as a traditional Georgian Colonial and its companion Carriage House.

These new homes provide superior comfort and indoor air quality, energy efficiency, and modern living near work, play, recreation, and community. The homes include:

- **Super-insulated building enclosure**
- **Advanced mechanicals for heating, cooling, and domestic hot water**
- **Energy positive - beyond zero energy, these homes produce more energy than they use**
- **Energy tracking and Smart-Home options**
- **Durable & healthy – energy recovery ventilation delivering superior indoor air quality**
- **Water conservation**
- **LEED Platinum and Energy Star approved**
- **Urban infill project near public transportation**

In short, these homes are at the leading edge of sustainable development in the United States. The final HERS Index Scores for the homes are, literally, off the charts. The four condos had HERS scores ranging from -14 to -22.




## What does High Performance Mean to Homebuyers?

**What does high performance mean for homebuyers and do they value it?** Buildings are changing; advancements in the science of building performance over the last decade give homebuilders the opportunity to create homes that are healthier to live, more durable and resilient to harsh weather, more comfortable to live in, little to no operating costs, and the resource efficiency of the homes lowers their environmental impact substantially. Are these benefits something that homebuyers are willing to pay more for? Will a bank appraiser and underwriter be supportive of a value premium for this type of product?

## What is a Paired Sales Analysis?

A paired sales analysis is “an appraisal technique used to find the value of one particular attribute. The appraiser finds two sales where the only difference is the attribute being appraised; the difference in value is considered to be the value of the attribute.” In the paired sales analysis for the for the two new construction projects we have stacked the properties in columns and highlighted the distinctive attributes in red.

| Property Address | 152 Highland St | 154 Highland St | 27 Marcella St Unit 6 | 27 Marcella St Unit 5 |
|---|---|---|---|---|
| | | | | |
| MLS # | 72206125 | 72197066 | 72192892 | 72172206 |
| Status | Sold | Sold | Sold | Sold |
| List Price | $649,000 (without solar) | $695,000 (with solar) | $629,000 | $649,000 |
| List $ psf | $450.38 | $470 | $379.37 | $379.53 |
| Sales Price | $655,000 | $680,000 | $627,500 | $626,000 |
| **Sales $ psf** | **$454.55** | **$459** | **$378.47** | **$366.08** |
| Off Market Date | 1/4/18 | 8/13/17 | 12/17/17 | 10/19/17 |
| Sales Date | 2/16/18 | 11/3/17 | 1/29/18 | 2/1/18 |
| Days On Market | 104 | 18 | 115 | 53 |
| | | | | |
| Style | 4 unit new construction combining superior building science and architectural integrity, rear building designed to reflect other carriage house style units in neighborhood, Front building 2 units duplex, Georgian Colonial | 4 unit new construction combining superior building science and architectural integrity, rear building designed to reflect other carriage house style units in neighborhood, Front building 2 units duplex, Georgian Colonial | 7 NEW CONSTRUCTION high quality Townhomes w/an average 1,650 sf.Homes feature 3 BR’s & 2 ½ BA’s; + crtyrd level garages of 300 SF.Other features include: open, LR/DR/Kit: on 1st fl w/ a ½ BA; 2 BR’s & full BA on 2nd fl & on 3rd fl a spectacular Garret Style Mstr BR Ste, sky-lit w/ en-suite BA..Also in-unit laundry, state-of-the-art BldgTechnology & Security | 7 NEW CONSTRUCTION high quality Townhomes w/an average 1,650 sf.Homes feature 3 BR’s & 2 ½ BA’s; + crtyrd level garages of 300 SF.Other features include: open, LR/DR/Kit: on 1st fl w/ a ½ BA; 2 BR’s & full BA on 2nd fl & on 3rd fl a spectacular Garret Style Mstr BR Ste, sky-lit w/ en-suite BA..Also in-unit laundry, state-of-the-art BldgTechnology & Security |
| Bedrooms | 3 | 3 | 3 | 3 |
| Full Baths | 2 | 2 | 2 | 2 |
| Half Baths | 1 | 1 | 1 | 1 |
| Total Rooms | 6 | 6 | 6 | 6 |
| Square Feet | 1441 | 1480 | 1658 | 1710 |
| Lot | 4489 | 4489 | 8877 | 8877 |
| Year Built | 2017 | 2017 | 2017 | 2017 |
| Fireplaces | 0 | 0 | 0 | 0 |
| Heating | ASHP | ASHP | Forced Air, Heat Pump, Gas | Forced Air, Heat Pump, Gas |
| Cooling | ASHP | ASHP | Central Air | Central Air |
| Garage Spaces | 0 | 0 | 1 | 1 |
| Parking Spaces | 1 off street deeded | 1 off-street deeded | 1 | 1 |
| EV Parking Spaces | EV ready | EV ready | none indicated | none indicated |
| Basement Desc | Basement storage | Basement storage | No | No |
| Int Features | "new construction combining superior craftsmanship with architectural integrity and sustainability (net-zero energy home). Open floor plan, natural light 3br 2.5 bath excellent finishes. What does a high-performance home and the best building science has to offer mean to you? More comfort, significantly lower operating costs, better indoor air quality and a lower environmental footprint" | "new construction combining superior craftsmanship with architectural integrity and sustainability (net-zero energy home). Open floor plan, natural light 3br 2.5 bath excellent finishes. What does a high-performance home and the best building science has to offer mean to you? More comfort, significantly lower operating costs, better indoor air quality and a lower environmental footprint" | "Jeld Wen wood windows /doors, sealed combustion Heat & Hot water systm w/greater than 95% efficient; to Environment Controls incl circulating instant hot water, constant air changes & Smart Home devices" | "Jeld Wen wood windows /doors, sealed combustion Heat & Hot water systm w/greater than 95% efficient; to Environment Controls incl circulating instant hot water, constant air changes & Smart Home devices" |

| | | | | |
|---|---|---|---|---|
| Ext Features | "Here's your chance to buy into historic and trendy Fort Hill. 4 unit new construction combining superior craftsmanship with architectural integrity and sustainability (net-zero energy home)." Ext patio. Deeded parking | "Here's your chance to buy into historic and trendy Fort Hill. 4 unit new construction combining superior craftsmanship with architectural integrity and sustainability (net-zero energy home)." Ext patio. Deeded parking | Outdoor decks | Outdoor decks |
| **Green Certification** | **LEED Platinum, Energy Star** | **LEED Platinum, Energy Star** | **None** | **None** |
| **HERS Index Score** | **-20** | **-20** | **55, Unit 1 is listed on RESNET National registry (code built home)** | **55, Unit 1 is listed on RESNET National registry (code built home)** |
| DOE HES | N/A | N/A | N/A | N/A |
| **Solar PV (size, age and ownership)** | **9.2 kW with OPTION to buy; purchaser decided not to purchase the solar PV which was valued at an addiitonal $39K of value** | **9.2 kW with OPTION to buy; purchaser decided to purchase the solar PV which was valued at an addiitonal $39K of value** | **None** | **None** |
| Walkscore | 68 Walk, 88 Transit (excellent), 77 Bike | 68 Walk, 88 Transit (excellent), 77 Bike | 80 Walk, 79 Excellent Transit, 78 Bike | 80 Walk, 79 Excellent Transit, 78 Bike |
| Sewer & Water | Public | Public | Public | Public |
| Condo fee | $315 | $340 | $271 | $279 |
| Assessed Value | $44,900 (land only) | $44,900 (land only) | $470,366 "Currently taxed as multi and land" | $470,366 "Currently taxed as multi and land" |
| Taxes | $493.90 | $493.90 | $2,548 | $2,548 |
| Tax Year | 2016 | 2016 | 2017 | 2017 |
| Notes | **multiple offers** | | | |

***DISCLAIMER***

***The paired sales analysis has not been modified for square footage differences and solar system adjustments as would happen in a formal residential appraisal.***

## What Were the Conclusions from the Paired Sales Analysis?

Two new construction projects in the same geographic location offers an excellent opportunity to evaluate whether there is a price premium for high-performance homes, and, if so, what the premium looks like in a conditioned setting. The projects were similar in size and geographic location and were delivered to the market at the same time. We can infer then, that the high-performance features of the Highland St. development represented a clear value difference.

The Marcella St. units offered the advantage of garage parking for one car each while the Highland St. development offered only off-street driveway parking for one care per unit. It is worth noting that one of the four buyers of the Highland project choose the option of installing an electric vehicle parking spot. Garage parking, however, is considered a significant feature given Boston's snowy winters.

The focus on high performance was the primary differentiator between the two projects. As noted in the paired sales analysis, the E+ Solutions homes have a LEED Platinum certification, the highest level of green home certification offered by the U.S. Green Building Council (USGBC). The HERS Index Scores, an energy rating that predicts a home's energy performance, was another key differentiator between the two projects. The Marcella St units had a HERS score of 55, which is the minimum HERS score needed for compliance to the Massachusetts Stretch Code. The E+ Solutions homes, however, offered an off-the-charts HERS Index Score of -20 for both units – these homes are built with the highest levels of applied building science. Buyers of the E+ Solutions homes also had the option to buy a proportional interest in the solar photovoltaic (PV) system that was installed on the rooftops of the two Highland St. buildings.

As seen in the paired sales analysis, there was a significant price premium for the Highland St. E+ Solutions homes. The average of the two sales prices for **the E+ Solutions homes had a 22.7% price per square foot premium** over the average of the Marcella St. condominiums. It is critical, however, that the extraordinary value of these types of homes be conveyed appropriately to buyers, their agents *and* to lenders. This requires a marketing and valuation strategy by an agent that is knowledgeable and competent about high-performance homes and a qualified appraiser armed with complete and accurate information about the project.

One recent high-performance home valuation study, ***What is Green Worth? Unveiling High-Performance Home Premiums in Washington, D.C.,*** identified current barriers in the real estate transaction process that may be preventing home sellers from receiving the full market value of their high-performance homes. One of the barriers cited was "the market is in need of real estate professionals with knowledge of green building principles and practices in order to better market high-performance homes."

**For more information about the E+ Homes at Highland Street go to** https://eplushomes.com/

## ABOUT THE AUTHOR:

Craig Foley is the founder of Sustainable Real Estate Consulting Services, a LEED Green Associate and chief of energy solutions for RE/MAX Leading Edge. Craig's combination of real estate and energy management skills give him a unique perspective about sustainable energy solutions and subject matter expertise on greening the MLS and high-performance home valuation and marketing. As a real estate broker, he has sold several high-performance projects in and around Greater Boston with RE/MAX Leading Edge.

As a real estate consultant, he has partnered with a broad range of companies including Lawrence Berkeley National Laboratories, Northeast Energy Efficiency Partnerships, Elevate Energy, and the Massachusetts Clean Energy Center. Craig was one of five people in the U.S. to receive the EverGreen Award by the National Association of Realtors (NAR) in 2013. He also serves as an advisory board member for the NAR Green Resource Council and is a certified instructor of the NAR Green Designation. His committee work at NAR includes the newly formed Sustainability Advisory Group.